U.S. Department of Homeland Security

United States Coast Guard

Marine Safety Center Technical Note

MTN 1-17
16715
December 4, 2017

MARINE SAFETY CENTER TECHNICAL NOTE (MTN) NO. 1-17

Subj: GUIDANCE ON DESIGN VERIFICATION FOR SUBCHAPTER M TOWING VESSELS

Ref: (a) Navigation and Inspection Circular 8-84, *Recommendations for the Submittal of Merchant Vessel Plans and Specifications*
(b) 46 CFR Part 144, *Construction and Arrangements*
(c) Navigation and Inspection Circular 3-89, *Guidelines for the Presentation of Stability Information for Operating Personnel*

1. Purpose: This Technical Note supplements the information in references (a) and (b) with respect to the verification of compliance with design standards process for Subchapter M vessels.

2. Applicability: The guidelines provided in this Technical Note apply to all requests to the Coast Guard for verification of compliance with design standards of 46 CFR Subchapter M. Additionally, these guidelines provide guidance for the submission of requests for equivalencies to design standards, for the use of alternate design standards, and for major conversion determinations for Subchapter M vessels. These guidelines do not apply to verification of compliance with design standards conducted by a qualified individual or entity other than the Coast Guard as allowed by 46 CFR 144.140.

3. Definitions:

a. Design verification: The process of reviewing individual plans, drawings, schematics, calculations or other documents necessary to demonstrate compliance with the construction and arrangement design standards found in Subchapter M. The Coast Guard will refer to and, as appropriate, mark plans, drawings, schematics, calculations, or documents that have been verified to comply with the required standards as **Verified**.

b. 144.140 entity: an individual or entity that conducts design verification as identified in Table 144.140.

c. Statement of Verification: A letter or document from a 144.140 entity that enumerates the required information as described in 46 CFR 144.145.

4. Discussion

a. 46 CFR 144.135 requires verification of compliance with the construction and arrangement design standards for certain Subchapter M vessels. Vessel owners or managing operators

must have a 144.140 entity review the vessel design documents and attest to the vessel's design as a whole.

b. The regulations do not require that each plan, drawing, schematic, or calculation be developed by a 144.140 entity, or by the same entity, only that a 144.140 entity reviews sufficient objective evidence to verify compliance with applicable design standards. This is done by reviewing plans, drawings, schematics, and calculations that demonstrate the vessel's design is in compliance with the requirements. Enclosure (1) provides a graphical representation of this process.

c. The MSC supports Coast Guard units by conducting design verification when requested by the Officer in Charge, Marine Inspection (OCMI). Therefore, vessel owners or managing operators that wish to submit vessel plans for design verification to the Coast Guard must coordinate first with the OCMI for the location in which the vessel is under construction, alteration, or repair. The OCMI and vessel owner or managing operator are encouraged to use enclosure (2) of this guide to facilitate discussions and to document which specific plans will be required for submission to the Coast Guard.

d. With the exception of certain vessels discussed in the next paragraph, the Coast Guard will not issue a stability letter for new towing vessels. Vessel masters and officers in charge of the navigational watch must ensure compliance with stability requirements in accordance with 46 CFR 140.605. For vessels without Coast Guard issued stability letters, or detailed Trim and Stability Booklets, a set of simplified stability instructions that will enable the operator to readily ascertain the stability of the vessel under anticipated loading conditions and to operate the vessel in compliance with applicable stability criteria should be developed and reviewed by the entity verifying compliance with stability standards. The general instructions listed in paragraphs 3 and 4 of enclosure (1) of reference (c) should be included in the stability instructions.

e. Towing vessels that will request a Load Line Certificate from an Authorized Classification Society, may request a stability letter from the Coast Guard. The MSC will issue a stability letter for these vessels only after stability compliance has been verified by MSC personnel.

f. As opposed to a full "sistering" of a vessel as allowed in 144.155, a vessel owner or managing operator may desire to extend verification for specific plans, drawings, schematics, calculations or other documents for use in the design of additional vessels. Plan verification extension (PVE) saves time and resources by preventing a duplication of effort for systems or arrangements which have already been verified, and are identical to another vessel under construction or has been previously constructed.

5. Action:

a. Vessel owners, or managing operators, requesting to use the Coast Guard as a 144.140 entity should provide an Application for Inspection (CG-3752 or CG-3752A) to the cognizant OCMI where the vessel will be constructed.

b. Enclosure (2) is provided for use by OCMIs upon receipt of an Application for Inspection

(CG-3752 or CG-3752A) when determining what vessel plans, drawings, schematics, calculations, or other documents will be required for a specific vessel. It is intended to be used to create a record of the design verification for the vessel, and once complete and signed by any 144.140 entity, it may serve as a Statement of Verification as required by 46 CFR 144.145(b). Enclosure (2) serves as a guide for clarity and documentation purposes. The OCMI may require additional plans or calculations be submitted depending on the particular vessel. Any additional plans or calculations required by the OCMI should be documented on the form to ensure there is a complete record of all required documents. OCMIs may use this as a template and create locally generated letters or templates to assist in documenting the design verification process.

c. Enclosure (2) also indicates to submitters the corresponding Design Verification Guides (DVGs) associated with each system to ensure they are aware of all plans, calculations, and supporting information requested by the Coast Guard for design verification. These DVGs are accessible on MSC's website at http://www.dco.uscg.mil/msc/.

d. Once verified, the MSC will issue a letter to the submitter to document the verification of the submitted items. It remains the vessel owner or managing operator's responsibility to ensure all plans, drawing, schematics, calculations, or other documents have been properly verified by a 144.140 entity, so that a Statement of Verification can be issued.

e. We will provide a Statement of Verification only when the Coast Guard (either the OCMI or MSC) has completed all the needed design verification. If all plans, drawings, schematics, and calculations will be submitted to the MSC, the submitter should request a Statement of Verification from the MSC. In this case enclosure (2) will be signed and returned.

f. Regardless of the entity conducting design verification, requests for equivalencies, alternate design standards, or major conversion determinations must be submitted to the Coast Guard via the cognizant OCMI. If needed, the OCMI may engage the MSC for assistance in review or evaluation. In such cases the MSC may require additional information to be submitted directly to the MSC. Guidance for these submissions can be found in enclosure (4).

g. Requests made to the Coast Guard for verification of compliance with design standards for sister vessels as allowed by 46 CFR 144.155 should be submitted to the MSC with a copy to the OCMI for the geographic area in which the vessel will be constructed. Requests should be in writing, address each element of 46 CFR144.155(a), and clearly identify the submission as a request for sister vessel status. Special attention should be paid to documenting the stability assessment criteria raised in Table 144.155.

h. To request plan verification extension (PVE) of individual plans, a vessel owner or builder should complete enclosure (5) and submit it to the MSC with a cover letter and a copy of the Application for Inspection (CG-3752 or CG-3752A), copied to the OCMI. The submitter must certify that they are the owner of the originally verified plans or that they have the legal owner's permission to request PVE of the originally verified plans. If the PVE request is granted, the MSC will return enclosure (5) to the submitter with the approval letter. It is the submitter's responsibility to provide the OCMI or survey entity a copy of this letter with all

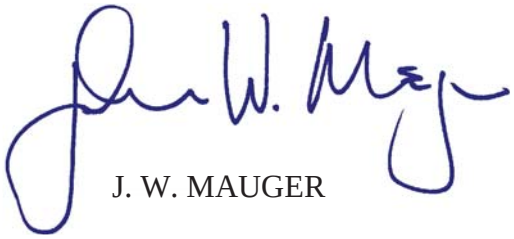
the plans and MSC letters listed on the PVE Request Form.

i. Any person directly affected by a decision or action by the MSC related to the design verification of submitted documents may make a formal appeal in accordance with 46 CFR 1.03-30. Any person directly affected by an OCMI or District Commander may make a formal appeal in accordance with 46 CFR 1.03-20 and 1.03-25 respectively.

j. Plans for arrangements, structure, and stability should be addressed to the Hull Division, and those for electrical or machinery to the attention of the Engineering Division. The preferred method for submission of plans, documents, and requests to the MSC is via email versus mail service. Plans, documents, and requests should be submitted to msc@uscg.mil. Each submission should specify a listing of the plans submitted and submitter contact information. Guidance for submitting large file sizes (10MB and above) and attachment format limitations may be found on our website http://dco.uscg.mil/msc. If plans cannot be submitted electronically, they can be mailed to the address indicated on the MSC website. Submit hardcopy in triplicate so that the MSC, the submitter, and the local OCMI receive copies of verified plans.

k. The MSC establishes a distinct project number for each vessel or class of vessels reviewed for verification. Once identified, all correspondence should reference the project number assigned by the MSC.

6. Disclaimer: While the guidance contained in this document may assist the industry, the public, the Coast Guard, and other Federal and State agencies in applying statutory and regulatory requirements, this guidance is not a substitute for the applicable legal requirements, nor is it in itself a regulation. It is not intended to, nor does it impose legally binding requirements on any party, including the Coast Guard, other Federal agencies, the States, or the regulated community.

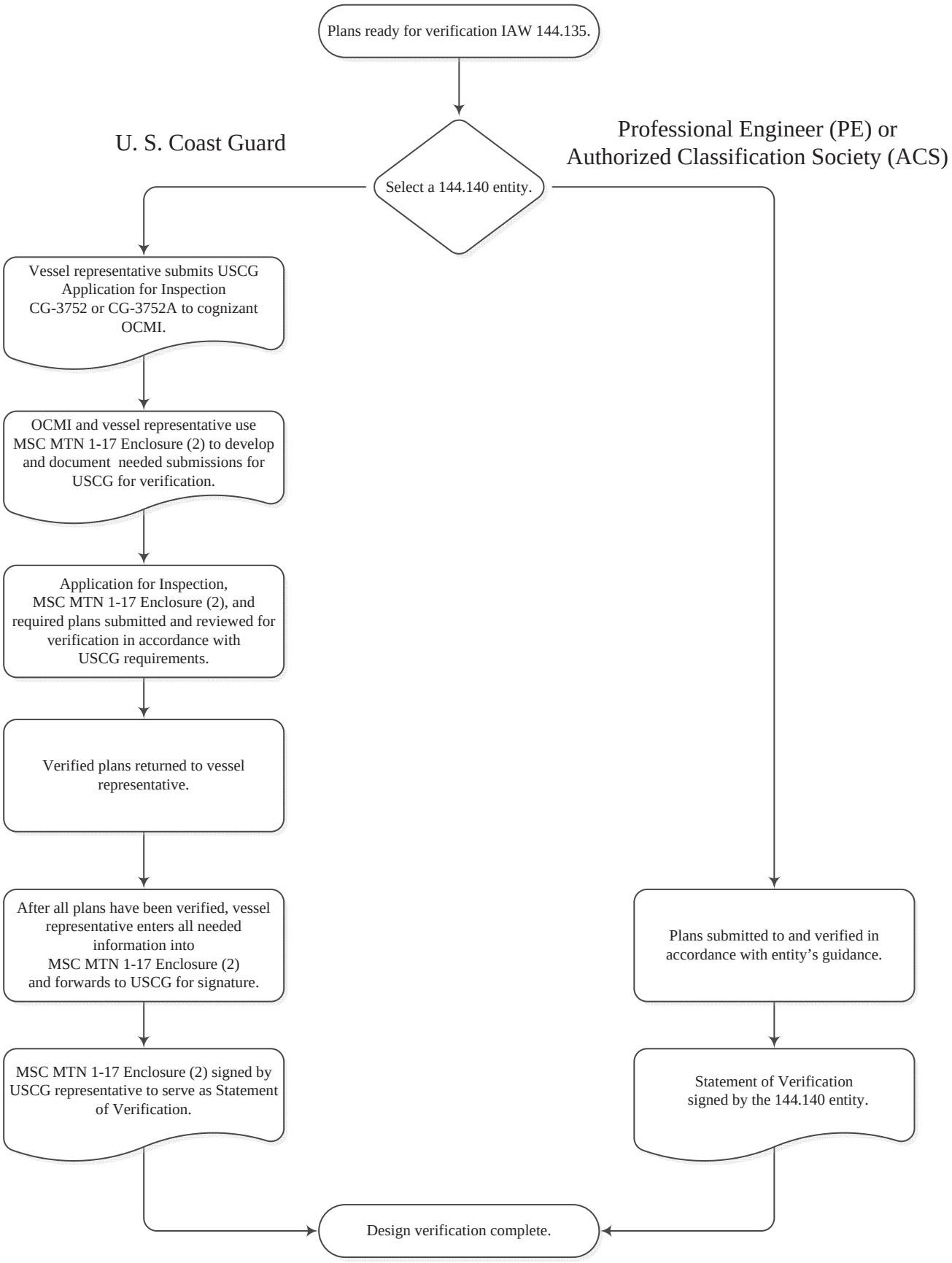


J. W. MAUGER

Encl: (1) Design Verification Options and Process Map
(2) Design Verification Activity Checklist
(3) Sample Simplified Stability Instructions for Subchapter M Vessels
(4) Submission Guidance for Requests for Equivalencies, Alternatives, and Major Conversion Determinations for Subchapter M Vessels
(5) Marine Safety Center Plan Verification Extension (PVE) Request Form

Copy: Commandant (CG-ENG), Office of Design and Engineering Standards
Commandant (CG-CVC), Office of Commercial Vessel Compliance
Commandant (CG-5P-TI), Office of Quality Assurance and Traveling Inspections
Supervisor, Towing Vessel National Center of Expertise

Subchapter M Design Verification Options and Process Map



Design Verification Activity Checklist

Vessel Information	
Vessel Name:	Shipyard:
O.N. / IMO / CG No. :	Hull No. :
Intended Service:	Route:

	Vessel Representative	OCMI / Authorized Individual / Entity Representative
Name:		
Email:		

	System or Component	Design Verification Guidance #	CG or MSC	ACS or P.E.	Verification Completed
Machinery Branch Mechanical Systems, Tanks (202) 795-6755	Bilge and Ballast	E1-36			
	Cooling Water				
	Fixed Fire Suppression Systems (All Types)				
	Exhaust				
	Fire Main				
	Fuel Oil Piping				
	Fluid Power Control				
	Lube Oil Piping				
	Miscellaneous Piping				
	Propulsion Shafting				
	Potable Water				
	Sewage Piping				
	Steering Gear				
	Ventilation				
Electrical Branch Electrical Systems (202) 795-6764	Fire Detection Systems	E2-31			
	Steering Gear Controls and Alarms				
	Electrical Plans				
	Dynamic Positioning Systems				
Small Vessel Branch Structures, Stability, General Arrangments (202) 795-6734	General Arrangement Plans	H1-18			
	Stability Test Procedures	GEN-05			
	Towing Vessel Stability	H1-04			
	Steel and Aluminum Structures	GEN-03			

I,_____certify that this vessel is suitable for the intended service and route specified in this form.

X _____

OCMI / MSC / 144.140 Entity

Standards used for the vessel's design and construction:

1- _____

2- _____

Alternate Design Standards Approved:

1- _____ **MSC Serial Letter No:** _____

2- _____ **MSC Serial Letter No:** _____

3- _____ **MSC Serial Letter No:** _____

4- _____ **MSC Serial Letter No:** _____

Equivalencies Approved:

1- _____ **MSC Serial Letter No:** _____

2- _____ **MSC Serial Letter No:** _____

3- _____ **MSC Serial Letter No:** _____

4- _____ **MSC Serial Letter No:** _____

Notes or comments regarding the design verification of this vessel:

STABILITY INSTRUCTIONS

December 4, 2017

Master, TOWBOAT, O. N. 1234567
Tow Boat Builder Hull No. 1
80.0' x 30.0' x 10.0' Towing Vessel (M)

You are responsible for maintaining this vessel in a satisfactory stability condition at all times and for following the instructions and precautions listed below. You are reminded that 46 CFR 140.605 requires you to verify your compliance with these instructions and precautions after loading and prior to departure on each voyage.

OPERATING RESTRICTIONS

1. ROUTE: Operation on Protected Waters may be permitted. Since the vessel's route is based upon other considerations in addition to stability, you are cautioned that the route may be further limited to that specified on the Certificate of Inspection (COI).

2. PERSONNEL: A maximum of 5 persons may be carried on this two-deck vessel. There are no stability-related restrictions on the number of people permitted on the upper deck. These numbers are based on an average weight of 185 pounds per person. Since the personnel capacity is based upon other considerations in addition to stability, you are cautioned that the number of persons carried and their distribution may be further limited to that specified on the COI.

3. FREEBOARD AND DRAFT: A minimum freeboard of 2 feet 4-1/8 inches to the main deck at amidships must be maintained. This corresponds to a maximum baseline (mean) draft of 7 feet 7-7/8 inches. Amidships is located at Frame 20. The maximum draft, as measured on the draft marks, of 7 feet 6 inches (forward) and 8 feet 1-1/2 inches (aft) is permitted in any condition of loading and trim so long as the maximum amidships draft is not exceeded. Trim and list should be minimized.

4. WATERTIGHT DOORS AND BULKHEADS: There are no doors located in any Main Transverse Watertight Bulkheads. No watertight doors or bulkheads shall be added, removed, or altered without the authorization and supervision of the cognizant Officer in Charge, Marine Inspection (OCMI).

5. HULL OPENINGS: When downstreaming, all exterior openings at the main deck level must be closed. Any openings that could allow water to enter the hull or deckhouse shall be kept tightly closed except when:

a. Access is needed through the opening for transit;
b. Operating on rivers with a tow, if the master determines the safety of the vessel is not compromised; or
c. Operating on lakes, bays, and sounds, without a tow during calm weather, and only if the master determines that the safety of the vessel is not compromised.

6. WEIGHT CHANGES: Stability instructions have been issued based upon the following lightship parameters:

Displacement	80.01	Long Tons (LT)
VCG	6.02	Feet Above the Baseline
LCG	40.03	Feet Aft of the Forward Perpendicular (FP)
TCG	0.04	Feet Starboard of Centerline

The FP is located 1 foot aft of Frame 2. Any alteration resulting in a change in these parameters may invalidate these instructions. The vessel is not fitted with fixed ballast. No fixed ballast or other such weights shall be added, removed, altered, and/or relocated without the authorization and supervision of the OCMI.

7. TANKS: No more than one centerline or port and starboard tank pair may be partially filled (slack) at any one time. Any cross-connections between port and starboard tank pairs shall be kept closed at all times when underway.

8. DECK CARGO: A maximum cargo load of 15 LT may be carried on the main deck in all conditions of loading and operation. When deck cargo is carried, it shall be on the centerline, with a longitudinal center of gravity (LCG) no further aft than 1 foot 10-3/4 inches aft of frame 35. The maximum vertical center of gravity of deck cargo is 4 feet 3 inches above the main deck. The height of the deck cargo shall not exceed 9 feet 6 inches above the main deck. Cargo must be positively secured against shifting prior to departing the pier.

9. LIFTING OPERATIONS: This vessel is not authorized to conduct lifting operations while underway.

10. TOWING: This vessel is authorized to engage in towing. Towing shall not be conducted at a displacement less than 195.28 LT, which corresponds to a mean draft amidships of 5 feet 9-1/4 inches. No vessel alterations affecting the horsepower of the main engines or the dimensions of the propeller, rudder, or towing bitt shall be performed without the authorization and supervision of the cognizant OCMI.

11. BILGES: The vessel's bilges and voids shall be kept pumped to minimum content at all times consistent with pollution prevention requirements.

12. LIST: You should make every effort to determine the cause of any list of the vessel before taking corrective action.

13. FREEING PORTS: Deck freeing ports and drains shall be maintained operable and completely unobstructed at all times.

Submission Guidance for Requests for Equivalents, Alternatives, and Major Conversion Determinations for Subchapter M Vessels

Authority	Cite	Description	Required Submittal Content
Equivalents	46 CFR 136.115(a)	Alternative solutions to requirements or standards[1].	1. Comparison analysis which clearly reflects the current standard and the suggested alternative including technical specifications. The analysis must demonstrate that the proposed alternative provides a level of safety equivalent to that intended by regulation. 2. Engineering analysis which includes risk-based and/or performance methodologies to justify the equivalency.
Alternate Design or Operational Consideration	46 CFR 143.210	Machinery or electrical systems of a novel design, unusual form, or special material (i.e., LNG-as-fuel, Li-ion battery propulsion, etc.)	Systematic analysis, based on engineering principles, that the machinery or electrical system provides an equivalent level of safety as would be provided by meeting the existing rule/regulation.
Major Conversion Determinations	CG policy designates MSC as the authority to conduct all formal major conversion determinations.	As defined in 46 CFR 136.110 a major conversion means a conversion of a vessel that meets any of the following: 1. Substantially changes the dimension or carrying capacity of the vessel. 2. Changes the type of vessel. 3. Substantially prolongs the life of the vessel. 4. Otherwise changes the vessel in such a way that it becomes a new vessel.	1. Outboard profile 2. General Arrangements before and after proposed alterations 3. Estimated weight changes 4. Detailed description of the proposed alterations
Deviations from Structural Design Standards	46 CFR 144.205(d)	Any use of a design standard not included in the regulation or incorporated by reference.	1. Vessel design details. 2. Area of intended operation. 3. Detailed justification for deviation from required design standards.

1. Equivalents are not waivers or exemptions from requirements or standards. Individuals seeking departures from written requirements should contact the local OCMI.

Date: _____ Sheet ___ of ___

Directions:

MARINE SAFETY CENTER PLAN VERIFICATION EXTENSION REQUEST FORM

1. Complete the table below with all verified plans and corresponding MSC verification letters for which plan verification extension is requested.
2. Electronically submit this form with a copy of the vessel's Application for Inspection directly to the MSC (MSC@USCG.mil), or submit a paper copy to our mailing address:

Commanding Officer (MSC)
2703 Martin Luther King Jr. Ave SE
Washington, DC 20593-7430

NAME AND IDENTIFICATION (O.N., CG NUMBER) OF VESSEL FOR WHICH PLANS WERE PREVIOUSLY VERIFIED:							
NAME AND IDENTIFICATION OF VESSEL(S) TO WHICH PLAN VERIFICATION IS TO BE EXTENDED:							
Drawing Number	**# of Sheets**	**Rev. #**	**Drawing Title**	**MSC Project Number**	**Letter Date**	**Letter Serial Number**	**Denied (MSC Use)**

By submission of this form, I hereby certify that I am the legal owner of the plans and documents listed herein; or, have the permission of the legal owner to request plan verification extension on their behalf.

(MSC Use) This PVE Request is addressed in MSC letter Serial No. _____