CHAPTER 5: VESSEL CONSTRUCTION, CONVERSIONS, ALTERATIONS, AND REPAIRS

A. INTRODUCTION

The inspection of a vessel during construction or conversion is normally considered an initial inspection. The scope of such inspections and the standards for construction of vessels and equipment are covered in the applicable regulations. (See MSM II A4 concerning approval of plans and specifications, and MSM II B1 concerning inspection of vessels for certification.) Inspections shall be made during the progress and upon completion of the work, as necessary, to determine that the vessel may be safely operated in the service in which it is employed. Reports or inspections by the officer in charge, marine inspection (OCMI) are not required when minor repairs by replacements with spare parts are made. However, when repairs are accomplished in a foreign port or under emergency conditions at sea, they must be reported to the OCMI at the first port where the vessel calls after such repairs are made. The OCMI shall verify the efficiency of the repair and determine whether it should be considered a temporary or permanent repair. The extent of this inspection should depend on the reported conditions. Whenever feasible, extensive examinations or tests (such as for boilers) may be delayed until the next periodic inspection. Final acceptance of repairs shall not be made until the OCMI is satisfied that all aspects are satisfactory.

B. REFERENCES

1. Regulations

Requirements for notifying the Coast Guard of repairs or alterations affecting the safety of a vessel or its machinery, or movement of a vessel to another port for repairs, are contained in 46 CFR 2.01-15. The following regulations also require that the OCMI be notified of repairs or alterations affecting the safety of the vessel and mandate, if the vessel is subject to inspection, that inspections be held:

	TYPE	CFR CITE
a.	Tank Vessels	46 CFR 31.10-25
b.	Marine Engineering	46 CFR 50.05-10
c.	Passenger Vessels	46 CFR 71.55
d.	Cargo and Miscellaneous Vessels	46 CFR 91.45
e.	Electrical Engineering	46 CFR 110.25
f.	Public Nautical School Ships	46 CFR 167.30-1
g.	Subdivision and Stability	46 CFR 170.005
h.	Small Passenger Vessels	46 CFR 176.120 (Sub T) 46 CFR 115.120 (Sub K)
i.	Oceanographic Research Vessels	46 CFR 189.45-1

2. American Bureau of Shipping (ABS) Publications

The ABS has produced numerous publications that contain requirements and instructions for the production of sound, effective hull welds. Rules for Building and Classing Steel Vessels and Rules for Building and Classing Steel Barges for Offshore Service are examples of these publications, which are generally accepted by the Coast Guard as standards (See MSM II A2.G for a list of ABS publications).

3. American Society of Mechanical Engineers (ASME) Code

46 CFR 57.02-1 states that the Coast Guard has adopted Section IX, "Welding and Brazing Qualifications," of the ASME Code, with certain limitations and modifications. Section IX, as modified by 46 CFR 57, is used as a standard for judging the quality of piping and machinery welds.

4. Navigation and Vessel Inspection Circular (NVIC) 7-68

Inspection personnel shall become thoroughly familiar with the contents of NVIC 7-68, "Notes on Inspection and Repair of Steel Hulls." This NVIC provides guidance in the inspection and repair of steel-hulled vessels for certification (See MSM II B1).

C. CONSTRUCTION OF VESSELS

1. General Standards

Vessels to which the inspection statutes and regulations apply shall be constructed in accordance with approved plans, specifications, and applicable regulations.

2. Bulkheads and Decks

NVIC 6-80, "Guide to Structural Fire Protection Aboard Merchant Vessels," contains information concerning approved insulation, bulkhead panels, and deck coverings used on most vessels. Plywood may continue to be used for nonstructural interior bulkheads in the superstructures of cargo or miscellaneous vessels of 4,000 and more gross tons (GT), built prior to 1 January 1962, provided the requirements of 46 CFR 92.05 and 92.07-90 are met. It is realized that there are other materials that minimize fire hazards as required by 46 CFR 92.05 and 92.07, and they are recommended. Plywood is prohibited for nonstructural interior bulkheads in the superstructures of passenger and tank vessels, and all cargo and miscellaneous vessels of 4,000 and more GT contracted for on or after 1 January 1962.

3. Living Spaces Aboard Tank Vessels

a. General Requirements. The requirements governing construction of the accommodation spaces (staterooms, hospital spaces, passageways) and public spaces such as messrooms and recreation rooms on tank vessels are prescribed in 46 CFR, Subchapter D. The use of "fire-resistive material" in the construction and insulation of crew accommodation spaces on tank vessels is required by 46 CFR 32.40-1(d) and 32.60-25. The term "fire-resistive material" means noncombustible material approved under 46 CFR 164.009 and listed as "noncombustible materials" in Equipment Lists, Commandant Instruction (COMDTINST) M16714.3. It is intended that all materials of construction, including panels and insulation and any materials used in the erection or for their support,within living spaces shall be approved "noncombustible materials.

b. The only combustible materials of construction permitted within the living spaces are decorative veneers and trim on the panels of staterooms and public spaces. No combustible materials are permitted in the passageways or in hidden spaces. There are also restrictions on the type of furniture or furnishings to be used.

4. Lap-Welded Seams In Tank Barges

a. Some shipyards fabricate tank barges with lap-welded strakes, since lap-welded construction in certain cases is cheaper and easier to complete than butt-welded construction (usually, small shipyards apply lap-welded construction). Neither the Coast Guard nor ABS has published rules specifically limiting or prohibiting the use of lap-welded joints, and some lapped joints may be practically unavoidable in any vessel construction; for example, tank barges usually have lapped joints at the turn of the bilge and at the deck edge. However, the use of lap-welded seams has the following disadvantages:

(1) A void is created in the lapped joint that can form a gas pocket if the fillet weld on the inside is not tight. Several such gas pockets could make the gas-freeing of a cargo tank difficult. In addition, these voids could provide a route for leakage of gas or liquid cargo from one tank to another.

(2) There is no way to test the tightness of the inside fillet weld, since the usual methods of testing a tank will indicate leaks only if the inside and outside welds of a lapped joint are not tight.

(3) An increased rate of corrosion is usually experienced in way of lapped joints.

(4) A tank with lapped joints is more difficult to clean than a smooth tank with butt-welded joints.

Conditions of Acceptance

b. Lap-welded joints may be accepted in way of cargo tanks on tank barges if the following requirements are met:

(1) Welded stopwaters are provided in each lapped seam in way of oiltight bulkheads;

(2) The overlap of the plates complies with ABS Rules, which specify that "Lapped joints are generally to have overlap of not less width than twice the thinner plate thickness plus one inch." The size of the overlap should not be excessive, to avoid the creation of large void spaces; and

(3) Joints are continuously welded on both sides. The use of lap-welded seams in tank barges should be discouraged, but not prohibited unless the inspector finds a failure to meet these requirements.

5. Single-Dogged Hatches and Scuttles

Hatches on inspected vessels are generally subject to the approval of the OCMI, according to their suitability for the intended locations on board and their use. There is no provision for type approval and they are not normally seen in detail on plans submitted for the OCMI's approval.

6. Fiberglass Gratings

a. General. Fiberglass gratings are not specifically addressed in the individual vessel regulations. However, fiberglass is combustible; therefore, its use must be limited based on the general requirements to reduce hazards from fire. Basically, fire-retardant fiberglass may be used anywhere except in accommodation areas, and in any other area where their failure could hinder escape or access by firefighters. Although all fiberglass must be fire-retardant, there are no Coast Guard approvals for fire-retardant fiberglass gratings or cable trays. However, the OCMI may authorize its use in particular installations, considering the fire retardance and the criteria in subparagraph 5.C.6.c below. The manufacturer should provide the Coast Guard inspector with appropriate test data; a report showing a flame spread rating less than 25 according to the American Society for Testing Materials (ASTM) Standard E-84 would constitute appropriate evidence. Fiberglass cable trays may be used in exterior locations and in machinery spaces, provided that they are not installed in concealed spaces.

b. Restrictions on Use. Fiberglass gratings may not be used:

(1) within the accommodation area;

(2) in areas where their failure could hinder escape or firefighter access. Vessels fitted with deck foam firefighting systems must have steel or equivalent access to the foam monitors (e.g., deck grating to foam monitors must be steel or equivalent.);

(3) The use of fiberglass for cargo tank hatch covers is prohibited on all foreign tank ships while trading in U.S. waters. Those vessels found not to be in conformity with this policy should be issued a deficiency notice to correct the situation within a reasonably brief time period.

Authorized Uses

c. Authorized Uses. Since the approval of fiberglass cable trays and gratings is so dependent on the specific location and application, it is not possible for the Commandant to grant general approvals. In the past, however, the use of fiberglass gratings aboard inspected vessels has been authorized in the following areas:

(1) Sea chest screenings;

(2) Small sundeck awnings and supports;

(3) Lifeboat bilge flooring;

(4) Electrical control flooring;

(5) Pipe guards on deck, in cargo holds, and in enginerooms;

(6) Fore and aft main deck catwalks;

(7) Main deck crossover catwalks;

(8) Removable guards over hawseholes, anchor hawsepipes, and scuppers;

(9) Personnel barriers, such as protection for electrical panels;

(10) Ladders, platforms, and catwalks located within double bottoms, bilges, peak tanks, fuel tanks, liquid bulk cargo tanks, and other spaces not normally entered when underway;

(11) Ship staging and work platforms (Occupational Safety and Health Administration (OSHA) requirements may also apply);

(12) Platforms and ladders located on radar, radio, or other electrical apparatus masts;

(13) Platforms or walkways on kingposts;

(14) Overlay on existing weather decks to provide slip resistant, self-draining walking surfaces;

(15) Overlay on steel decking around electrical equipment to provide for insulation and safety of personnel; and

(16) Elevated flooring in boatswain's lockers.

7. Hull Welding Standards for Aluminum Small Passenger Vessels (T-Boats)

The regulations contained in 46 CFR 177.300 incorporate, by reference, various non-Coast Guard standards with which a builder must comply to satisfactorily meet minimum structural design requirements. This is a broad requirement which is not otherwise defined, particularly with respect to construction details such as welding.

Recent examinations of aluminum T-boats built in the late 1980's and early 1990's revealed that shell plate fit-up and edge preparation was such that a proper root gap was not achieved so that a full penetration weld could not be made consistently in the construction of the vessels.
Essentially, the shell plate was square-butted together and ground by hand to produce a rough bevel. This procedure effectively left a shoulder in the joint which was not assimilated during the welding process, Further, there was no attempt made to back gouge the weld from the opposite side to remove the discontinuity. Hence, when a cap pass was applied to the back side, a lack of fusion remained, clearly apparent when the weld is x-rayed.

This type of shell welding process is not acceptable for any type of inspected vessel where the long term effects of fatigue could adversely effect the strength of these connections. This could result in failure while in service and/or be less resistant to impact from mechanical damage.

Henceforth, effective immediately, all OCMIs in whose zones aluminum T-boats are constructed, shall ensure that the joint design and welding of butt joints strictly adhere to the provisions contained in the American Bureau of Shipping (ABS) Rules for Building and Classing Aluminum Vessels (1975), Chapter 30, Section 30.7. or to the provisions of Lloyd's Rules and Regulations for Classification of Yachts and Small Craft, Part 2, Chapter 3, dependent on the standard used to meet the structural design requirement.

D. VESSEL REPAIRS, ALTERATIONS, AND "HOT WORK"

The problem of avoiding casualties on all vessels under repair is extremely complicated, due to the possible presence of explosive gases and sources of ignition created by the use of flame or spark producing tools. No repairs or alterations involving the safety of a tank vessel may be made until the requirements of 46 CFR 35.01-1 have been met. These regulations set forth the provisions under which a certified marine chemist will make a decision as to whether the work can be accomplished safely (see section 5.I below). A tank vessel may have "hot work" performed in or on the boundaries of a tank previously containing flammable liquids only after the tank has been cleaned and gas-freed by conventional methods, and when the surrounding tanks have been cleaned and gas-freed or inerted with carbon dioxide or water. 33 CFR 126.15(c) applies to vessels conducting hot work while moored at designated waterfront facilities.

E. INSPECTION AND REPAIR OF TANK BARGES

1. Introduction

Tank barges employed primarily in river or inland service are generally towed alongside or pushed ahead, as opposed to being towed astern. Barges in these services are subjected to rigors of locking and fleeting operations that are not normally experienced by seagoing barges or self-propelled vessels. As a result, some distinct structural problems have evolved.

2. Hull Damage Consider-ations

a. Introduction. While the following guidance was conceived generally to address the problems occurring on vessels in river service, the benefits of preventing pollution incidents through its application may be universally realized. Therefore, this guidance is applicable to all tank barges having areas of the cargo envelope (excluding the deck) that are not protected by a double hull.

b. Causes. Normal river and inland operations result in frequent structural deformations of a barge's hull. The rubbing of barges against one another and against lock walls causes the hull plating in some areas of the vessel (side plating against framing members, barge corners, ends, and knuckles) to wear thin, while the majority of plating remains in good condition. Such wearing diminishes the plate thickness in these areas and causes plate deformation at the edges of the internals. Continued deformation and metal working results in many weakened areas that are extremely prone to crack initiation and growth. Such degradation of strength in the cargo envelope (the hull) makes river and inland barges particularly prone to pollution incidents resulting from the minor damage of routine operations or low-energy collisions.

3. Inspection Standards

The extent of inspection, and the types of repairs necessary to ensure that a tank barge can operate safely, will naturally depend upon its age, route, and other considerations. However, the operation of tank barges upon routes with minimal exposure to severe weather or sea conditions cannot justify imposing less stringent inspection or repair standards if they increase the likelihood of a pollution incident. The provisions of NVIC 7-68 apply to all tank barges and shall always be applied. The following additional notes apply to the inspection of single-hulled tank barges:

a. Deficiencies. In determining whether a deficiency compromises a vessel's suitability for its intended service, the possibility of a pollution incident arising from the deficiency must be considered. A vessel whose condition is considered likely to cause a pollution incident is not suitable for carriage of oil in bulk.

b. General Evaluation of Hull Plating. Tank barges are, of course, subject to the general causes of deterioration noted in NVIC 7-68. However, because of the frequent rigors of locking and fleeting operations, particular attention must be given to end and sideshell plating that must withstand such continuous wear. Where such plating is stiffened by internal structural supports or bulkheads, the greatest loss in plate thickness can be expected. Often, plating between structural supports will show little loss in plate thickness, while plating supported by internals will be extremely thin. The acceptable degree of hull plating deterioration has traditionally been evaluated by considering the effect of the reduced plate thickness upon total hull strength. Specific limits for deterioration of various areas of the vessel have been suggested in NVIC 7-68. Localized wastage in excess of these limits has generally been accepted, provided adjacent material retains adequate strength and the localized deterioration does not result in a radical change in cross-section or a general weakening that could act as a notch.

c. Evaluating Excessive Deterioration. A further consideration must be whether reduced thickness of the local area would allow penetration of the product envelope from low-energy impacts or abrasion encountered during fleeting or locking operations. Here the general guide of 25-percent deterioration indicated in NVIC 7-68 applies. However, there are instances where renewal of hull plate should be required even though deterioration/wastage may be less than 25 percent. An example is heavily or deeply pitted plating areas on vessels which were constructed with less than 3/8" original hull plating. In this case, 25-percent deterioration would mean plating of less than 1/4" as the only barrier between cargo and water. When plating becomes this thin, an evaluation must be made in each case to determine the strength of the hull and its ability to withstand the rigors of routine, unrestricted operations.

4. Repair Standards

General Concerns

a. General Concerns. The need for renewal of plating is generally evaluated by considering its overall condition. However, in the case of tank barges that must withstand frequent fleeting and locking operations, where the hull plating is the only barrier between cargo and water, the condition of the plate in the way of internal structural supports should be the determining factor, even when the plating between internals shows negligible wastage. NVIC 7-68 provides guidance on gauging for evaluation of plate condition and cautions against gauging without sufficient cause. This does not preclude gauging during an inspection to adequately assess the condition of hull plating in the way of internal structural supports. The repeated rubbing of tank barges against lock walls and other barges can leave little evidence of loss of plate thickness in way of internals, and gauging may be necessary to reveal the true condition of such plating.

Plate Cracking

b. Plate Cracking. The rigors of unrestricted river operations generate problems other than thinning of plating. The repeated working of shell plating against lock walls and other barges causes crack initiation and growth in many areas. Frequent handling of tank barges by towboats results in areas that are repeatedly set in by low-energy impacts, resulting in the formation of cracks in plating. Generally, the presence of more than two repaired cracks in one local area should be cause for special attention: the formation of a subsequent crack in such areas is likely.

Repairs of Cracked Plating

c. Repairs of Cracked Plating. To avoid pollution incidents, cracked plating should be repaired through plate renewal or an insert. When cracks are repaired through welding, the repair procedures outlined in NVIC 7-68 should be followed; the need for proper edge preparation and full penetration welds is emphasized. When repairs involve the renewal of less than a full plate, an insert of less than 18" by l8" normally should not be accepted (see NVIC 7-68). Inspectors shall ensure that the edges of the insert lie in line with existing welds or that the corners of the insert have the proper radius.

Use of Rub Bars and Doublers

d. Use of Rub Bars and Doublers. Doubler plates are unacceptable for permanent repairs of tank barge hulls, as discussed in NVIC 7-68. Often, however, rub pads or rub bar doublers are installed in areas where excessive wear of the hull plating is detected or anticipated. When such a doubler is to be installed on an existing single-hulled barge, the hull plating to be covered should be carefully examined to ensure that excessive wastage has not already occurred. In some cases, older tank barges may have rub pads or rub bars that were installed without adequate evaluation of the hull plating. Removal of these may be necessary to ascertain the suitability of the original hull plating. Where half-round pipe is used as a rub bar, the hull plating beneath is often subject to accelerated corrosion. Gauging from inside the tanks or periodic removal of these bars may be necessary to ensure proper hull plating thickness. Where such rub bars extend across several tanks, the installation of water stops should be considered. Repairs to internals should generally follow the guidance in NVIC 7-68.

Stiffening of Internals

e. Stiffening of Internals. On tank barges in river service, the need for repairs to internal structural supports may be questioned because the stresses of heavy seas and weather conditions are not normally encountered and overall hull strength may seem less critical. However, when plating on single-hulled tank barges is not adequately supported, repeated low-energy impacts or excessive stresses from overloading can deform hull plating to the point of failure and result in pollution. Hull plating must always be provided with adequate stiffness to prevent underway panting, and must be able to distribute the force of low-energy impact loading uniformly along the internal structure of the vessel. If the internal structural supports are substantially deformed from original conditions or fail to have the designed amount of contact between support members and hull plating, consideration must be given to requiring renewal.

Restrictions on Use of "Clips"

f. Restrictions on Use of "Clips." The common practice of welding "clips" to join distorted members to the hull plating cannot be accepted on single-hulled tank barges for extensive repairs to internals. Isolated use of clips may be acceptable if the internals so repaired continue to provide substantially the designed amount of support to the hull plating.

F. STRUCTURAL FAILURES AND CASUALTIES

1. Normal Operating Conditions

Structural failures as defined below are to be distinguished from structural damage. For each defined failure standard, normal operating conditions are stressed to distinguish between those fractures and buckles occurring as a result of the natural working of a vessel's hull as opposed to those which occur as a result of some external force such as collision, allision, grounding, fire, explosion, earthquake, improper cargo handling or ballasting, etc. Fractures and buckles which result from external forces should not be construed as structural failures but reported as marine casualties if they meet the definitions contained in 46 CFR 4.03. Conversely, those, fractures or buckles which occur naturally should not be considered marine casualties per se. However, by definition, because all Class 1 structural failures compromise the vessel to safely operate within its design parameters, they are clearly reportable as marine casualties under 46 CFR 4.03. Class 2 and 3 structural failures, as defined, will normally fall outside the parameters of the marine casualty definition except in the rare occasion where the cost of a single repair might exceed the monetary value established in 46 CFR 4.03. In any case, the purpose of reporting structural failures is to determine if unwanted trends are developing in particular classes of vessels or vessels which may be operating in a particular environment in order to ensure that appropriate corrective actions are initiated.

2. Classifications and Definitions

Definitions

a. Standards for the definitions in paragraphs MSM II A5.E.2.b and A5.E.2.c:

Outer Shell

(1) Outer Shell: The side-shell and bottom plating of a vessel including the bow and stern rakes of barges.

Oil-Tight Envelope

(2) Oil-Tight Envelope: That portion of the outer shell in way of cargo oil tanks and the vessel's bunker/fuel, lube oil and slop tanks, exclusive of the clean ballast tanks.

Main Strength Members

(3) Main Strength Members: Those structural members which provide primary longitudinal strength to the hull and those transverse structural members which directly contribute to support longitudinal strength members.. Such members include the strength deck plating; side and bottom plating; tank top plating; the center vertical keel; underdeck, side and bottom longitudinal stiffeners; internal longitudinal bulkheads and stiffeners; deep web frames and girders; transverse bulkheads and girders, and associated bracketing connecting the aforementioned longitudinal and transverse structural members.

Buckle

(4) Buckle: Any deformation in the outer shell and/or strength deck plating and the adjacent internal main strength members to the extent that structural strength has been lost.

Action

(5) Action: The extent of response an operator must take, with concurrence by the OCMI, for a particular structural failure.

Class I Structural Failure

b. Class I Structural Failure: During normal operating conditions, either

(1) A visible, through thickness fracture of any length in the oil-tight envelope of the outer shell where threat of pollution is a factor or,

(2) A fracture or buckle which has weakened a main strength member to the extent that the safety of the vessel to operate within its design parameters- is compromised.

ACTION: Immediate corrective action must be initiated by the operator with approval of the cognizant OCMI. Temporary repairs may be permitted to allow the vessel to safely transit to a repair facility.

Class 2 Structural Failure

c. Class 2 Structural Failure: A fracture or buckle within a main strength member which does not compromise the safety of the vessel to operate within its design parameters and does not create a threat of pollution either by location or containment.

ACTION: Necessity for corrective action shall be evaluated and agreed upon between the vessel operator and OCMI when the failure is found. Temporary repairs until the next scheduled repair period may be authorized.

Class 3 Structural Failure

d. Class 3 Structural Failure: Any fracture or buckle which does not otherwise meet the definition of a Class 1 or 2 structural failure or a fracture which might normally be considered a Class 2 but is determined not to be detrimental to the strength or serviceability of the effected main hull structural member.

ACTION: Corrective action or notification to the OCMI is not required. Shall be noted for the record, monitored by the operator if deemed desirable and addressed,at the next regularly scheduled repair period.

3. Notification of Class 1 Structural Failures on U.S. Flag Vessels

The following actions shall be taken when a Class 1 structural failure occurs on any U.S. documented non-recreational vessel. Under no circumstance will a vessel be allowed to operate under the terms and Conditions of its Certificate of Inspection until permanent repairs are completed and they are approved by the OCMI. Temporary repairs with additional imposed conditions of operations may be authorized by the OCMI to permit the vessel to proceed to a discharge port and/or repair facility.

Operator's Responsibility

a. Operator's Responsibility. When a Class 1 structural failure is discovered, the vessel operator shall immediately report it to the cognizant OCMI of the zone where detected. It shall be the operator's responsibility to complete and submit Coast Guard form CG-2692, "Report of Marine Accident, Injury or Death in accordance with 46 CFR 4.05-10. The operator will submit details of the temporary and/or permanent repair procedures to the OCMI and the ABS (or appropriate class society). The repair plan shall include a past history of any similar failure, the results of any past analysis related to that type of failure and the results of past repair actions. Operators of vessels with either Coast Guard Critical Areas Inspection Plans (CAIPS) or ABS Enhanced Survey Programs are advised that submittal of these documents for OCMI review would satisfy this requirement. If the operator has no available history to provide, then a failure analysis will be required, original to the OCMI, copy to Commandant (G-MOC). Design induced failures on vessels that have had plan approval by the Marine Safety Center (MSC) shall be reported to the MSC. For clarification's Class 1 structural failure must always be reported on the CG-2692 regardless of when or where found.

OCMI Responsibility

b. OCMI Responsibility. The OCMI shall advise G-MOC, in conjunction with district (m), immediately after receiving notice of a Class-1 structural failure by most expeditious means possible. G-MOC will in turn advise G-MO-1 of the event. After regular working hours and on weekends, notification should be made through the Headquarters Command Center. if cognizant G-MOC personnel are unavailable, notification should be made to a G-MO-1 traveling inspector. The OCMI shall evaluate the operator's repair proposal. OCMIs are strongly urged to contact G-MO-1 for consultation regarding acceptable repair procedures. G-MO-1 files contain significant information on previously approved repairs which would be beneficial to ensuring consistency across Marine Inspection zones.

4. Tank Vessel Restrictions

Pending completion of permanent repairs to the oil-tight envelopes of tankships, operational restrictions may be placed upon these vessels. Restrictions may include prohibition of carrying cargo in the affected tank(s) in order to allow a vessel to remain in service while in that condition, the operator must submit calculations to the OCMI which demonstrate that the other intact tanks can be loaded without placing additional stress on the hull structure and that the vessel can safely operate with the affected tank either ballasted or empty.

5. Vehicles with Recurring Structural Failures

A vessel which suffers repeated Class 1 structural failures or a continuous high numbers of Class 2 structural failures will be placed in a "Special Attention Vessels" category. vessels not otherwise enrolled in the Critical Areas Inspection Plan (CAIP) program outlined in NVIC 15-91, NVIC 15-91, Change 1 and A5.J. of this volume may be required to do so. If the condition of the hull structure does not significantly improve, additional operating restrictions regarding route and service may be imposed. In severe cases, the vessel's COI may be revoked and the vessel removed from service. G-MOC will maintain a list of these vessels and they will be regularly attended by a traveling inspector. All structural repairs for these vessels will be approved by G-MOC.

6. Vessels Enrolled in the Alternative Compliance Program (ACP)

As of February 1995, a pilot program was established to delegate the ABS authority to perform surveys of US flag vessels on behalf of the Coast Guard pursuant to issuance of a COI. Guidance for this program is contained in NVIC 2-95 and COMDTINSTs 16711.17 and 16711.18. Unless otherwise provided for in MSM II A5.J. with respect to the CAIP Program, approval of Class 1 structural repairs lies solely with the ABS unless it is determined through oversight monitoring procedures that the repairs, as effected, are inadequate. Participation of a vessel in the ACP does not relieve an operator of the responsibility of reporting a Class I structural failure to the cognizant OCMI.

7. Documentation of Class 1 Structural Failures

It is rare that two or more types of Class I structural failures occur during the same event or examination interval. Should this happen, each type shall be reported by separate CG-2692. If multiple failures of the same type occur, they may be reported on a single CG-2692. The following information should be provided as a minimum with the CG2692 for each Class I structural failure:

a. A one or two sentence description on the CG-2692 noting the location and size of the fracture, affected structural components, how the failure was found and method of repair. it is acceptable to attached a shipyard repair specification or class surveyor's report if they contain this type of information.

b. Photos and/or sketches of the structural failure with identifying marks noting the strake; plate number; frame number; side or bottom longitudinal number; location, i.e., port, starboard or centerline; ship's name and any other useful reference points - Photographs should clearly indicate the originating point of the fracture if it can be visually determined.

c. A description of the structural detail if determined that it caused or contributed to the cause of the failure, including a description of any similar detail failures which previously occurred in that vessel or sister vessels.

d. Identification of the vessel's trade and principal operating route; time and weather conditions when the failure occurred; and the stability condition of the vessel, including hull stresses if available. When the specific time of the failure is not known, a general statement about weather conditions and stability patterns is sufficient.

e. Steel samples shall be obtained for analysis and/or nondestructive testing for Class 1 structural failures, not previously analyzed, if the cause of the failure is not due to some obvious or known discontinuity. The vessel operator shall arrange for the failure analysis if it will assist in determining the cause of the failure. A copy of the report shall be provided to the cognizant OCMI investigating the failure.

f. When accurate information is not available, then the best available data is to be reported concerning the date when found, approximate time/date when the failure may have occurred, possible contributing environmental conditions, stability condition of the vessel and any other information deemed to be possibly pertinent. All such information should be noted as approximate.

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8. Notification of Class 1 Structural Failures on Foreign Flag Vessels

In addition to the procedures outlined in paragraph E.3.a, the following items shall be adhered to when a Class 1 structural failure occurs to a foreign vessel operating in U.S. waters:

a. Repair proposals shall be provided by either the vessel operator or authorized agent to the vessel's class society representative and the cognizant OCMI. Repairs are not authorized until approved by class.

b. If class authorizes temporary repairs, the OCMI will notify the vessel's master and agent that the vessel will not be allowed to return to a U.S. port until permanent repairs are accomplished, approved by class and all outstanding conditions of class related to the incident removed.

c. Under port state control authority vested within the Captain of the Port, the OCMI may reject class approval of either permanent or temporary if it is determined that they will not restore the vessel to a condition to allow it to operate within its design parameters.

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9. Notification of Class 2 and Class 3 Structural Failures

Class 2 and Class 3 structural failures as defined in MSM II A5.E.2.c. and d. do not meet the definition of a "marine casualty" in 46 CFR 4.03. Therefore, neither failure is required to be reported on Form CG2692. However, when Class 2 and Class 3 structural failures are detected, the following actions will be taken.

Class 2 Structural Failures

a. Class 2 Structural Failures. Class 2 structural failures have the potential to become serious through fracture propagation, particularly in a longitudinal strength member that has failed in tension. Please refer to NVIC 15-91, Change 1, which contains important information regarding critical crack length and brittle failure. When a Class 2 failure is found, it must be reported the cognizant OCMI if not found during a scheduled Coast Guard examination. In either case the operator shall submit a repair proposal containing either a temporary or permanent fix. In no case will a temporary repair proposal be accepted during a hull examination for credit unless it involves the necessity of the vessel proceeding to another port for permanent repair. Based on the information presented in the proposal, the OCMI may allow a temporary repair or require immediate permanent repair.

Class 3 Structural Failures

b. Class 3 Structural Failures. Class 3 failures are not required to be reported to the OCMI if found at times other than a credit hull exam. The operator shall address all Class 3 failures at each credit hull examination. Based on location, size and type of structural member involved, the OCMI may elect to defer repairs and permit the failure to be monitored at some mutually agreeable interval with operator, particularly if the repair will set up a hard spot or stress riser making the detail more susceptible to failure.

10. Documentation of Class 2 and 3 Structural Failures

Operators of All vessels which have either a CAIP manual and/or an ABS Enhanced Survey record shall enter the types and dispositions of the failures as appropriate and in accordance with the guidelines of MSM II A5.J. or the ABS Rules pertaining to enhanced surveys. Entries of such failures on vessels not required to maintain these records will be made into the MSIS system through an MISN. The entry should be detailed to sufficiently describe the number and types of failures and where the hard copy of the repair approval is located. OCMIs are encouraged to contact the Traveling Inspectors regarding repair of Class 2 failures as a means to help insure consistency throughout marine inspection zones.

11. Relationship Between the OCMI and ABS Regarding Repair Approval

Historically, many OCMIs required operators to submit and obtain approved repair plans from ABS (or the cognizant class society) prior to presenting it to the OCMI. While this has worked successfully in most cases, there have been occasions where OCMIs have certain concerns about items not believed to be adequately addressed in the ABS approval. Typically, the OCMI waits until an approval of repairs has been received from the ABS or cognizant class society. In order to help ensure a harmonious regulatory position, all OCMIs should review any repair proposal concurrently with their local ABS counterparts to come to a decision on the acceptability of the repair proposal. This partnership facilitates the process by forging a unified regulatory review that assures that the acceptance by one party will not be disputed by the other causing untimely delays through the appeal procedures.

12. Forwarding of Class I Structural Failure Reports

Upon completion of the investigation of a Class 1 structural failure, the OCMI shall forward the CG-2692 and all supporting attachments to G-MOA for inclusion into the casualty database, via the district (m) office.

G. REPORTS OF EQUIPMENT FAILURE ONBOARD INSPECTED VESSELS

Whenever approved systems or items of approved equipment (systems or items approved under an approval number) fail, or non-approved systems fail and a dangerous condition results, Form CG-2752A, Report of Equipment Failure on Inspected Vessel, shall be submitted. This report is used to indicate failures only, not to report replacements due to normal wear or deterioration. All steering gear failures shall be reported in as much detail as possible.

H. NFPA CERTIFIED MARINE CHEMISTS

1. Requirements for Inspections Prior to "Hot Work"

The following regulations require an inspection to be made before alterations, repairs, or operations involving hot work are undertaken within cargo tanks used to carry flammable and combustible liquids or chemicals in bulk or on their boundaries, fuel tanks and their boundaries, piping, and equipment connected to cargo or fuel tanks:

	TYPE	CFR CITE
a.	Tank Vessels	46 CFR 35.01
b.	Passenger Vessels	46 CFR 71.60
c.	Cargo and Miscellaneous Vessels	46 CFR 91.50
d.	Public Nautical School Ships	46 CFR 167.30
e.	Oceanographic Research Vessels	46 CFR 189.50
f.	Mobile Offshore Drilling Units (MODUs)	46 CFR 109.573

2. Requirement for a Marine Chemist

In the U.S. or its territories and possessions, inspections preceding hot work must be made by a marine chemist certified by the National Fire Protection Association (NFPA). A list of certified chemists is contained in the annual NFPA Marine Chemists Directory. When no marine chemist is reasonably available, the regulations provide for the OCMI to select and authorize another person to perform the required inspections (see paragraph A5.I.7 below). When the vessel is not in the U.S., and no marine chemist or other person authorized by the OCMI is reasonably available, the regulations require the inspection to be made by the senior vessel officer present and properly noted in the vessel's logbook.

SAFETY NOTE: It is unsafe to conduct an ISE while a vessel is loading/discharging, even when the space is certified by a Marine Chemist. The ISE shall not be done due to the potential for changing conditions which would create a hazardous environment.

3. Functions of the Marine Chemist

The Marine Chemist will:

a. Conduct a physical inspection and test the condition of tanks and spaces;

b. Determine what previous cargoes were carried;

c. Check calibration of instruments before and after each day's use; and

d. Test spaces for oxygen (19.5 percent minimum), combustible gases (must be below 10 percent lower explosive limit (LEL), and toxic substances (minimum by threshold limit values (TLV's)). TLV's are published in the latest edition of the booklet "Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment." This is published by the American Conference of Governmental Industrial Hygienists.

SAFETY NOTE: For additional information concerning toxic vapor hazards in confined spaces, see MSM I, Chapter 10.

4. Marine Chemist Certification

The marine chemist must complete and sign a marine chemist certificate indicating the compartment is "safe for workers" and "safe for hot work" before hot work begins. A signature of receipt is required from the owner, employer, or shipyard representative responsible for posting the certificate and maintaining the conditions required by it. The certificate also states conditions under which the marine chemist should be consulted or recalled. Unsigned marine chemist certificates are invalid. The marine chemist notes the results of his or her inspection on the certificate, as well as any conditions that must be maintained by the "competent person," including:

a. Frequency and types of additional tests;

b. Further inspections;

c. Qualifications; and

d. Other pertinent instructions.

5. Standards for Marine Chemist Activities

The publication "Control of Gas Hazards on Vessels," NFPA 306 (latest edition), is the guide for the inspections required and certificates issued before alterations, repairs, or operations as described above are performed. Inspection personnel should become familiar with the provisions of NFPA 306 and the procedures that the marine chemist must follow to issue a marine chemist certificate, as well as additional requirements for bulk chemical cargo tanks and flammable cryogenic liquid (FCL) carriers.

6. "Competent Person

a. Introduction. OCMI's should become familiar with the OSHA requirements in 29 CFR 1915.12 concerning flammable and oxygen-deficient atmospheres and tests made by "competent persons." This designation is a creation of the OSHA regulations (29 CFR 1915), by which certain functions, relating to ship repair, shipbuilding, and shipbreaking are performed. A "competent person" is generally defined in the OSHA regulations as a person capable of recognizing and evaluating employee exposure to hazardous substances and other unsafe conditions. The "competent person" is also capable of specifying necessary protection and precautions to be taken to ensure the safety of employees required by the particular regulation to which the condition applies.

b. Functions. The "competent person" is responsible to his or her employer, and one or more such persons are required to be designated by employers when working conditions in a shipyard involve flammable atmospheres. If a certified NFPA marine chemist performs the duties of the "competent person" in addition to the duties of the marine chemist, that fact shall be recorded. The "competent person's" duties generally involve:

(1) Determining oxygen content in tanks or spaces prior to workers' entry;

(2) Determining concentrations of flammable vapors or gases in cargo tanks and other spaces having contained flammable or combustible liquids or gases prior to entry by workers;

(3) Maintaining safe conditions relating to cleaning and cold work in tanks and spaces having contained combustible or flammable liquids or gases;

(4) Determining concentrations of flammable vapors or gases in areas not requiring a marine chemist certificate prior to hot work;

(5) Maintaining, receipting for, and posting marine chemist certificates and appropriate warning signs;

(6) Maintaining and testing conditions in tanks and spaces after certification is issued by a marine chemist; and

NOTE: Qualifications for a "competent person" include knowledge and application of protective equipment and devices to minimize hazards from coatings and residues, fire watches, fire extinguishers, charged hoses, fresh air breathing apparatus, air purifying respirators, etc.

(7) Maintaining a log of inspections, tests, operations performed, and any instructions from the marine chemist.

SAFETY NOTE: In spaces where toxic atmospheres or residues may be present, only a marine chemist, industrial hygienist, or other person similarly qualified to recognize and test for toxic substances shall be authorized to conduct the required pre-entry tests and inspections.]

Interaction with the Marine Chemist

c. The "competent person" accompanies the marine chemist through the vessel while the latter conducts the tests and inspections necessary to certify tanks as "safe." The "competent person" normally conducts a tour of all operations at least once every 24 hours and usually more often, depending on the type of work in progress. The marine chemist is not required to conduct follow-up inspections and tests unless recalled or unless conditions affecting issuance of certificates change (e.g., opening additional tanks, transferring oil, changes in atmospheric conditions of tanks).

Interaction with Coast Guard

d. In summary, the "competent person" is charged with carrying out the responsibilities of the employer in meeting the provisions of the marine chemist certificate and additional requirements of the OSHA regulations. The OCMI's role in this process should be:

(1) Awareness of the OSHA and Coast Guard regulations relating to shipyard operations;

(2) Awareness of the employer's responsibility to follow OSHA and Coast Guard requirements;

(3) Identification of those instances where existing regulatory requirements are not being followed, either by the "competent person" or the marine chemist;

(4) Reporting violations of regulations and unsafe practices to OSHA Regional Directors (concerning "competent persons") or to Commandant (MSC) (concerning marine chemists); and

(5) Dialogue with local marine chemists, OSHA officials, and shipyard employers to gain more insight into how "competent persons" and marine chemists operate, and to resolve problems of mutual concern.

7. Substitutes for Marine Chemists

a. Introduction. Under the regulations, the OCMI may be called upon to authorize another person to perform required inspections when it is claimed that the services of marine chemists are not reasonably available. The OCMI should consider each case on its own merits, considering the usual availability of marine chemists within reasonable distances, the impact on the vessel of delays in securing marine chemists, the nature of the cargo that the vessel previously carried, etc.

b. Restrictions. If it is necessary to authorize another person to perform a marine chemist's functions, the OCMI should give greatest consideration to those persons having long practical experience in the repair of vessels, rather than those versed in theory alone. It is stressed that an authorized substitute for a marine chemist is limited by the regulations to act only in the case of an individual vessel. Blanket authorizations to act in lieu of a marine chemist are prohibited.

c. Authorization Procedures. Authorization for persons to act in lieu of a marine chemist shall be made in writing. The names of persons making such recommendations, the person(s) recommended and their credentials, the name of the vessel being examined, the shipyard or repair point, and the date of recommendation shall be indicated. Copies of such authorizations shall be kept in a separate file marked "Marine Chemists - Authorized Substitutes For." From time to time, the OCMI may be asked to report on such authorizations to determine which areas require additional marine chemists.

8. Certification Standards

The NFPA certifies each person found to be a competent marine chemist to carry out the requirements in NFPA-306. An NFPA appointed, 5-member qualification board examines each marine chemist application to determine whether all requirements set forth in Appendix A of the current Marine Chemists Directory are fulfilled. Each marine chemist must re-qualify every 5 years, by completing additional training and educational requirements to ensure that he or she remains abreast of changing technology. The Coast Guard and OSHA provide nonvoting liaison officers to the qualification board who address their agencies' policies and problem areas. The Coast Guard liaison officer relays to the board comments from field units regarding individual marine chemist performances.

9. Types of Certificates

The NFPA issues only one type of certificate. This unlimited certificate certifies that the holder is competent to discharge all duties of a marine chemist in accordance with NFPA 306, on vessels of all types and sizes except FCL carriers. A special FCL carrier endorsement on the marine chemist certificate (license) is necessary before a marine chemist is authorized to issue marine chemist (gas-free) certificates for such vessels.

I. REPAIRS AND ALTERATIONS TO MARINE ENGINEERING EQUIPMENT

1. Introduction

The requirements in 46 CFR 59 apply to the repairs of all boilers, appurtenances, and pressure vessels subject to inspection by the Coast Guard. No repairs, replacements, or alterations shall be made without prior approval by the OCMI except in an emergency. The submittal of plans and specifications for approval may be required as specified in 46 CFR 59.01-5.

2. Tailshaft Repairs

The Coast Guard will accept welded repairs to tailshafts used on ABS classed vessels when they meet ABS requirements. When possible, repairs and tests to such shafts shall be witnessed by a Coast Guard inspector. The inspector shall verify that the work was performed by a welder qualified or certified by the Coast Guard, the U.S. Navy, or ABS, and that the welding repair is satisfactory. The ABS Guide for Repair, Welding, Cladding and Straightening of Tail Shafts details the procedures for repairing cracked steel shafts by welding. This guide also contains the requirements that must be passed prior to qualification to repair cracked or corroded shafting by welding. In the case of unclassed vessels, these recommended procedures should be used by the inspector as a guide in determining whether a satisfactory repair has been made.

J. CONVERSION OF LANDING SHIPS, TANK (LST'S)

NVIC 7-56, "Manned LST's; structural reinforcement and drydocking hull inspection requirements," contains instructions for the structural reinforcement of LST's being converted for manned commercial operation in ocean, coastwise, or Great Lakes service, and for the inspection of these vessels after conversion. NVIC 11-63, "LST's as Unmanned Barges; structural reinforcement and drydocking hull inspection requirements," contains the requirements for LST's converted for use as unmanned barges (See Chapter B5 of MSM II).

K. CRITICAL AREAS INSPECTION PLANS (CAIPS)

1. Use of CAIPs

NVICs 15-91 and 15-91, Change 1 established guidance concerning the implementation and use of CAIPS. CAIPs may be applied to any vessel or class of vessel based on evidence of repetitive and significant structural failures. The purpose of the CAIP is identify, track and document the history of a vessel's structure, including the means and methods employed to mitigate structural failures through modification of substandard design and construction details. It is meant to be a living document. As a vessel ages, it can reasonably be expected that new and/or more frequent failures of the hull girder will occur due to fatigue caused by a variety of factors. These include but are not limited to repetitive cyclical loading in a seaway, stresses imposed by environmental factors, operational conditions such as route, speed and cargo operations and type of service. In this manner, causes of structural failures are addressed and permanently corrected. This eliminates the potential for performing in effect a temporary repair of a fracture or defective which immediately addresses the symptom, but does not hold up in service.

2. Use of CAIPs by Inspectors

Periodic updating of the CAIP provides that the latest and best information about the hull structure is available to inspectors attending the vessel. All inspectors assigned to hull examinations of CAIP vessels shall review the manual prior to commencing the inspection. This is particularly important for new inspectors with limited hull/structural experience as the information directs attention to areas highly susceptible for failure, provides detailed information on previously approved repair procedures which aid in evaluating a current repair proposal and ensures a consistent regulatory approach. Inspectors are cautioned that although the CAIP is an excellent "road map" for detecting fractures, the remainder of the vessel must be carefully examined as unexpected fractures, potentially indicative of new trends, could have occurred since the last examination interval.

3. Establishing CAIP Requirements

As outlined in NVIC 15-91, the following implementation procedures apply:

a. G-MOC will be the implementing authority for CAIPs on vessels operating in multiple OCMI zones. This will be based on review of Class 1 structural failure casualty data, MSIS sorts of MISNs on Class 2 structural failure entries and Traveling Inspectors reports.

b. The cognizant OCMI is authorized to establish CAlPs for vessels that operate solely within that zone. The OCMI shall notify the district and G-MOC of the CAIP initiation.

c. G-MOC will maintain a list of all vessels required to have CAIPS. This will be available in an MSIS VFSC product. As of June 1996, all tankers engaged in the Trans Alaskan Pipeline Service (TAPS) trade, including all vessels engaged in the export of oil from Valdez, Alaska to a foreign destination, are required to maintain CAIPS. Special details concerning these CAIPs are contained in Section 10.D.10. of this volume.

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4. Operator Responsibilities

When a vessel or class of vessels are designated by G-MOC for the CAIP Program, the vessel operators shall:

a. Develop a CAIP in accordance with the performance elements of Enclosure (2) to NVIC 15-91. Format of the CAIP is left to the operator's discretion as long as all the performance criteria is included in the document.

b. Submit the CAIP to the vessel's classification society for review and approval.

c. Upon classification society approval, forward a copy of the approval letter to G-MOC. Submittal of the CAIP itself is not required.

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5. CAIP Surveys All CAIP surveys are the responsibility of the vessel operator. Coast Guard inspectors are not required to be present during the surveys but OCMIs are strongly urged to assign inspectors because of the tremendous training opportunities afforded by these inspections. Vessel operators often employ highly experienced structural experts to examine and evaluate the vessel's internal structure. These individuals are generally also responsible for drafting repair proposals. Inexperienced inspectors can gain important experience pertaining to structural assessment through association with steel surveyors. The following guidelines shall be followed:

a. Notice of a CAIP survey should be given at least 15 days in advance to the cognizant OCMI.

b. If Coast Guard inspectors will attend, the operator should present the extent and schedule of the exam to the cognizant OCMI. OCMIs are encouraged to contact the Traveling Inspectors (G-MO-1) to discuss upcoming surveys. The Travelers have accumulated extensive records of many past CAIPs that would be helpful to the marine inspector.

c. The CAIP must be conducted by an individual who is qualified to conduct structural examinations. This individual may be a class surveyor, a surveyor who has been certified by a classification society, or an experienced surveyor who can provide documentation of his/her qualifications to the OCMI. Port engineers and/or ship's officers may be employed if the operator attests in writing to their qualifications. Operators are advised that CAIPs conducted by unqualified individuals will not be accepted.

d. Cleanliness of the internal structure is paramount to the quality of the CAIP survey. Cleanliness is a subjective term. However, as a minimum, critical and active repair areas should be:

(1) Sufficiently free of standing water, particularly around bottom shell master erection butts and weld wraps of mushroom or rat-hole cutouts of bottom shell longitudinals.

(2) Sufficiently free of sludge and mud.

(3) Sufficiently free of wax build up and loose scale.

(4) Cleaned to prevent soft coatings, if applied, so as to prevent or hinder fracture detection.

If the CAIP surveyor has any doubt about the cleanliness of the internal structure, further butterworthing, water-washing and/or stripping shall be conducted.

e. Surveys may be completed by any of the following methods-

(1) Rafting

(2) Staging

(3) Other techniques that apply latest and best technology, such as high resolution cameras suspended in tanks, which result in satisfactory close-up examination of the vessel structure and is acceptable to the OCMI.

Ideally, any of the physical methods employed should permit the surveyor or inspector to be no more than ten (10) feet from any structural component within the critical area defined by the CAIP.

f. Upon completion of the CAIP survey, the operator shall prepare survey report for entry into the CAIP manual. one copy shall be entered into the manual aboard the vessel. Another shall be forwarded to the cognizant OCMI for review. The operator shall provide an executive summary of the report to G-MOC. This summary is intended to be brief. It may contain only types and numbers of the various classes of structural failures noted and if these failures were in existing or new active repair areas. It is expected that these documents be prepared and forwarded within 60 days of the CAIP survey.

6. OCMI Responsibilities and Guidance

The cognizant OCMI shall ensure that the following items are adhered to:

a. OCMIs shall instruct their inspectors to review the CAIP at each drydock exam and inspection for certification to verify that the plan is updated and the required surveys have been performed.

b. When resources permit, inspectors should participate in CAIP surveys. It can not be stressed enough about what an extremely valuable training opportunity a CAIP provides to first tour inspectors. Attending inspectors should monitor the survey and assess its overall quality and completeness.

c. When OCMIs are advised of fractures, they shall require and monitor repairs as required by MSM II A5.E.2.

d. OCMIs should conduct a thorough review of CAIP reports to determine if the periodic information from NVIC 15-91 is provided. The following areas should be of particular interest:

(1) Scope of the survey

(2) Qualifications of the surveyor

(3) Fractures reported as required.

(4) Repair proposals submitted by the operator are acceptable within the established guidelines. Repair procedures specifically to TAPS tankers can be found in MSM II B4.D.10.

e. CAIPs provide a historical record of the vessel's structural failure and repair history. This history should be employed to evaluate current repair proposals. if certain construction details or prior repairs continue to fail, repairs in kind should not be authorized. OCMIs shall notify operators of their responsibility to improve the deficient detail(s) and work in conjunction with the operator and vessel's class society to mitigate reoccurrence. Conversely, OCMIs and attending surveyors should recognize the effectiveness of prior repairs and design modifications and accept current repairs done in accordance with these procedures. This supports consistency across OCMI zones.

f. When Class 1 fractures occur, OCMIs shall require a failure analysis or non-destructive testing of steel samples in accordance with A5.E.7.e. of this volume. The CAIP process was developed to analyze structural failures and prevent or mitigate their recurrence. Such analysis is vital to this effort.

g. A history of recurring structural failures combined with an operator's reluctance to develop a permanent solution to their cause is sufficient grounds for the OCMI to recommend to Commandant (G-MOC), via the cognizant district (m), that a vessel be restricted from a particular trade, or, removed entirely from service. This is obviously a complex process that will require several levels of review. However, nothing is intended to limit the OCMI's authority to remove a vessel's Certificate of Inspection if it is determined that the vessel cannot safely operate within its design parameters.

h. After review of the CAIP survey report, the OCMI shall ensure that the proper CAIP survey information is entered into MSIS.

i. Vessels in the ACP. Several vessels required to maintain CAIPs have been accepted into the pilot Alternative Compliance Program (ACP). These vessels are inspected by ABS on behalf of the Coast Guard and are subject to oversight only. All oceangoing tankships classed by the ABS are required to follow Enhanced Survey guidelines in addition to normal survey requirements. The Enhanced Survey requirements closely parallel CAIP standards and are deemed equivalent as permitted by NVIC 15-91, Change 1, for the normal twice in five-year drydock interval. However, the Enhanced Survey guidelines do not specify any annual survey requirements. Thus, strictly adopting the ABS guidelines for Enhanced Survey causes the operator to not comply with the Coast Guard standards if the vessel is subject to an annual CAIP requirement. Consequently, when oversighting these vessels, the OCMI must determine that the vessel has completed an annual CAIP to NVIC 15-91, or, that the Enhanced Survey guidelines have been formally extended by ABS to the annual interval and that the required surveys have been performed. Failure to conduct either examination within the prescribed interval will cause the vessel to be removed from service until done and possible civil penalty procedures initiated against the operator.