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NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 01 03

Subj: GUIDE TO SUBCHAPTER W SAFETY ASSESSMENTS UNDER 46 CFR 199.630(f)

1. PURPOSE. This Circular provides guidance on the Subchapter W safety assessment alternative for survival craft as permitted by 46 CFR 199.630(f) for passenger vessels of at least 100 tons gross tonnage (Subchapter H) in Great Lakes; lakes, bays, sounds; and rivers service. The alternative safety assessment is not available to Subchapter H vessels in international, oceans, or coastwise service. In addition, this alternative is only available to those Subchapter H vessels in Great Lakes or lakes, bays, and sounds service that are ferries or have no overnight passenger accommodations. This circular describes the type of information and extent of analysis expected in the alternative safety assessment, as well as guidance on the evaluation and approval of the safety assessments.

2. ACTION.

   a. Officers in Charge, Marine Inspection (OCMIs) and the Commanding Officer, Marine Safety Center are encouraged to bring this Circular to the attention of the passenger vessel industry and other marine interests within their areas of responsibility. It is available on the World Wide Web at **http://www.uscg.mil/hq/g-m/nvic/index.htm**. Internet release authorized.

   b. The cognizant OCMI should verify and concur with the safety assessment if submitted as an alternative to the requirements of 46 CFR 199.201(b).

   c. Owners and operators of passenger vessels are encouraged to review the guidance contained in this Circular before conducting and submitting a safety assessment as an alternative to the survival craft requirements in 46 CFR 199.201(b).

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3. DIRECTIVES AFFECTED. None.

4. BACKGROUND. One of the changes to the primary lifesaving requirements for vessels as a result of 46 CFR Subchapter W is the requirement for non-SOLAS passenger vessels over 100 gross tons on routes other than oceans or coastwise to carry survival craft. As shown in 46 CFR 199.10(h), this is required at the time of construction for vessels constructed after October 1, 1996. Vessels constructed prior to October 1, 1996 are required to have survival craft by October 1, 2003. The detailed survival craft requirements are contained in 46 CFR Table 199.630(a). However, as permitted by 46 CFR 199.630(f), an alternative to the prescriptive survival craft requirements in 46 CFR 199.630(a) is provided on the basis that a safety assessment is completed and found acceptable to the OCMI. The safety assessment consists of an analysis of the hazards facing the vessel and the completion of a Shipboard Safety Management and Contingency Plan (SSMCP). Together, these must show that an alternative method for evacuation will provide a level of safety equivalent to that provided by the survival craft. The safety assessment permitted by 46 CFR 199.630(f) is but one of several alternatives allowed by 46 CFR 199.630.

5. DISCUSSION.

   a. The safety assessment described in 46 CFR 199.630(f) is a performance-risk-based approach to a vessel evacuation as an alternative to the prescriptive survival craft requirements. The safety assessment consists of two separate but related items. The first item, which is described in 46 CFR 199.630(f)(1), is an assessment of the hazards that could be encountered on the vessel due to normal operations, other vessel traffic, the port configuration, climate and environmental factors. The second item, which is described in 46 CFR 199.630(f)(2), is a Shipboard Safety Management and Contingency Plan (SSMCP). The SSMCP includes guidance for response to catastrophic vessel damage, mobilizing emergency teams, protection of passengers from fire and smoke, evacuation, and emergency communications. The results of the hazard assessment should be used to develop the SSMCP. The safety assessment is accepted by the OCMI as an alternative to the requirement for the vessel to be equipped with survival craft when the OCMI is satisfied that the hazard analysis and the SSMCP provide a level of safety equivalent to that provided by the prescribed number of survival craft. It must be kept in mind that the reduction or elimination of survival craft carriage requirements does not alleviate the need to have an effective means for an evacuation of the passengers and crew.

   b. The overall process for completing the safety assessment and for the OCMI to accept it as an alternative to the survival craft requirement is described in enclosure (1). Note that vessel owners/operators and OCMIs need to refer to the earlier guidance on completing the SSMCP contained in NVIC 1-97, "Shipboard Safety Management and Contingency Plan for Passenger Vessels."

   c. It is recommended that the safety assessment, especially the hazard analysis, be completed as a team effort involving representatives of the vessel owner/operator, the OCMI, and other local port entities or emergency agencies as deemed necessary. The Coast Guard Quality Assurance staff, Commandant (G-MO-1), can be requested to

facilitate or assist in this process. The hazard analysis is best completed using a scenario-based analysis. Enclosure (2), a generic scenario based hazard assessment matrix, is provided to facilitate conducting the necessary hazard analysis. It represents a process that systematically answers the following questions for identified accident scenarios: 1) What aspects could lead to an accident?; 2) If the accident scenario occurs, what mitigating factors are available?; and 3) Considering the accident scenario with available mitigating factors, what is the likelihood that it will lead to an evacuation? Enclosure (3) gives examples of mitigating factors to also help in completing the hazard analysis.

d. When a vessel owner/operator, that has obtained approval of a safety assessment in lieu of the survival craft, requests limited operation outside the vessel's certificated route; it should be treated as a temporary excursion operation using Form CG-949. Thus, it is not necessary for the owner/operator to complete a new safety assessment. However, the conditions assumed in the original safety assessment should be reviewed for the temporary excursion to ensure that the assumptions in the vessel's original safety assessment will remain valid.

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Rear Admiral, U. S. Coast Guard
Assistant Commandant for Marine Safety, Security and Environmental Protection

Encl: (1) Subchapter W Safety Assessment
(2) Generic Hazard Assessment Matrix
(3) Examples of Possible Mitigating Factors

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Subchapter W Safety Assessment

1.0 INTRODUCTION

Section 199.10 of Subchapter W gives the applicability of lifesaving requirements for the various vessel types. Table 199.10(a) indicates that passenger vessels inspected under Subchapter H and operating in a non-international service must comply with the applicable provision in Subparts A, B, C, E, and F. Subpart C, specifically 199.201(b), requires passenger vessels to carry survival craft. Subpart F, in table 199.630(a), lists the possible alternatives to the survival craft carriage requirement. One of which is the option in 199.630(f) to conduct a safety assessment. The following flow chart (Figure 1) illustrates the applicability of 46 CFR 199.630(f):

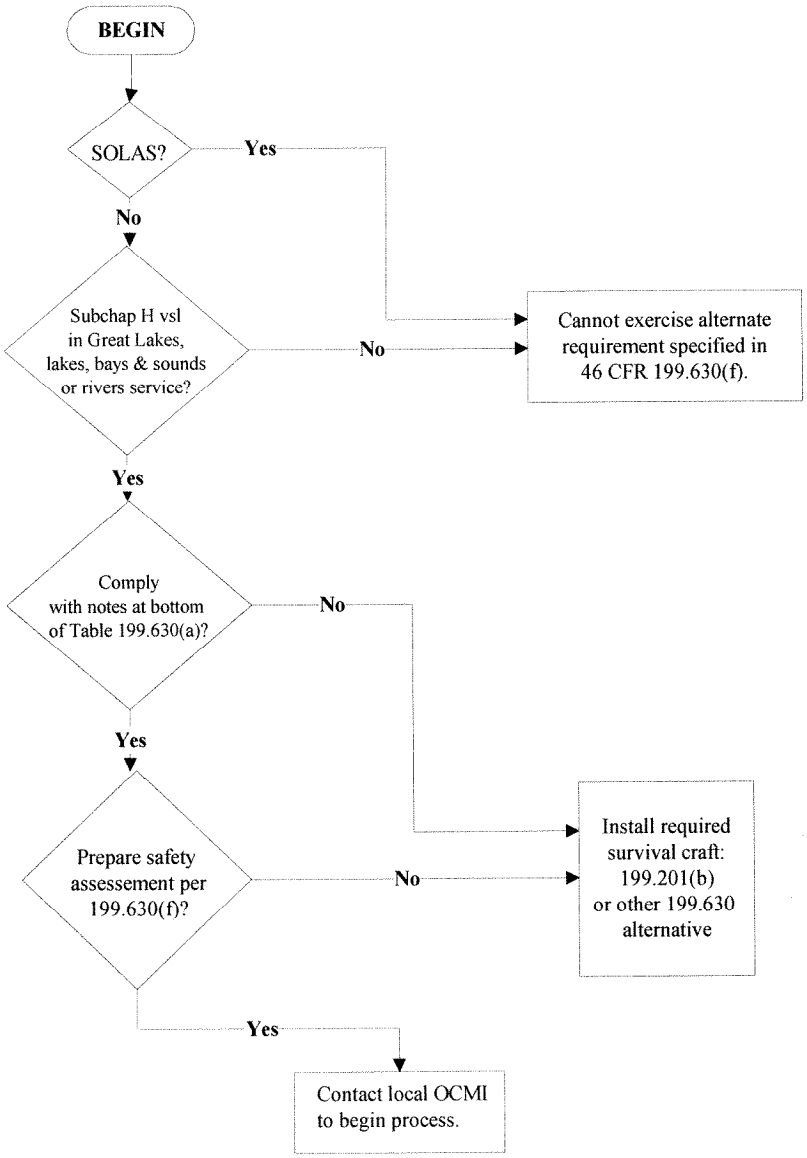

Figure 1: Subchapter W Applicability Flow Chart For 46 CFR 199.630(f)

1.1 Purpose of Safety Assessment Alternative

The Subchapter W safety assessment alternative offers each owner/operator the opportunity to develop an equivalent means of complying with survival craft equipment regulations. The Subchapter W safety assessment alternative provides owner/operators the opportunity to demonstrate that they can adequately manage the specific hazards their vessels may encounter, provided that the safety assessment is effective in demonstrating an equivalent level of safety as the survival craft requirements. This approach gives the vessel owners/operators a choice of compliance options.

Note: Examples are presented throughout this document to illustrate the assessment process. They are hypothetical and have not been taken from actual safety assessments. Therefore, they should not be used as a basis for approval.

1.2 Subchapter W Safety Assessment Requirements

The 199.630(f) safety assessment alternative requires completion of the following:

(1) A hazard assessment that evaluates the navigation and vessel safety conditions within the vessel's operating area (see 199.630(f)(1)); and

(2) A Shipboard Safety Management and Contingency Plan (SSMCP) that provides pre-planning and guidance to the crew on properly responding to emergencies (see 199.630(f)(2)).

The hazard assessment identifies the potential hazards associated with operating the vessel, and evaluates the safety features and operating controls available to ensure the safety of the passengers and crew. The results of the hazard assessment are important as they determine the options available to the owner/operator. In general, the lower the risk from the hazard assessment, then the easier it will be for the owner/operator to gain acceptance for the alternative means of evacuation other than using the prescribed number of survival craft. In contrast, a vessel with a higher risk may not be allowed to use this alternative unless additional mitigating factors are put in place to lower the risk.

The SSMCP is prepared after the hazard assessment and needs to be based on the hazard assessment to ensure that pre-planned responses to the hazards are identified. The SSMCP contains the information needed to assist the crew during emergencies, including pre-determined evacuation and communication procedures, and information on the coordination of external agencies that may be needed for assistance. Detailed guidance on preparing an SSMCP can be found in NVIC 1-97.

Although the regulations address only individual vessels, a common safety assessment jointly developed by different vessel operators or by a fleet operation in the same geographic area may be considered.

2.0 SAFETY ASSESSMENT PROCESS

The safety assessment process is comprised of four clearly defined stages as shown in Figure (2). Each of the four stages is explained in further detail.

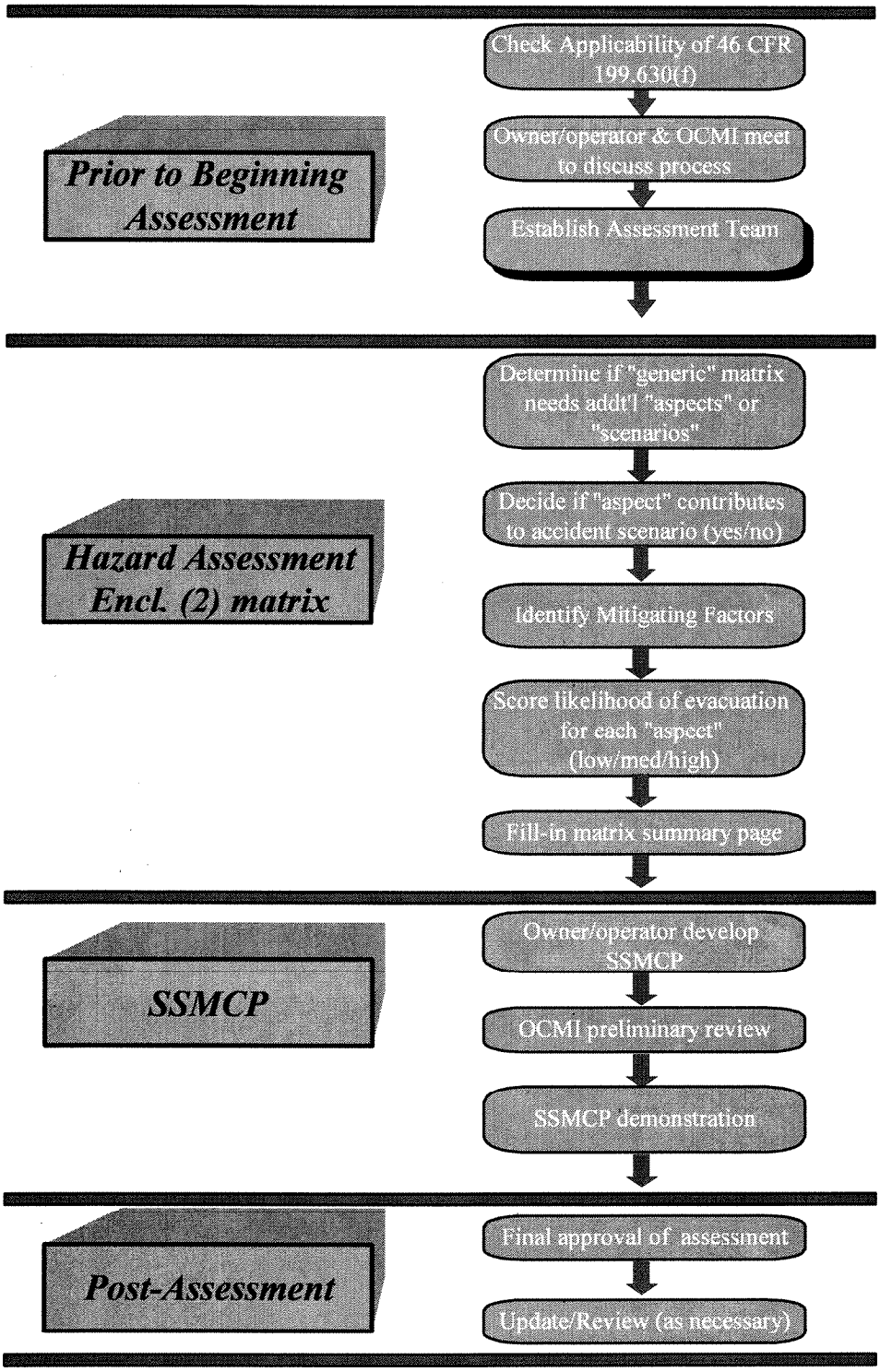

Figure 2: Subchapter W Safety Assessment Process

3.0 Prior to Beginning Safety Assessment

Once the vessel owner/operator determines that the 199.630(f) alternative is available and decides to pursue it, the OCMI must be notified of the intent to undertake the process so that the appropriate Coast Guard personnel and resources can be allocated. It is beneficial for the vessel operator to meet with the local OCMI to discuss the safety assessment process. Since the alternative might require time and monetary investment, the OCMI should ensure that the vessel owner/operator has a general understanding of the process prior to beginning the safety assessment.

If a vessel normally operates in more than one area of responsibility, the affected OCMIs will normally designate a primary Coast Guard representative unless a representative from each OCMI zone will participate as a member of the team. Further review and input by other Coast Guard offices may sometimes be necessary depending on variations in the port and waterway conditions within the different zones of operation.

A group or consortium of vessels, whether operated by the same company or different companies, may develop one safety assessment. This may be particularly useful in cases where vessels are co-located in one metropolitan area and their operations are sufficiently similar to be addressed by a single assessment. It is anticipated that this would be available when a number of vessels make up a ferry system or operating fleet. Although the majority of the safety assessment would contain the same information (environmental factors, operational area, traffic, etc.), some information, such as vessel characteristics, would be vessel unique. Therefore the safety assessment for the consortium should contain a section that addresses concerns that are specific to each vessel. Operators interested in pursuing a safety assessment consortium should discuss this option with their OCMI representative before beginning the safety assessment process.

The vessel owner/operator should recognize that this is a process where the burden is on them to show that the alternative demonstrates an equivalent level of safety to evacuation using survival craft. It is anticipated that the industry will lead much of the discussion on alternatives to consider. It may be beneficial to hold some, if not all, team meetings onboard the vessel to allow the team members to be in the environment where mitigating factors can be seen first hand. "Consensus" is a key element of the team's ability to complete the hazard assessment and assign risk scores. The manner in which the team interacts and conducts itself will influence the team's ability to reach "consensus".

4.0 Hazard Assessment Process

The purpose of the hazard assessment is to identify and evaluate the different vessel aspects and the resulting risk of an evacuation due to the vessel's normal operation, the port, and the environment. The hazard assessment should be completed with a team that will normally consist of representatives from the vessel owner/operator, the cognizant OCMI, port entities, and possibly the local emergency response agencies. The team should be identified in writing to facilitate the process. It should be recognized that the actual people contributing information may be dynamic as certain accident scenarios or mitigating factors are explored. Certain people

with a particular knowledge may be called upon to provide information to the team but they do not necessarily need to be designated as a team member.

It is recommended that the hazard analysis be accomplished using a scenario based approach that systematically answers the following questions for identified accident scenarios: 1) What aspects could lead to an accident?; 2) If the accident scenario occurs, what mitigating factors are available?; and 3) Considering the accident scenario with available mitigating factors, what is the likelihood that it will lead to an evacuation?

The depth of the hazard analysis correlates directly to the complexity of a vessel's operation. As an aid for completing the hazard analysis, a generic hazard assessment matrix designed for the expected type of hazards encountered in most situations is provided for in enclosure (2). The generic hazard assessment matrix is a relatively short, concise working document that recognizes five significant accident scenarios that may lead to evacuating the vessel: fire, collision or allision, grounding (powered or drift), security threat (terrorism), and loss of power or propulsion. The matrix focuses on the likelihood of an evacuation based on commonly identified accident scenarios.

The matrix is intended to be used as a working document to generate discussion about each potential accident scenario and the related mitigating factors. The joint discussion of potential hazards will offer an increased level of mutual understanding that allows the participants to look beyond the simple addition of required lifesaving equipment and consider a more holistic or systematic approach to accident prevention, mitigation, and management.

The matrix is not intended to evaluate multiple or concurrent accident scenarios, such as two fires starting at the same time or an accident that also causes the loss of the related mitigating factors. One example that illustrates both of these points is a collision that disables a machinery space fire suppression system and also causes a machinery space fire. This scenario should not be considered because it involves concurrent accident scenarios and loss of a mitigating factor (fire suppression system). It is appropriate to consider a machinery space fire but not in conjunction with a collision. While the Coast Guard is aware that these complex scenarios are possible, they are considered beyond the scope of the safety assessment intended by Subchapter W.

4.1 Modification of Generic Matrix

As noted, the depth of hazard analysis depends on the specific vessel and its operation. The hazard analysis for a vessel on a dedicated, limited route with very little port traffic should be less involved than that for a vessel with a larger operating area within an area of heavy vessel traffic. Therefore, given that the contents of enclosure (2) are generic, modifications may need to be made. The assessment team should decide if additional aspects need to be added to the generic matrix to fully cover the range of hazards that are specific to the vessel in question. However, when making modifications it is important to understand that the underlying process must remain intact.

4.2 Contribution of "Aspects" to Accident Scenario

The five accident scenarios are listed in the left-hand side column of the matrix, which, when taken with the No/Yes columns are designed to answer the following general question: *Could the identified aspect contribute to the occurrence of the accident scenario?* Below each accident scenario is a group of questions that when answered "yes", are aspects that may contribute to the occurrence of the accident scenario. These questions are considered to be the minimum that should be evaluated for each accident scenario. While some of them may not seem significant, the assessment team should consider if there is a realistic chain of events that could ultimately require evacuation of the vessel.

The matrix questions are categorized into three general areas – port and waterway aspects, operational aspects, and vessel aspects – that may cause an accident that could lead to evacuation. Port and waterway aspects are considered external aspects that are present in the vessel's operating area, such as typical vessel traffic patterns, volume of traffic flow or local waterway conditions. The operational aspects are considerations that stem from the business or entertainment conducted onboard the vessel, such as galley cooking hazards or low lighting conditions during performances. The vessel aspects are those that are internal to the vessel such as the materials of construction used in the public spaces and the types of machinery present in the machinery spaces.

In general, when using the matrix, if the aspect is not present or could not contribute to the accident scenario, check the "No" box. If the aspect could possibly contribute to the listed accident scenario in any way, check the "Yes" box.

4.3 Mitigating Factors

During the hazard assessment, the assessment team also identifies any mitigating factors that could help prevent or eliminate the accident scenario and subsequently not result in an evacuation. It may stop the accident from occurring or it may make it less severe (e.g. a vessel that has automatic sprinkler system even though it may not be required by regulations). The question that should be answered for the middle column of the matrix is as follows: *What factors, if any, are available to mitigate or eliminate the hazards associated with the aspect?*

Numerous types or levels of mitigating factors may be identified for each aspect. Mitigating factors usually encompass three general areas: installed equipment, emergency procedures (for passengers and/or crew), and training (for passengers and/or crew). A mitigating factor may already be present, or if necessary the operator can modify the vessel or an operational aspect to address an identified adverse condition. Vessel operators are encouraged to be innovative and mitigate the identified hazards in the most effective way, however there must be a consensus among the team members that the mitigating factors identified are valid and offer sufficient results. Examples of some mitigating factors are included in Enclosure (3). The mitigating factors need to be identified and briefly explained on the matrix sheet.

As an example, consider a case where the assessment team has visited the vessel and agrees that exposed hot surfaces and flexible/non-metallic oil/fuel hoses in the machinery space both contribute to the occurrence of fire incidents. The team identifies existing mitigating factors

such as: fixed fire suppression system, remote engine/fuel shutdowns, and gear for manual firefighting operations. While the vessel meets the minimum requirements for crew training and firefighting equipment, the assessment team agrees that it would be quite difficult for a firefighting party to enter a machinery space and combat some oil/fuel fire scenarios due to a number of factors. The owner/operator would like to do more to mitigate the fire scenario and proposes to install lagging on hot exhaust surfaces and to install spray shields on or around flexible hoses. After review, the team agrees that that addition of lagging and shields will further mitigate this fire aspect/scenario.

4.4 Likelihood of Evacuation (Low/Med/High)

After the applicable accident scenario aspects and their related mitigating factors are agreed on, the next step is to assign the relative likelihood of evacuation for each aspect by checking the low, medium, or high box in the last column. The question that should be answered for the last column is as follows: *Considering the accident scenario and available mitigating factors, what is the likelihood that it will lead to an evacuation?* The degree to which the aspect contributes to the accident scenario resulting in an evacuation is based on the team's judgment and consideration of the mitigating factors.

To illustrate this process, consider the following examples. The first involves the assessment of a dinner cruise operation that operates on the Western Rivers. The team identifies a scenario where due to heavy traffic conditions during the brief grain harvest season, the likelihood of a collision with a large towing vessel and barges is increased. A collision with a large towing vessel will have a much greater impact on a vessel evacuation than say, a small fire caused because smoking is permitted in a dining area. The collision could significantly damage the vessel, causing flooding and immediate sinking. Since the passenger vessel operator cannot control the traffic volume, there may not be any mitigating factors for this aspect and the "high" or "medium" box on the matrix should be checked since it is likely that the collision would result in an evacuation. In the second case of smoking being permitted, a dropped cigarette could ignite other materials, but the vessel is equipped with smoke detection and an automatic water sprinkler system that could quickly detect and extinguish the fire if it functions properly. Because these mitigating factors are adequate to prevent the fire from threatening the vessel, this aspect would consequently have a "low" likelihood of resulting in an evacuation.

4.5 Matrix Summary Page - Scoring

When all of the questions have been answered for the various aspects of the accident scenarios, an overall score (e.g. low, medium, or high) for the likelihood of evacuation attributable to that scenario is determined by the team and entered at the bottom of the right-hand column of the matrix. The assessment team should base decisions on their judgment and knowledge of the vessel operating conditions. There is no set formula for this decision, however, the assessment team should agree on the results. To complete the hazard assessment matrix, the overall scores for each of the accident scenarios are recorded on the summary page at the end of the matrix.

> Low: The assessment team agrees that the vessel should be assigned a score of "low" for all scenarios.

Medium: When one or more accident scenario is "medium" and the remaining scores are "low".

High: Vessels with one or more accident scenario scored as "high".

At this point in the process, it is important for both the owner/operator and the OCMI to consider the risk summary score and what it means. The hazard assessment is a key element in the process. The OCMI will need to consider the results of the hazard assessment together with the proposed means for evacuation to be satisfied that the alternative means for evacuation adequately addresses the results of the hazard assessment and provides a level of safety equivalent to that provided by the survival craft. It is recognized that the alternate means of evacuation will not be fully developed until the SSMCP is written and is subject to revision depending on the demonstration conducted later in this process. Therefore, it is recommended that the owner/operator communicate their conceptual plan for the means of alternate evacuation to the OCMI at this time. There is value in the owner/operator and OCMI reaching agreement that the alternative method of evacuation, which will be fully developed and detailed in the SSMCP, is supported by the results of the hazard assessment.

It is generally accepted that the risk summary score from the hazard assessment should be "low" in order for an alternate evacuation to be considered. However, this is a judgment decision for the OCMI and ultimately the OCMI must be satisfied with both the hazard assessment and the SSMCP before accepting an alternative to the survival craft. Therefore, it is expected there will be instances when the OCMI will accept that the proposed alternative evacuation sufficiently addresses the results of the hazard analysis and concur with continuing the process and the development of the SSMCP when the risk summary score is other than "low." There may also be instances when the risk score is "low" and the OCMI believes that additional risk mitigation is needed because of concerns that the proposed alternative method of evacuation will not provide a level of safety equivalent to that provided by the survival craft.

When the OCMI does not accept that the proposed alternative evacuation will provide the equivalent level of safety to that provided by the survival craft, the owner/operator must then decide how to proceed. The owner/operator may decide to stop this process and not continue with the completion of the SSMCP; however, owners/operators are always encouraged to do this as a non-mandatory means to increase safety. Another option would be to pursue other alternatives as permitted by 199.630. If the owner/operator decides to continue pursuing the 199.630(f) option, additional risk mitigating factors or a different means of evacuation will need to be proposed. Any new mitigating factors that are proposed will need to be presented to the team so that they can return to the hazard assessment matrix in order to reevaluate the level of risk.

Consider the previously discussed example regarding the possible collision with a barge during the grain harvest season. When the assessment team completed the matrix for the collision/allision accident scenario, the aspect of collision with a grain barge was scored "high" because no mitigating factors were identified. Because of this, and the owner/operator's proposed alternative method of evacuation, the OCMI determined that the level of safety was not

equivalent to that provided by the survival craft. However, the owner/operator may then decide to not operate the vessel during the short harvest season, which when reconsidered as a mitigating factor in the hazard matrix, may sufficiently reduce the overall risk summary score such that the OCMI determines an equivalent level of safety is provided.

5.0 Shipboard Safety Management Contingency Plan (SSMCP)

After the hazard assessment is completed, the operator develops an SSMCP that addresses the accident scenarios listed in the hazard assessment matrix. The SSMCP should provide detailed discussion of all mitigating factors and any other concerns noted in the hazard assessment. The SSMCP should be periodically reviewed and updated to assure that it remains current.

5.1 SSMCP Development

NVIC 1-97 contains guidance on preparing a SSMCP and should be referred to in this step. The SSMCP should be focused on the accident scenarios described in the hazard assessment matrix, since it is the basis for determining the survival craft requirements needed for an evacuation. It is important that the SSMCP fully describes the mitigating factors available for each scenario and provides clear direction for those instances where an evacuation is anticipated.

It is possible that the SSMCP will contain multiple crew responses for a common scenario on a vessel. For example, the actions taken during the winter may differ from the summer. It may be different from daytime to nighttime because of the change in passenger demographics. Responses for one geographic area may not be applicable for certain other areas.

The SSMCP should contain detailed instructions for the crew's response to the hazards identified through the hazard analysis. In-depth training and onboard drill requirements to maintain the crew's proficiency should be incorporated into the plan. It is vital that the crew understands that an alternative approach to the lifesaving equipment requirements has been permitted. As a result, they have specific duties for the safe handling of passengers in the event of the accidents associated with the vessel's operating area.

Effective communication between the vessel and local emergency response organizations is a critical element in the SSMCP. Radio frequencies useable by all parties and emergency contact telephone numbers should be included in the plan.

5.2 State Emergency Disaster Response Plans

Some state agencies, such as the Indiana Gaming Commission, require disaster and emergency response plans for casino vessels. These response plans, when properly implemented and exercised, are effective in coordinating local emergency agencies and in establishing proven evacuation methods. Many of the state requirements for emergency response plans parallel those for a SSMCP. OCMIs may accept state emergency response plans for this purpose as long as the plans are found to satisfy the safety assessment requirements in 46 CFR 199.630(f)(2). When this approach is taken, the hazard assessment matrix in Enclosure (2) should still be completed to ensure that all relevant lifesaving and evacuation aspects of the vessel have been addressed. The

format of the plan required by the state agency need not be revised to align with the format in NVIC 1-97.

5.3 SSMCP Review

When the SSMCP is completed, a review by the OCMI is needed to ensure that the required material is covered in adequate detail and appears functional. Therefore, the goal of this step is to ensure that effective crew response and evacuation procedures have been developed to provide a level of safety equivalent to the base requirement of providing the required survival craft. The OCMI should review the SSMCP to the level of detail necessary to conclude that the proposed alternative procedures are adequate for the vessel's operation.

5.4 SSMCP Demonstration

After the details of the SSMCP have been reviewed by the OCMI, a practical demonstration should be conducted and demonstrated to the satisfaction of the OCMI that the SSMCP can be carried out and it is effective. The demonstration should verify that the physical implementation of the plan is realistic and that unforeseen issues will not prevent its successful execution. The demonstration could include evacuation using the alternative lifesaving arrangements and other emergency procedures contained in the SSMCP. The complexity of the demonstration scenario should be determined by the OCMI considering the nature and extent of the alternate arrangements. The goal of the demonstration is to ensure that the vessel and crew are able to successfully perform the tasks and manage the accident scenarios identified in the SSMCP. Ordinarily, the demonstration should focus on the most likely and most demanding accident scenarios.

The extent of the demonstration of the alternative evacuation could range from a simple walk-through exercise to a partial or full-scale evacuation. It may be unrealistic to expect an evacuation demonstration of the total compliment of passengers, however it may be justified in some circumstances. Computer generated evacuation simulations may be considered as a part of the demonstration if, they are supplemented with a selected evacuation demonstration using the vessel's actual escape paths and equipment. The number of simulated passengers to use for the demonstration should be established by the OCMI. The target population for the evacuation demonstration on most ships should be approximately the number of passengers that would normally be located in the largest main vertical zone. Before the demonstration is conducted, the OCMI and the operator should agree on the criteria that will be required to show that the plan can be successfully implemented. If these criteria are met, the alternative lifesaving arrangements should be approved.

In general, the demonstration is a one-time exercise intended to validate the SSMCP and should only need to be repeated if the SSMCP or the conditions of operation change. The participation of port entities or local emergency response organizations is not essential, unless it is determined that they will play an active role in the vessel evacuation that they wouldn't have if the prescribed survival craft were carried (e.g. actually using police or fire boats to remove passengers and crew for the untenable vessel).

No time limits have been established for the successful completion of the demonstration. The OCMI should consider the length of time the alternative arrangements require to evacuate the vessel in contrast to the amount of time judged necessary to evacuate if the vessel carried the required survival craft. The 30-minute time limit in Subchapter W for the launching of survival craft applies to the hardware used to release the specified equipment, and begins when the abandon ship order is given. Even though the 30-minute time limit does not consider the time necessary to notify the passengers and move them to the assembly areas, it could be used as an acceptable criterion, since the possibility for an immediate evacuation order may exist.

The OCMI may ask for a demonstration of communication with other vessels, responders, or other resources identified in the SSMCP. Mitigating factors that are largely dependent on human actions or decision may also prove to be an area chosen by the OCMI for inclusion in the demonstration. Focusing on areas of higher risk or concern will allow the OCMI to substantially verify the SSMCP without having to demonstrate every aspect.

6.0 Post Safety Assessment

6.1 Final Approval

Final approval of the safety assessment is granted only after the OCMI is satisfied that the level of safety shown by the safety assessment and the SSMCP demonstration is equivalent to or exceeds the level of safety provided by the survival craft prescribed in 46 CFR 199.630(a). A letter from the OCMI to the operator will note that the alternative is accepted. The OCMI should place a copy of the approval letter in the vessel's MISLE file, and also insert a note to alert future inspections of the equivalency determination.

6.2 Updates/Review

The SSCMP and hazard assessment should be updated as often as necessary to reflect changes in the vessel's configuration and outfitting, service, or operating environment. It is recommended that the owner/operator and marine inspector review the SSMCP at the same interval as the COI to ensure that it remains valid. Some changes to the port and waterway may occur that are outside the vessel operator's control or knowledge. If changes that may affect the implementation of the plan have occurred, the OCMI may require some or all of the procedures to be re-demonstrated. Since much of the safety assessment may rely on conditions within the port, such as traffic volume or river levels, it is essential that both the operator and the OCMI be aware of changes and their impact on the safety assessment and SSMCP.

GENERIC HAZARD ASSESSMENT MATRIX

This matrix contains the level of detail expected for a Subchapter W Safety Assessment for most vessels, however, the actual hazard assessment should be tailored to the specific conditions being evaluated and may require evaluation of aspects not listed on the generic form.

Company: **Vessel:**
OCMI Zone: **Date:**

All questions should be answered as if the possible accident scenarios may lead to vessel evacuation.

Accident Scenarios: Which aspects contribute to the occurrence of each listed incident below?	No	Yes	If yes, identify mitigating factors that address the risk of the accident scenario.	Likelihood of evacuation		
				Low	Med	High
1. FIRE						
a. Port Aspects that contribute to a fire						
1. Does the port have hazardous cargo vessel traffic?						
2. Are there other port aspects?						
b. Operational Aspects that contribute to a fire						
1. Are open flames used for services (sterno for catering) or entertainment (pyrotechnics)?						
2. Are additional flammables used (alcohol, candles)?						
3. Is smoking permitted?						
4. Does hotwork/welding take place with passengers onboard or within 6 hours of carrying passengers?						
5. Are portable heaters used in any space?						
6. Are any small appliances (possibly unauthorized) used that could cause a fire?						
7. If the vsl carries cargo, could a fire start that involves that cargo?						
8. Does vsl carry materials that could chemically react and result in a fire?						
9. Are there any other sources of ignition that are inherent to the vessel's operation?						
c. Vessel Aspects that contribute to a fire						
1. Does the vessel lack compliance with current structural fire protection regulations (pre-1972 vessel)?						
2. Are there type 6 and/or 7 spaces (table 72.05-10) with combustible furnishings, veneers or trim (capable of excess smoke production)?						
3. Is the vessel constructed from any flammable materials?						
4. Does the vessel use unique machinery (e.g. hand-oiled, coal fired, gasoline, hydraulic systems, turbines, large boilers)?						
5. Does the vessel use flexible fuel or lube oil lines near hot surfaces?						
6. Are flammables other than fuel in fixed tanks (e.g. sterno, compressed gasses, paint) stored on the vessel?						

7. Are any fuel or oil lines subjected to vibration that could cause fatigue and fracture/failure over time?						
8. Are there hot surfaces in the machinery space capable of igniting combustibles solids or liquids that might come in contact with the hot surface?						
9. Does a potential exist for a fire caused by the electrical system?						
10. Could activities in Galley or involving cooking result in a fire?						
11. Is there a potential for a fire caused by hot exhaust gases or related to the exhaust stack?						
12. Minimally or periodically unattended machinery plants? (Automation)						
13. Are there other vessel aspects?						
			Overall score for **fire**?			

All questions should be answered as if the possible accident scenarios may lead to vessel evacuation.

Accident Scenarios: Which aspects contribute to the occurrence of each listed incident below?	No	Yes	If yes, identify mitigating factors that address the risk of the accident scenario.	Likelihood of evacuation: Low	Med	High
2. COLLISION/ALLISION						
a. Port Aspects that contribute to a collision/allision						
1. Is the vessel exposed to high commercial traffic areas within the port?						
2. Does the port lack traffic schemes or separation zones?						
3. Does the port have narrow channels or obstructions?						
4. Are the aids to navigation unreliable?						
5. Do recreational vessels hinder the vessel or cause the vessel to alter course?						
6. Does the port have high speed vessel traffic?						
7. Are there port specific weather conditions, natural occurrences or sea states to consider?						
8. Does the port hold frequent marine events or activities that attract large numbers of vessels?						
9. Are there stationary obstructions (e.g. bridges, jetties) to consider?						
10. Are there any other port aspects?						
b. Operational Aspects that contribute to a collision/allision						
1. Does the vessel encounter crossing situations on its route?						
2. Does the vessel's schedule cause fatigue situations for the crew?						
3. Does the vessel operate at night?						
4. Does the vessel's route require numerous course changes?						
5. Does the vessel routinely operate in restricted visibility?						
6. Is a collision/allision likely to cause flooding?						
7. Are there other operational aspects?						
c. Vessel Aspects that contribute to a collision/allision						
1. Does the vessel lack back-up systems for emergency steering or power?						
2. Are propulsion systems engine room control only?						
3. Does propulsion type (e.g. paddle wheelers) limit maneuverability?						
4. Minimally or periodically unattended machinery plants? (Automation)						
5. Are there other vessel aspects?						
			Overall score for **collision/allision**?			

All questions should be answered as if the possible accident scenarios may lead to vessel evacuation.

Accident Scenarios: Which aspects contribute to the occurrence of each listed incident below?	No	Yes	If yes, identify mitigating factors that address the risk of the accident scenario.	Likelihood of evacuation		
				Low	Med	High
3. GROUNDING (POWERED OR DRIFT)						
a. Port Aspects that contribute to a grounding						
1. Is the operating area characterized by shallow water?						
2. Is the topography of the waterway seabed/bottom likely to cause flooding in case of grounding?						
3. Are the aids to navigation unreliable?						
4. Do tides, currents, and bottom topography raise stability concerns in case of grounding?						
5. Are there port specific weather conditions, natural occurrences or sea states to consider?						
6. Are there other port aspects?						
b. Operational Aspects that contribute to a grounding						
1. Does the vessel's schedule cause fatigue situations for the crew?						
2. Does the vessel operate at night?						
3. Does the vessel's route require numerous course changes?						
4. Does the vessel routinely operate in restricted visibility?						
5. Are there other operational aspects?						
c. Vessel Aspects that contribute to a grounding						
1. Does the vessel lack back-up systems for emergency steering or power?						
2. Are propulsion systems engine room control only?						
3. Is the vessel constrained by draft?						
4. Does propulsion type (e.g. paddlewheelers) limit maneuverability)?						
5. Minimally or periodically unattended machinery plants? (Automation)						
6. Are there other vessel aspects?						
			Overall score for **grounding**?			

All questions should be answered as if the possible accident scenarios may lead to vessel evacuation.

Accident Scenarios: Which aspects contribute to the occurrence of each listed incident below?	No	Yes	If yes, identify mitigating factors that address the risk of the accident scenario.	Likelihood of evacuation		
				Low	Med	High
4. SECURITY THREAT (TERRORISM)						
a. Port Aspects that contribute to a terrorist/security threat						
1. Is the port area a target for a security threat?						
2. Are there other port aspects?						
b. Operational Aspects that contribute to a terrorist/security threat						
1. Can the operation be considered a target for a security threat?						
2. Does the vessel operate with a high capacity of passengers?						
3. Is the vessel part of a transportation system?						
4. Are there other operational aspects?						
c. Vessel Aspects that contribute to a terrorist/security threat						
1. Is the vessel considered a high visibility vessel?						
2. Is the vessel considered a historical or national icon vessel?						
3. Minimally or periodically unattended machinery plants? (Automation)						
4. Are there other vessel aspects?						
			Overall score for **security threat (terrorism)**?			

All questions should be answered as if the possible accident scenarios may lead to vessel evacuation.

Accident Scenarios: Which aspects contribute to the occurrence of each listed incident below?	No	Yes	If yes, identify mitigating factors that address the risk of the accident scenario.	Likelihood of evacuation: Low	Med	High
5. LOSS OF POWER/PROPULSION						
a. Port Aspects that contribute to loss of power/propulsion						
1. If shore power is used inport, is there a history of power interruptions?						
2. Are there other port aspects?						
b. Operational Aspects that contribute to loss of power/propulsion						
1. Does vsl have history of temporarily losing power or propulsion?						
2. Is there a potential for losing power when adding or removing a generator from the electrical distribution?						
3. Could sudden addition of service or emergency electrical load cause of power or propulsion control?						
4. Are there other operational aspects?						
c. Vessel Aspects that contribute to loss of power/propulsion						
1. Can fire in a single space cause loss of power?						
2. Can fire in a single space cause loss of propulsion?						
3. Can a collision cause loss of power?						
4. Can a collision cause loss of propulsion?						
5. Would loss of power cause a collision/allision?						
6. Can a grounding cause a loss of power?						
7. Can a grounding cause a loss of propulsion?						
8. Would loss of power increase risk of grounding?						
9. Would loss of propulsion increase risk of grounding?						
10. Minimally or periodically unattended machinery plants?						
11. Are there other vessel aspects?						
			Overall score for **loss of power/propulsion**?			

Comments/Additional Challenges:

Reviewers:

Company Representative: _____

USCG Representative: _____

Summary of Subchapter W Hazard Assessment Matrix

(for Passenger Vessels of 100 GT or More in Specific Services)

Company:	Vessel:
OCMI Zone:	Date:

Accident Scenarios	Low	Medium	High
1. Fire			
2. Collision/Allision			
3. Grounding			
4. Security Threat			
5. Loss of Power/Propulsion			
Cumulative Score:			

Low: The accident scenarios are well mitigated, and the vessel is not likely to become untenable leading to an evacuation. A vessel will only be assigned a score of "low" when all accident scenarios are scored as "low." A "low" score is an indication that some or all of the required survival craft do not need to be carried depending on SSMCP.

Medium: The accident scenarios are only partially mitigated resulting in the potential for evacuation.

High: The accident scenarios are not well mitigated. Accident scenario will likely cause untenable conditions that require evacuation.

Examples of Possible Mitigating Factors

Port Aspects

- Response organizations (firefighting boats, etc.) readily available within the operating area.
- Established communication network between the vessel and response organizations.
- Vessel traffic system available.
- Traffic separation scheme used within the operating area.
- Vessel operates only in secluded area of the port (lake, slough, etc.).
- Bottom topography is soft (mud, etc.).

Operational Aspects

- Emergency response manual/procedures in use on the vessel.
- Experienced crew adequately trained to respond to emergencies.
- Security organization in place.
- Limited/restricted operating area.
- Limited/restricted operations in poor weather conditions, at night, etc.
- Elimination of factors that might delay passenger egress from a fire (dim lighting, luggage/carts in corridors).
- Elimination of factors that might delay the passengers' recognition of a fire (gaming machine noises, stage performances).
- Provide fireman's outfits of a type that will realistically allow the crewmembers to make a difference in the outcome of a fire.
- Even though possibly not required (46 CFR 77.30), provide sufficient self-contained breathing apparatus to allow crew to adequately respond to fire scenario?
- Institute procedures so that passengers realistically know what action to take during an emergency based on the information provided to them?

Vessel Aspects

- Smoke detection system.
- Automatic sprinkler system
- Lagging of hot surfaces in machinery spaces
- Fire suppression system.
- Active smoke control system.
- Security/monitor system.
- Public address system that can be operated on emergency or battery power.
- Refuge areas that can be maintained smoke-free until rescue is complete.
- Vessel built to current structural fire protection standards.
- Use of "fire resistant furnishings" as described by 46 CFR 72.05-55
- Vessel built to current watertight subdivision standards.
- Vessel is unlikely to capsize (flat or barge-like bottom).

- Active safety & security patrols
- Eliminate vessel arrangements that hinder manual firefighting operations or provide features that enhance (i.e.: having to go around more than two corners with a fire hose will significantly slow the fire party; arrangement of stairways; hose ports in doors; size of doorways or hatchways that provide access in emergency, ...)
- Provide NFPA 13 compliant automatic sprinkler system installed even though it may not be required by the regulations.

Shallow Water

The alternative in 46 CFR 199.630(h) relieves a vessel from the requirement to have survival craft provided the vessel is (1) on a route that is in shallow water not more than three miles from shore and the vessel cannot sink deep enough to submerge the topmost deck, or (2) if the OCMI determines that the water is shallow enough such that passengers and crew can wade ashore. In some cases, when a vessel cannot meet these specific shallow water requirements for all of its operating area, it might be available as a mitigating factor for the safety assessment done under 199.630(f).

If shallow water is used as an alternative under 199.630(h) or as a mitigating factor under 199.630(f), factors other than just the depth of water should be considered. For instance, to expect passengers and crew to be able to wade ashore, distance from shore, weather conditions, water temperature, current, and bottom condition are some of the most obvious, but not necessarily all of the additional factors to consider. With regard to potential flooding scenarios, the possible environmental conditions (e.g. bottom topography, current) should be considered when determining whether or not the topmost deck of the flooded vessel could be relied upon as a qualified refuge area. A naval architect and/or the Coast Guard Marine Safety Center should be consulted, if needed, to address this issue.