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NOTICE OF CHANGE

MIL-STD-1625C(SH)
NOTICE 1
30 December 1992

MILITARY STANDARD

SAFETY CERTIFICATION PROGRAM FOR DRYDOCKING FACILITIES AND SHIPBUILDING WAYS FOR U.S. NAVY SHIPS

TO ALL HOLDERS OF MIL-STD-1625C(SH)

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FOREWORD

1. The Safety Certification Program (SCP) for drydocking facilities and shipbuilding ways, including transfer facilities, has been established to ensure the safety of U.S. Navy ships which are to be drydocked or built on these facilities. The procedure entails an evaluation and approval of data associated with the design, material condition, and operation of the facilities. This procedure is described in detail in this Military Standard (hereinafter referred to as the "standard").

2. The certification procedures, contents of certification reports, and technical requirements for certification are described in this standard. The SCP description and general certification requirements are provided in section 4. Detailed technical requirements are described in sections 5 through 9.

3. This document is applicable for certifying Navy-operated and commercially-operated drydocking, building, and launching facilities: but does not necessarily reflect all of the design requirements of dry docks, building ways or launch ways which are required by new design ship specifications.

4. The certification of a facility is based upon the evaluation of the facility data provided for certification by the operating activity. The operating activity remains solely responsible for maintaining and operating the facility in a safe manner and condition.

5. Certification of U.S. Navy dry docks leased to commercial operators should be obtained by the operator prior to docking Navy ships. The Navy is not responsible for providing or preparing certification data. Certification of the dock is not required for docking non-Navy ships.

6. In any safety program, there is the need for a strong position regarding the training of personnel. Training programs should ensure that new personnel are adequately qualified to perform their assigned functions and that every person has a sound knowledge of how their work station interacts with others. The programs should also have provisions for qualified personnel to periodically review the responsibilities and qualifications of their work stations, and for retraining or requalification whenever new procedures or operations are introduced.

7. Where terms are used herein such as "submitted", "submitted to the Navy", "provided to the Navy", or "made available for Navy review", the recipient is intended to be:

(a) The Naval Sea Systems Command (Industrial and Facility Management Directorate) when a Navy shore or fleet activity is submitting the certification report for its own drydocking facility.
(b) The Supervisor of Shipbuilding, or other designated Navy representative, when a U.S. Navy contractor is submitting the certification report for his own or leased drydocking facility.

CONTENTS

1. SCOPE

1.1 Scope of the safety certification program (SCP). The purpose of the SCP is as follows:

1.1.1 Purpose. The purpose of the SCP is to ensure the safety of U.S. Navy ships during docking and undocking operations and while in dock. It also relates to the safety of ships under construction and during launching operations. The capacity of the facility as designed is to be ascertained, as well as the current material condition of the facility with regard to its foundations, structure, and supporting auxiliary systems, including those for ship protection. Also included is an assessment of operating procedures, manning and personnel qualification procedures, and maintenance procedures supporting operational reliability.

1.1.2 Limitations of SCP scope. The scope of the SCP excludes the following; however, compliance in these areas may be under the cognizance of other Government agencies:

(a) Personnel safety. Requirements of agencies, such as the Occupational Safety and Health Administration.
(b) Mechanical handling system. Safety requirements in the design and operation of equipment, such as cranes.
(c) Pollution control systems. Pollution control systems, such as those required by the Environmental Protection Agency.
(d) Service systems. Facility subsystems which are installed solely to provide habitability and housekeeping services to the ship, such as potable water and steam for heating and galley. The facility subsystem raw and salt water is included in the scope of SCP to the extent that it supports ship protection systems.
(e) Industrial systems. Systems used in industrial services, such as welding or abrasive blasting.

1.2 Facilities included in SCP. Facilities included in SCP should be in accordance with 1.2.1.

1.2.1 Size. There is no lower limit on the size of facilities which may be certified under the SCP. However, in order to provide regulatory flexibility at the lower end of the scale, a two-tier classification is established so that facilities having a capacity of 500 long tons or less have reduced requirements for documentation of Facility Certification Reports (FCRs) and Facility Recertification Reports (FRRs). More extensive requirements for such documentation apply to facilities having a rated capacity of more than 500 long tons. This gradation of documentation requirements does not imply a lessening of safety considerations at any facility.

1.2.2 Type. Floating docks, graving docks, marine railways, vertical lifts, conventional inclined building ways, and building ways employing modular construction methods are included in the SCP.

1.2.2.1 Nonpermanent facilities or facilities of unusual design. Nonpermanent facilities or facilities of unusual design used for performing functions similar to those of the facilities referenced in 1.2.2 are also covered by the SCP. The process leading to certification of nonpermanent facilities or unusual facilities will normally be conducted more expeditiously and economically by submission and review of a preliminary FCR as indicated in 4.3.2.

1.2.3 Facilities located abroad. Facilities located outside the U.S. are included in the SCP only if they are operated by the U.S. Navy.

1.2.4 Facilities for nuclear-powered ships. This standard serves as a certification document for docking U.S. Navy ships. Additional requirements which are appropriate solely to docking nuclear-powered ships will be invoked by the Navy to supplement the requirements herein.

1.3 Applicability of the SCP. The SCP is applicable to U.S. Navy ships, as defined by the Naval Vessel Register, and Military Sealift Command (MSC) ships under construction. U.S. Navy service craft and small boats, and ships operated by the MSC are not included in the scope of this standard.

2. REFERENCED DOCUMENTS

2.1 Government documents. The following Government documents form a part of this standard to the extent specified herein.

PUBLICATIONS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

0901-LP-480-0015 - Piping Systems.
S9086-C6-000/CH096 - Weights and Stability.
S9086-7G-000/CH997 - Docking Instructions and Routine Work in Drydock.

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

P-355 - Seismic Design for Buildings.
P-355.1 - Seismic Evaluation of Supports for Existing Electrical-Mechanical Equipment and Utilities.
DM-29.1 - Graving Drydocks.
DM-29.2 - Marine Railways.
DM-29.3 - Drydocking Facilities Characteristics.

(Copies of publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

3. DEFINITIONS

3.1 Acronyms and abbreviations. The acronyms and abbreviations listed in this standard are defined as follows:

(a) CRC - Certified rated capacity
(b) FCR - Facility certification report
(c) FRR - Facility recertification report

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(d) GM - Metacentric height
(e) KG - Vertical center of gravity above the keel
(f) LCG - Longitudinal center of gravity
(g) LCB - Longitudinal center of buoyancy
(h) LT - Long tons
(i) NAVFAC - Naval Facilities Engineering Command
(j) NAVSEA - Naval Sea Systems Command (Industrial and Facility Management Directorate)
(k) NDT - Non-destructive testing
(l) NSTM - Naval Ships' Technical Manual
(m) SCP - Safety Certification Program
(n) SUPSHIP - Supervisor of Shipbuilding, Conversion and Repair, USN
(o) VCG - Vertical center of gravity

3.2 Definitions of special terms. The following definitions shall be used in this standard.

(a) Configuration control procedures. The configuration control procedures are the procedures used to systematically evaluate, coordinate, approve (or disapprove), and accomplish changes after the baseline certification.
(b) Control inspection. A control inspection is an inspection composed of planned and scheduled examinations and tests to determine conditions of a facility and its equipment with respect to their abilities to perform all functions for which they were separately and interrelatedly designed; and to determine the need for repairs, alterations, or changes to ensure the material readiness of a facility to carry out its design functions.
(c) Correction of deficiencies. Correction of deficiencies is the act of restoring a facility to a condition equivalent to its original or design function, capacity, and efficiency by repair, overhaul, replacement or alteration.
(d) Deviation. A deviation is the departure from a specific requirement of this standard when adequate compensating features, as determined by the U.S. Navy, are provided in lieu of meeting this requirement.
(e) Facility. A facility is a physical plant for drydocking or building and launching ships.
(f) Facility operations supervisor. The term facility operations supervisor will be used herein to designate the dockmaster, docking officer, launching superintendent, or other title used to indicate an individual responsible for supervising the operations of a facility covered by this standard.
(g) Graving dock launch pontoon. A graving dock launch pontoon is a pontoon which is captive in a graving dock and never leaves this protective location; it is lowered not by flooding, but by lowering the water in the graving dock. Certain damage, weather, and operational considerations which apply to launch pontoons do not apply to graving dock launch pontoons because of their different construction and operation.

(h) Launch pontoon. A launch pontoon is a floating dry dock utilized for launching ships, that moves from the ship transfer site to a submergence site.

(i) Lay period. A lay period is the period between the docking and undocking evolution, during which a ship is in the facility.

(j) Light dock operating condition. The light dock operating condition for a floating dry dock is the dock with all ballast tanks pumped down to the residual water level. The dock weight in this condition includes the weight of the keel and bilge blocking system up to a horizontal plane formed by the top of the keel blocks at the standard height used for the maximum ship intact stability calculations.

(k) Margin line. A margin line is a line 3 inches below the top wingwall deck at the side, defining the highest permissible location on the side of a floating dry dock of any waterplane in the final condition of sinkage, trim, and heel.

(l) Operator. An operator is a commercial or Naval shipyard, or Naval activity operating a facility, applying for certification.

(m) Preventive maintenance. Preventive maintenance consists of periodic examination, lubrication, minor adjustment, and minor repair of items to ensure the continuous operation and safety of a facility and its equipment.

(n) Seismic zone. A seismic zone is a system for indicating the probability and severity of earthquakes within a designated area. An arbitrary scale of 0 through 4 is used, together with an adjective description of the likely extent of damage. NAVFAC P-355 contains contour maps showing the seismic zone classification of various land areas.

(o) Sill of the stern (or bow,) gate of a closed-ended dock. The sill of a gate is the upper surface of the dock structure against which the bottom of the gate makes contact.

(p) Small facility. A small facility is one with a CRC of less than 500 LT.

(q) Survey. A survey is the thorough evaluation of the material condition and operational capabilities of the facilities.

(r) Surveyor. A surveyor is the engineering firm or classification society selected by an operator to perform surveys, tests and trials of the facility.

(s) Ton. A ton is the weight unit used interchangeably with LT in the field of naval architecture; equal to 2,240 pounds.

4. GENERAL REQUIREMENTS

4.1 General. This section provides an overview of the SCP, general requirements for certification of drydocking facilities and building ways, and requirements for operation of certified facilities.

4.2 SCP overview. The SCP is described in 4.2.1 through 4.2.10.

4.2.5.3.2 Facility certification will be temporarily suspended from the commencement of overhaul until review and approval of a post-overhaul report by the cognizant Fleet Commander, SUPSHIP, or Naval Shipyard Commander. (Overhaul is when a drydocking facility undergoes repair to the extent that docking operations are terminated for over 90 calendar days.) The post-overhaul report shall be submitted by the operator via the chain of command and shall include the following:

(a) The material condition is satisfactory to drydock ships within the certification limitations.
(b) The personnel qualification procedures and manning procedures are adequate, and the assigned operating personnel are trained.
(c) The operating procedures are validated.
(d) The methods and procedures for protection of a ship during the lay period are current and adequate.

4.2.6 Facility modifications after certification. If the operator chooses to modify his facility, the following shall be submitted:

(a) An intended design change report describing the proposed change and modification dates and the effect of this change on the facility's capacity.
(b) A revision to the certification report after completion of the change, containing updated design data and new capacity of the facility, as appropriate. In addition, the operator shall submit the revised manning, operational limitations, and operating procedures compatible with the physical modifications.
(c) Report on the completion of the scheduled change, if not included in the revised certification report.

4.2.7 Reporting requirements. The operator of a certified facility shall make a report to the Navy if:

(a) The facility is modified to the extent that the basic design or capacity is changed (see 4.2.6).
(b) Key personnel changes occur (see 4.2.8).
(c) The operating procedures are modified or the manning is revised (see 4.2.9).
(d) Repairs or modifications prescribed in the activity's corrective action and monitoring plan are completed (see 4.5.5).
(e) Incident or accidents occur (see 4.8.3).

4.2.8 Key personnel changes. The operator shall report key personnel changes to the Navy two weeks prior to any dockings, or immediately when there is a ship in the dock, if there is a change of status of any individual for whom a facility operations supervisor qualification certificate has been issued or upon the initial designation and certification of any new facility operations supervisor (see 4.7.2). If the qualified facility operations supervisor is no longer capable, or leaves the operating activity without a qualified replacement, certification of the facility will be suspended automatically until NAVSEA has received and approved the qualifications required by paragraph 4.7.2.2.

4.2.9 Changes in operating procedures. Changes in operating procedures shall be reported to the Navy before these changes are put into operation for handling Navy ships under any of the following conditions:

(a) The procedures are being altered because of changes in facility design and manning.
(b) The procedures are being changed because of an incident of the type described in 4.8.3.1.

4.2.10 Certification alteration. After reviewing any change report, the Navy may, at its discretion, alter or suspend certification as indicated in 4.2.5.

4.3 Certification reports. Certification reports shall be as described in 4.3.1 through 4.3.4.2.

4.3.1 Types. There are three types of certification reports:

(a) A preliminary FCR whose purpose is defined in 4.3.2.
(b) An FCR submitted for the initial certification of a facility.
(c) An FRR submitted for renewal of certification.

4.3.2 Preliminary FCR. Preliminary FCR shall be as follows:

4.3.2.1 Purpose. A preliminary FCR may be submitted to obtain concurrence from the Navy on certification requirements proposed by the operator for certification of nonpermanent facilities or facilities of unusual design. A preliminary FCR may also be submitted to obtain a ruling from the Navy on requested deviations which are considered necessary by the operator and which can be justified as specified in 4.3.2.2. Additionally, a preliminary FCR may be submitted for guidance from the Navy on the contents of the design data package to be generated and included in the FCR, when a significant portion of the facility's original design data is missing.

4.3.2.2 Content. The preliminary FCR shall be written in the form of a concise, self-contained proposal, providing the necessary background information and justification for the proposed requirement changes and FCR content. The initial submittal of the document to NAVSEA shall be as complete as possible in order to keep the time required for a complete review to a minimum. In case of nonpermanent facilities or facilities with unusual design, the operator shall propose certification criteria which reflect the special design and operating conditions of the facility. If deviations are requested, the operator shall demonstrate in the preliminary FCR the necessity for the deviation, shall thoroughly describe compensating design and operating features, and shall demonstrate that safety will be preserved.

4.3.2.3 Format. For format requirements, see appendix A, 20 through 20.5.

4.3.2.4 Submission. For submission requirements, see 4.3.3.5.

4.3.3 FCR. The FCR shall be as follows:

4.3.3.1 Content. FCR contents are described in 30 of appendix A.

4.3.3.2 Responsibility. The operator is responsible for preparation of the FCR and the accuracy of its contents.

(a) Establish a draw down curve during a dewatering cycle by taking piezometer readings every 1/2 hour. Record piezometer readings monthly and compare to the draw down curve. Submit an annual report containing summary data to NAVSEA for evaluation.
(b) Annually, record elevations of the dock's floor, walls, and crane rails in order to determine any differential settlement or heave. Submit summary data in an annual report to NAVSEA.
(c) After each earthquake producing a site acceleration of 0.08g or greater, or every five years, whichever comes first, record cracks in the walls and floors at selected locations. Report any perceived significant increase in crack size or seepage rate to NAVSEA.
(d) Monitor and, if possible, record seepage rates at significant locations. Report any perceived significant increase in seepage to NAVSEA.
(e) Monitor annually the growth of existing voids or the development of new voids under the dry dock floor at existing holes.

4.5.3 Surveyor's endorsement. The surveyor shall review and endorse the corrective action plan and monitoring plan.

4.5.4 Responsibility. After the Navy's review and acceptance of the certification report, the actions and schedule specified in these plans become mandatory for the operator. Records of facility repairs and modification and records of observations on monitored systems shall be maintained by the operator for 5 years.

4.5.5 Reporting requirements. The operator of a facility shall report to the Navy when he completes the repairs or modifications prescribed in his corrective action and monitoring plan as directed by the Navy.

4.6 Design data and calculations. Design data and calculations shall be in accordance with 4.6.1 through 4.6.3.

4.6.1 General. Detailed requirements are specified in the following sections:

(a) Floating dry docks - Section 5
(b) Graving docks - Section 6
(c) Marine railways - Section 7
(d) Vertical lifts - Section 8
(e) Building ways - Section 9

4.6.1.1 Nonpermanent facilities or facilities of unusual design. After having reviewed preliminary FCRs prepared in accordance with 4.3.2, the Navy will, if necessary, modify the requirements of 4.6.

4.6.1.2 Design data. If the operator lacks original design data, he may propose inclusion of new drawings, descriptions, and calculations, and may obtain the Navy's guidance by submitting a preliminary FCR, as indicated in 4.3.2. Historical evidence of past performance of the facility is also admissible.

4.6.1.3 Evaluation of the present state of the facility. The scope of calculations needed to demonstrate that the facility is certifiable in its present state shall be determined by the operator and surveyor after having examined the survey results.

4.6.1.4 Deviations. Deviations from the criteria set forth in this standard will be considered on a case-by-case basis and acceptance is at the option of NAVSEA. If deviations are requested, necessary justification for the deviations shall be provided. The justification shall include compensating features which shall ensure that safety will be preserved.

4.6.2 FCR content. Design data and calculations submitted for initial certification shall include the following:

(a) A general description and history of the facility, as indicated in appendix A, 30.3.2.
(b) Drawings, sketches, descriptions, and calculations that describe the facility shall be included as enclosures to the FCR, as indicated in appendix A, 30.4.2, to satisfy the detailed require ments described in sections 5, 6, 7, 8 or 9 (as applicable).
(c) Facility data and calculations which demonstrate that the facility is certifiable in its present state for the rated capacity proposed by the operator shall be included in the report. The scope of these data depends upon the requirements of sections 5, 6, 7, 8 or 9 (as applicable) and evaluation of survey results as specified in 4.4.1.

4.6.3 FRR content. Design data and calculations submitted for certificate renewal shall include the following:

(a) If the facility has been modified since the last certification, drawings, sketches, descriptions and calculations shall be provided to describe the changes in design (see appendix A, 30.4.2).
(b) The design data and calculations submitted shall be as described in sections 5, 6, 7, 8 or 9 (as applicable).

4.7 Manning procedures and personnel qualification criteria. Manning procedures and personnel qualification criteria shall be in accordance with 4.7.1 through 4.7.2.2.

4.7.1 Manning procedure. A manning procedure shall be prepared for the facility. The procedure shall be available to the facility operations supervisor and shall describe the stations to be manned, the functions to be performed, and the qualification criteria for personnel manning those stations during all operating evolutions. The procedure shall include personnel required for casualty or damage control.

4.7.2 Personnel qualification criteria. The operator shall ensure that personnel are qualified through training and experience. The operator shall provide the qualification criteria required for an individual to man the stations described in the procedure required by 4.7.1. As an alternative qualification method, an operator may provide documented qualification criteria by referencing recognized standards, such as personnel qualification standards in the case of Navy operators.

4.7.2.1 Facility operations supervisor. Each operator shall designate at least one facility operations supervisor who is qualified to conduct dockings and undockings or launching operations, as applicable, on each facility for which certification is requested. The facility operations supervisor shall be at the facility or available for immediate recall while a Navy ship is in the facility. The facility operations supervisor shall be available within one hour by automobile from the facility. Building ways are exempt from this requirement prior to the initial launching or outfitting of a Navy ship.

4.7.2.2 Qualifications and certification of a facility operations supervisor. A facility operations supervisor shall be professionally qualified through training and experience to conduct all evolutions in a safe, proper, and reliable manner. The operator shall provide a certificate of qualification and designation for each facility operations supervisor. The facility operations supervisor certificate, which meets the requirements of appendix C and is approved by the operator's top management, provides the means for making the operator's facility operations supervisor qualification a matter of record. When a Navy ship is drydocked or launched, the certification shall be submitted, whether the operator is performing the work under a master ship repair contract or some other type of Navy contract. Navy docking officers shall be certified. A sample form for facility operations supervisor certification is shown on figure 1. In addition to the certificate of qualification, the operator shall provide a resume of the training and qualifications for each individual designated as a facility operations supervisor. An outline for the requirements of a facility operations supervisor is presented in appendix C.

4.8 Operating procedures. Operating procedures shall be in accordance with 4.8.1 through 4.8.3.2.

4.8.1 General. Complete operating procedures for the docking facility shall be prepared and included in the certification report. These operating instructions, or related portions thereof, shall be available at the appropriate stations and to the facility operations supervisor. Typical requirements for these procedures are as follows:

(a) Procedures for operating the facility shall be prepared and made available in writing to the facility operations supervisor. They shall include a plan for operation and shall assign responsibilities for each phase of the evolution.

(b) Facility operating procedures shall be in step-by-step detail. These procedures shall include checksheets for use in prerequisite checks of dock systems status before facility operations are initiated. Additionally, formal prerequisite checks are required for critical ship interface items, such as underwater appendages and hull fittings. Checksheets shall also be used to ensure that facility systems are properly secured and that ship protection systems are prepared for the ship's lay period.

(c) Verification signature requirements shall be included for critical steps in the operating procedures and in the checksheets for prerequisite and docking or undocking checks.

(d) Calculations of ship stability, prior to drydocking.

(e) Operating procedures shall ensure the provision of vital dockside services which shall include, but shall not be limited to, continuous fire protection for the ship. However, hookup of a hose to the ship to provide fire protection is not required prior to the ship being well landed on the blocks if this hookup would delay the docking sequence or create a problem in controlling the ship's list.

(f) Additional requirements for operating procedures which cover various facility types are specified as follows:

(1) Floating dry docks (see 5.7).
(2) Graving docks (see 6.6).
(3) Marine railways (see 7.7).
(4) Vertical lifts (see 8.6).
(5) Building ways (see 9.6).

4.8.1.1 Emergency procedures. Emergency operating procedures for casualty and damage control during the operation of the facility shall be specified in advance. These procedures are written for conceivable events, or series of events which may be in progress and which will cause damage to equipment unless correct procedural steps are taken immediately. The nature and speed of these events are such that proper and correct procedural steps will serve not only to limit damage to the facility, but also to prevent or minimize damage to the ship. Conceivable events include system or component breakdowns such as structural failures, equipment failures, and power loss situations. The procedures for the following events shall be included in the certification report as a minimum for each facility:

(a) Fire.
(b) Flooding.
(c) Loss of communications.
(d) Power loss situation.
(e) System or component failure.

These procedures shall clearly state, for each casualty event, the initial response actions and the individual or operating station responsible. The appropriate emergency operating procedures shall be posted or readily available at the applicable operating station.

4.8.2 Requirements for operation of a certified facility. The requirements for operation of a certified facility are as follows:

4.8.2.1 CRC. A certified facility shall not be used for docking or building Navy ships whose weights, block loadings or stability calculations exceed the limiting values specified for certification. Also, operational limitation applied to the facility during certification (see 4.2.4.2) shall not be violated. If an operator uses his facility to accommodate a commercial vessel that exceeds the CRC, he shall demonstrate to the Navy that the structural limitations of the facility have not been exceeded and that the facility is safe for the accommodation of Navy ships. One method of demonstrating that the structural and stability limitations of the facility have not been exceeded is to provide calculations in the certification report for a "maximum ship" situation. The "maximum ship" calculations provided in the certification report may then be compared to the loading experienced when accommodating a particular commercial vessel, thus establishing whether or not the facility has been stressed beyond the structural limitations.

4.8.2.2 Requirements for operational limitations and stability consider-ations for a particular ship. In addition to the requirements for an FCR, operational limitations and stability data shall be determined and made available to the Navy, or documented and submitted when requested, prior to a particular ship being docked, constructed, fleeted or launched. The documentation shall demonstrate that the particular ship and facility is within the constraints imposed as a result of this standard. These requirements vary by type of facility as detailed in subsequent paragraphs. The documentation shall include the principal dimensions of the facility and the ship, loading conditions of the facility and the ship, blocking loads, clearance over the blocks, intact and damage stability and other pertinent data as required to demonstrate that the ship's safety will not be impaired. For floating dry docks, buoyancy and stability limitations including the GM of the ship and dock system shall also be included.

4.8.2.3 Planning. Using the operating procedures specified in the certification report and the pre-docking or pre-launching surveys as a guide, the following shall be prepared for use during docking or launching operations for each Navy ship:

(a) Sequence and description of important steps.
(b) Pumping and flooding plan (where applicable).
(c) Docking logs and checklists showing required data entries and verification signatures for the evolution to be performed; that is, docking, undocking, launching, and so forth.

4.8.2.4 Normal operation. The following requirements shall be met under normal operation of a facility:

(a) The facility shall be operated in strict compliance with the written operating procedures.
(b) The completed and signed logs (see 4.8.2.3(c)) shall be filed and maintained for a period of 5 years.

4.8.2.5 Emergency operation. Emergency operations shall be carried out as follows:

(a) Emergency operations for which procedures have been defined in advance (see 4.8.1.1) shall be carried out in accordance with these procedures.
(b) Emergency operations undertaken for the first time, and for which procedures have not been developed in advance, shall be analyzed and recorded. Records of these operations shall be prepared as required in these procedures and shall be maintained until the next certification report is filed. If necessary, operating procedures shall be revised to prevent recurrence of the emergency, and procedures shall be developed to deal with similar emergencies in the future.

4.8.3 Accident and incident reports. Accident and incident reports shall be as follows:

4.8.3.1 Requirements. The operator shall submit a report to the Navy in the format shown in Appendix J under any of the following circumstances:

(a) The facility is damaged to such an extent that its ability to operate safely is diminished. This report shall be required whether or not a ship is in the facility at the time damage occurs and whether or not the cause of the damage was natural or man-made.

(b) Either a ship, the facility or both, are damaged and the total repair cost is expected to exceed $50,000.
(c) For any incident where unplanned flooding occurs beyond the control of normal drainage procedures for the lay period.

4.8.3.2 Submission. A preliminary incident report describing the extent of damage shall be submitted within 24 hours of the incident. Within 1 month after the incident, a detailed written report shall be made and shall contain the information required by Appendix J. Failure to meet these reporting requirements shall result in suspension of certification.

4.9 Protection of a ship during the lay period. The requirements for protection of a ship during lay period shall be in accordance with 4.9.1 through 4.9.5.

4.9.1 Applicability. This portion of the standard concerns itself with the capabilities of, and planning by, the operator to protect the ship in the facility during the lay period. For the purpose of this SCP, protection during the docking or undocking operations is specified in 4.8.

4.9.2 Security patrol and fire watch during the lay period. The operator shall provide adequate security and fire watch patrols for protection of the ship. The method of manning these patrols, the frequency of such patrols, the equipment available for emergencies, and the written procedures for these patrols (including their responsibilities) shall be furnished as part of the certification report. Alarms, communications and facility lighting shall be included

5.3.3 Stability and buoyancy. The calculated stability and buoyancy characteristics shall be provided as part of the initial facility certification, and need only be updated in the case of changes. The principal dimensions, displacement, and centers of gravity of the assumed "maximum ship" used in the calculations shall be provided. These calculations shall be by an approved method, such as the Ship Hull Characteristics Program. This does not obviate the preparation of stability calculations and a pumping plan for docking a particular ship. When preparing individual U.S. Navy ship pumping plans where the blocking heights differ from the standard, the light dock weight and center of gravity shall be modified as necessary in the calculations. Procedures for preparation of a pumping plan, required to ensure the stability of the ship-dock combination, and a sample format shall be included in the certification document. Guidance for preparation of a pumping plan is provided in appendix D.

5.3.3.1 Stability and buoyancy criteria. The dock shall meet the intact and damaged stability and reserve buoyancy criteria specified below:

(a) Buoyancy requirements. The available buoyancy shall be determined on the basis of the rated freeboard requirements:

(1) Open-ended docks. The minimum rated freeboard at the lowest point of the pontoon deck of the dock (excluding pits) with the ship lifted shall be as graphically depicted on figure 2 and described as follows:

a. For docks of 12,000 tons capacity or less, 12 inches of freeboard.
b. For docks of 18,000 tons capacity or more, 18 inches of freeboard.
c. For docks with capacities of between 12,000 and 18,000 tons, defined by a linear progression of between 12 and 18 inches, respectively, of freeboard.

(2) Closed-ended docks. Minimum freeboard with the ship lifted shall be 12 inches, measured from the sill of the stern (or bow) gates.

(3) Docks in the fully ballasted-down condition. Minimum freeboard (measured from the top deck at side) in the fully ballasted-down condition shall be 3.25 feet. "Fully ballasted-down" shall mean:

a. Tanks 100 percent full in docks where the bottom of the tank vent terminates at the level of the top of the tank.
b. In docks designed on the isothermal compression principle, to the ballast free surface level in the compressed state. Calculations shall be provided to prove the setting of the vent bottoms will limit submergence. Condition of maximum submergence shall be verified during the submergence test required by 5.6.3.

(b) Intact stability requirements. The intact stability shall be determined for all modes of operation, including the five phases shown on figure 3. Longitudinal stability shall be included for phases 3 and 4. Free surface effects shall be determined and included in the calculations. Intact stability shall meet the requirements stated below:

(1) GM in the phase of minimum stability shall meet the requirement shown on figure 4.
(2) The dock shall withstand the effects of beam winds stated below without heeling more than 15 degrees.

a. Determine the angle of heel under 90-knot beam wind, when the ship is fully docked, ship and dock system in phase 5 shown on figure 3.
b. Determine the angle of heel under 20-knot beam wind, when the ship and dock system is in its minimum-stability phase.
c. Determine the wind velocity which would cause 15 degree heel when the ship and dock system is in its minimum-stability phase.

The heeling arm shall be calculated as follows:

Heeling arm due to wind
$= (0.004\ V2 \times A1 \times \cos^2\theta)/(2240 \times \text{displacement})$

Referring to figure 5:

A = combined projected sail area of ship and dock, square feet.
l = lever arm from half draft to the centroid of sail area, feet.
V = nominal wind velocity, knots.
θ = angle of heel.

(c) Damaged stability and reserve buoyancy requirements. The intent of the damaged stability and reserve buoyancy requirements is to provide the dock with the capability to withstand a moderate level of damage and resultant flooding, such as could be the result of improper operation, system failure, physical injury from external hazards and so forth, without unduly endangering the ship. The dock shall withstand the following damage and resultant flooding for the worst combination of sinkage, heel, and trim without heeling more than 15 degrees, trimming more than the lesser of 3 degrees or 20 feet, submerging the margin line (see 3.2) or exceeding the maximum allowable differential heads provided under 5.3.4.1(h) and (i).

(1) In the fully ballasted condition, phase 1 shown on figure 3, the following two types of casualties and resultant flooding shall be assumed:

a. Side shell damage: Damage shall be assumed to occur between main transverse bulkheads with penetration up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured.

b. Bottom shell damage: Damage shall be assumed to occur between main transverse bulkheads such that the complete space between main transverse bulkheads floods. The safety deck may be assumed to remain watertight.

(2) In the deballasted condition with ship on the blocks, phase 5 shown on figure 3, the following two types of casualties and resultant flooding shall be assumed:

a. Side shell damage: Damage shall be assumed to occur on the side shell at a main transverse bulkhead such that the two adjacent tanks or spaces are flooded. Damage shall be assumed to penetrate up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured. For closed-ended docks, the basin shall be assumed flooded.

b. Bottom shell damage: Damage shall be assumed to occur on the dock bottom at the intersection of a main transverse watertight bulkhead and a main longitudinal watertight bulkhead such that all tanks or spaces adjacent to the intersection are flooded. The safety deck shall be assumed to be undamaged. For closed-ended docks, the basin shall be assumed flooded.

If access openings, tank air vents, or other openings which would allow unrestricted flooding into undamaged spaces are below the final damaged waterline, flooding of these spaces shall be taken into account. Utilization of pumping, grounding of the dock, or any contribution of the mooring system to limit sinkage, heel, or trim shall not be considered. When assessing the flooding of a damaged tank (in the deballasted condition), the tank level shall be assumed to be at the residual level. The buoyancy of the docked ship shall not be included.

Docks previously certified to stability and buoyancy requirements shall continue to be certified to those requirements and shall not be required to meet the above requirements. Docks constructed prior to the effective date of this document for which initial certification is being requested shall meet stability and buoyancy requirements consistent with those applied to certified docks of similar age. As specified in 4.6.2 and 5.3.3.2, calculations and other pertinent design and construction data which demonstrate the ability of the dock to meet the above requirements shall be submitted. The calculations shall be made on the premise that the basin depth is sufficient to allow the maximum calculated sinkage, heel, and trim. If basin depths limit the sinkage, or angle of heel or trim, it shall be reported in the FCR but will not govern certification.

5.3.3.2 Design data. The following design data shall be provided for the facility as designed, if new, or for the facility in its present material condition:

(a) A light dock weight determination - this summary weight estimate shall show the dock in the light operating condition with all ballast tanks at the residual water levels. A correction shall be added for silt accumulation in the tanks.
(b) Curves of form.
(c) Tank capacity tables or curves. These shall include a table, or a set of curves as shown on figure 6, which shows the water levels required in each tank to maintain the dock at a given draft. These curves shall be developed to ensure that the LCB and LCG of the ballasted dock coincide. A combined set of curves that relates the water levels and tank capacities to the external draft of the dock may be presented.
(d) Buoyancy calculations to determine the maximum lift capacity based on the minimum freeboard criteria of 5.3.3.1 and the light dock weight determination. A curve of lift capacity versus LCB may be presented.
(e) Stability calculations to substantiate that the dock meets all intact and damaged stability criteria of 5.3.3.1. A lifting capacity curve of ship's adjusted VCG versus lifting capacity (see figure 7) shall be presented based on the dock in the phase of minimum intact stability with the rated minimum GM from figure 3 and on damage stability for the dock in phase 5 with a ship on the dock. The ship's adjusted VCG is defined on figure 8.

5.3.3.3 Evaluation of present stability and buoyancy condition. The maximum lifting capacity, buoyancy and stability shall be verified by substantiating the weight estimate by a deadweight survey or inclining experiment required by 5.6.2.

5.3.4 Structure. The dock structure shall be as follows:

5.3.4.1 Structural design data. The following structural data shall be provided for the facility as designed, if new, or for the facility in its present material condition:

(a) Maximum allowable bending moment calculation.
(b) Transverse strength calculation substantiating the maximum allowable pontoon deck loading in LT per linear foot.
(c) Longitudinal deflection calculation corresponding to maximum allowable bending moment.
(d) Maximum keel block, side block, and hauling block loading calculations.
(e) Maximum pontoon deck loading at other than keel block and side block locations, if different than that of the blocking area.
(f) Structural arrangement and scantlings.
(g) Longitudinal and transverse watertight bulkhead design calculations.
(h) Maximum allowable differential head between adjacent tanks.

(i) Maximum allowable differential head between tanks and exterior dock draft.
(j) Maximum allowable differential head between adjacent tanks (or groups of adjacent tanks) to produce a bending moment equal to the maximum allowable value.
(k) Data and calculations substantiating adequacy of connections between sections of multi-section docks.
(l) Detailed descriptive data and calculations substantiating adequacy of mooring attachments on the dock's structure.

5.3.4.1.1 Material strength criteria. The following strength criteria for materials of the principal structural members shall be used:

(a) For American Bureau of Ships (ABS) specified ordinary-strength hull structural steel with minimum yield strength of 34 kilopounds per square inch ($Klbs/in^2$) or equivalent:
  (1) Permissible stresses for longitudinal or transverse bending shall be taken as 20.0 $Klbs/in^2$.
  (2) Permissible stresses for compression or tension shall be taken as 22.6 $Klbs/in^2$. Buckling shall be considered for members in compression.
(b) For douglas fir, permissible compressive stresses perpendicular and parallel to grain shall be taken as 400 pounds per square inch (lb/in^2) and 1400 lb/in^2 respectively.
(c) For red or white oak, permissible compressive stresses perpendicular and parallel to grain shall be taken as 600 lb/in^2 and 1300 lb/in^2 respectively.
(d) For concrete, permissible compressive stresses shall be taken as 2500 lb/in^2 unless documentation to substantiate actual stress can be provided.

5.3.4.1.2 Docked ship's hull girder. For all new certifications, longitudinal transmission of the pontoon deck loads by the docked ship's hull girder shall not be considered. Thus, rigid connections are required between sections in sectional floating docks. These rigid connections shall be comparable in strength to the dock's wingwall structure. The hull girder of the docked ship shall not be considered as a means for connection or alignment of sections in multi-sectioned docks.

5.3.4.2 Evaluation of present structural condition. Structural calculations shall be provided for the facility in its present condition, unless adequate justification for use of original design data is submitted. Corrosion allowances and age effects used during preparation of calculations shall be identified.

5.3.5 Ballasting and deballasting systems. Ballasting and deballasting systems shall be as follows:

5.3.5.1 Ballasting and deballasting time. The times required for ballasting and deballasting the dock, both as designed and in its present state, shall be listed.

5.3.5.2 Arrangement. Sketches and diagrams shall be provided which describe the number and arrangement of pumps, piping, valves, indicators and other aspects of the ballasting and deballasting system.

5.3.5.3 Piping systems. Piping system design data shall be provided which show that the following requirements are satisfied on those docks originally designed to have such features:

(a) The ballast/deballast piping shall be arranged to permit unrestricted flow.

(b) Each inlet and outlet ballasting/deballasting system line shall be provided with two-valve protection. One of the valves in each line shall be located near the shell. Inlets shall be protected by a bar or other type strainer.

(c) Cross-connecting ballasting/deballasting lines shall be arranged so that stability is not impaired.

5.3.5.4 Reliability. The data provided in the certification reports shall demonstrate that failure of a pump will neither put the dock out of operation nor cause damage to either dock or ship in dock.

5.3.5.5 Ballast-deballast control. System descriptions shall be provided showing valve and pump control systems and both normal and emergency methods, demonstrating that the following requirements are met:

(a) Pump-controlled docks. Valves may be manually controlled from the vicinity of the pumps or remotely from a central control station (with manual override control). Operational control of the pumps is preferable from a central control station. Control may be exercised locally if sufficient personnel are available to maintain control and if good communication with the central control station exists.

(b) Valve-controlled docks. It is preferred that valves and pumps be controlled remotely from a central control station. However, control of valves may be exercised locally if sufficient personnel are available to maintain control and if good communication with the control station exists. Valves shall have a manual method of operation in addition to any method of remote operation.

5.3.6 Electric power system. The electric power system shall support a maximum load, developed during simultaneous operation of the dry dock's dewatering pumps, fire protection pumps, valve opening and closing mechanisms, communication equipment, lighting, alarms, and any other support equipment or systems necessary for the safe operation of the dry dock. An adequate alternate power source shall be provided to ensure that a backup capability is available to complete critical docking operations at a reduced rate and to operate alarms, lighting, and fire protection equipments in case the primary power system fails. The dry dock shall have a lighting system in vital spaces which is

automatically actuated in case of main electric power failure. System descriptions and diagrams shall be provided which include a single-line diagram of the power distribution for equipment operation from both the primary and alternate electric power sources.

5.3.6.1 Independently-powered docks. Dry docks which are independent of shoreside power shall be provided with multiple, electric-power-generating units. The generating capacity shall be such that, with one unit inoperable, the dock shall be safe while docking or undocking at a reduced rate, and still provide power for alarms, essential lighting and fire protection equipments. Fuel available for the generating units shall be sufficient for more than one complete docking and undocking cycle. Safe docking conditions include proper operation of valve opening and closing mechanisms, essential lighting, indicators, communications and any other essential support equipments or systems.

5.3.6.2 Shore-dependent docks. Dry docks dependent on shoreside electric power for the primary source of power shall be provided with an alternate source of power. This alternate power may be provided by an on board generator or from a separate shoreside feeder line. Shoreside feeder lines shall be separated as far as practicable, fully insulated, and shall flex from tidal action. The alternate power source shall have sufficient capability to maintain safe conditions while docking or undocking at a reduced rate. Safe docking conditions include proper operation of valve opening and closing mechanisms, alarms, essential lighting, fire protection equipments, indicators, communications and any other essential support equipments or systems.

5.3.6.3 Distribution. Power distribution shall be arranged so that fire protection and dewatering systems may be operated directly from the primary, as well as the alternate, electric power source. Additionally, fused service disconnect switches or circuit breakers shall be provided for each feeder line in a readily accessible location. These protective devices shall open safely under load or close safely into a fault, either manually or by automatic switching control.

5.3.7 Indicators. The certification report shall demonstrate how the following requirements are met.

5.3.7.1 Draft indicators. Draft indicators shall be provided showing draft of the dock at the four corners of the dock and at the mid-length on port and starboard sides.

5.3.7.2 Trim and heel indicators. Indicators shall be provided so that the dockmaster may be informed continuously of the trim and heel of the floating dry dock during docking and undocking evolutions.

5.3.7.3 Ballast tank level indicators. Ballast tank level indicators shall be provided for controlling ballasting and deballasting. Their accuracy shall be adequate to prevent accidental overstressing of tank bulkheads by excessive differential heads and accidental overstressing of the overall dock structure in shear and bending.

5.3.7.4 Dock deflection indicators. Dock deflection detection systems shall be used on each wingwall for all floating dry docks with a CRC of 500 tons or greater. However, they shall not be used as the only means for preventing overstressing of the dock. Consequently, they are not to be regarded as substitutes for tank-level indicators. Their accuracy shall be adequate to prevent accidental overstressing of dock and ship structure. Draft boards are not a satisfactory deflection detection system.

5.3.7.5 Ballast system valve indicators. Ballast system valves shall have indicators that indicate the position of the valve. If local and remote indicators are installed, their accuracy shall be calibrated within plus or minus 5 percent.

5.3.8 Communication systems. System diagrams and descriptions shall be provided showing that the system is adequate for bringing the ship in and out of the dock, as well as aligning the ship into the docking position; control of the ballasting and deballasting processes; and dealing with emergency situations. The communication systems shall include both primary and alternate systems, for example:

(a) A ship-to-shore dial telephone system connecting the central control station with dock office and security station.
(b) A sound-powered telephone or portable two-way radio system connecting the central control station with each manned operating station. Additional circuits may be necessary, connecting the central control station with the crane operator.
(c) A public address system, including audible fire alarm and talk-back capability, connecting the central control station with all normally manned spaces.

5.3.9 Essential lighting systems. System descriptions shall be provided for installed lighting systems essential for the safe operation and security of the facility.

5.3.10 Alarms. The certification report shall include a complete listing of the types and locations of all alarms which are installed in the dry dock and shall describe how they are monitored. Typical types of alarms which should appear on the list, if they are installed, are shore-power loss, emergency generator malfunction, flooding, dangerous trim or list levels, smoke and high temperature, fire, carbon dioxide (CO_2) system release and firemain low pressure.

5.3.11 Mooring and anchoring. Detail drawings and description of the mooring arrangement shall be provided. The operator shall describe the severest weather and seismic conditions that the facility is likely to encounter and shall demonstrate (by calculations) that the mooring system and pier will hold the dock in place when a maximum ship is in dock. It shall be demonstrated that the dock mooring system shall accommodate list and trim without interference with adjacent structures or undue stress causing damage to the dock. If anchors are used for heavy-weather mooring, calculations shall be provided showing the adequacy of the system without one anchor. In protected waters, the calculations may be made for a 50-knot wind, unless winds of higher velocity have been experienced in the past. NAVFAC DM-29.1, DM-29.2 and DM-29.3 may be used for guidance in preparation of these calculations.

extinguishers. Hose lines for fighting fires in way of the reactor compartment shall be restricted to fresh water sources. The pressure at the pier outlets shall provide a minimum nozzle pressure of 60 lb/in² when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. Booster pumps may be used at the dry dock outlets to boost pressure to a ship's firemain (either permanently installed or temporary). A backup pumping capability, such as diesel-driven fire pumps, or alternate power supplies for electric-driven pumps, shall be provided to ensure that the full water capacity for fire protection is available within 15 minutes if there is a power interruption or failure of a single pump.

5.3.14.3 Fire stations. Dock fire stations shall consist of 2-1/2 inch hose valves with 2-1/2 inch supply outlets and 1-1/2 inch hose outlets. Fire stations are required in the dry dock so that any area can be reached with a 20-foot fog stream from 100 feet of hose. Fire stations serving the bottom of the dry dock shall preferably be hard piped from the water supply sources. However, portable stations which are securely lashed down and supplied by jumper hoses will be considered satisfactory in meeting this requirement.

5.3.14.4 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the pontoon deck and in the dry dock proper. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO2 extinguisher shall be located in pumprooms and other spaces having electrical equipment; and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at locations subject to liquid fuel fire (for example, fueling stations and diesel-engine-driven equipment).

5.3.15 Additional requirements for launch pontoons. Launch pontoons shall be as follows:

5.3.15.1 Ship transfer system. The system for transferring a ship from building way to launch pontoon and the method by which pontoon stability and ship alignment are maintained during transfer shall be described, if applicable. The design and load carrying capacity of the system shall be provided.

5.3.15.2 Pontoon transfer system. The method by which the pontoon is moved to and from the submergence site shall be described.

5.4 Operational limitations. Enclosure III of the certification report, described in appendix A, 30.4.3 shall contain the following information:

(a) Wind, tide, and current conditions under which docking and undocking are permitted.
(b) Limits of local, concentrated block loads in long tons per block and long tons per linear foot of blocking length.
(c) Limits on longitudinal hull deflection.
(d) Maximum differential head permitted on tank bulkheads.
(e) Minimum GM required for ship-dock combination together with a curve of ship's adjusted VCG versus lifting capacity.
(f) Minimum ballasted and deballasted freeboard required for open- as well as closed-ended docks.
(g) Maximum trim and list of dock.

5.4.1 Lifting capacity curves. The curve of ship's adjusted VCG versus lifting capacity (see figure 7), that was described in 5.3.3, shall be contained in the certification report. Additional curves, such as that described below, may be included in the certification report.

5.4.1.1 Effect of ship location on lifting capacity. By analyzing the available buoyancy, required freeboard, and dock strength, a curve may be prepared showing lifting capacity of the dock against the LCG location of a ship with respect to the LCB of the dock, as shown on figure 9.

5.5 Calculations for docking of a particular ship. In addition to the stability, buoyancy, and loading required in the design sections of the certification report, calculations on the stability, buoyancy, and loading of the ship-dock system during the docking of a particular ship shall be available to the Navy on-site representative prior to each individual ship docking. These calculations shall be developed as discussed in 5.3.3. In addition, the following shall be completed:

(a) Calculations for the ship's stability during drydocking shall be prepared in accordance with NAVSEA S9086-7G-STM-000/CH997, which discusses docking operations and calculations for ensuring stability of the ship during docking, stability of side blocks, and loading of knuckle blocks.
(b) Stability calculations as discussed in 5.3 are required. Intact stability calculations shall be for the five phases shown on figure 3. The curve of a ship's adjusted VCG versus lifting capacity shall be checked to ensure that the minimum GM is available in the phase of minimum stability. Damage stability calculations shall be performed in accordance with 5.3.3.1(c) for the particular ship/dock combination with the ballast water level determined by the pumping plan.
(c) A pumping plan shall be prepared for each docking evolution (see appendix D). Enclosure VI of the certification report shall contain procedures for preparing a pumping plan and a format for this pumping plan.

5.5.1 Additional data. Additional contents of enclosure VI shall be provided in accordance with appendix A, 30.4.6.

5.6 Surveys. Surveys shall be in accordance with 5.6.1 through 5.6.11.

5.6.1 Checkoff list. A summary checkoff list for the survey shall be included in the certification report. A sample checkoff list for the material survey is provided in appendix E. This list may be expanded or modified to suit a particular facility.

5.6.2 Light dock weight determination. The light dock operating condition (see 3.2) shall be verified by a deadweight survey or inclining experiment. NAVSEA S9086-C6-STM-000/CH096 provides the procedures for performing both inclining experiments and deadweight surveys and the results shall be included in the survey results. An inclining experiment is required if sufficient design data is not available for performing a weight estimate. If a weight

estimate is available, a deadweight survey shall be conducted to verify the weight estimate. The inclining experiment or deadweight survey shall be used to verify the maximum lifting capacity of the dock at its rated freeboard.

5.6.3 Submergence test. A submergence test shall be conducted and witnessed by a survey firm and the results obtained shall be included in the survey results. The dock shall be ballasted down to maximum submergence for 45 minutes to determine the maximum draft of the dock, to verify the minimum freeboard in this submerged condition, and to check the watertight integrity of the dock. In the case of docks designed to attain the maximum allowable design draft by means of an air cushion system under the safety deck, the distance of the ballast tank vents below the safety deck and the location of these vents with respect to the center of area of the tank top shall be recorded and made a matter of record in the FCR. If the maximum submerged draft cannot be attained or if the dock cannot be submerged to the margin line because of an insufficient amount of available ballast water or a limited basin depth, this fact shall be reported in the FCR, but will not govern certification capacity.

5.6.4 Leakage. Surveys for leaks shall be conducted to determine the watertight integrity of the shell plating, decks, and transverse and longitudinal bulkheads. Tests may be accomplished by visual inspection, air tests, water tests or as conditions warrant.

5.6.5 Structural survey. Structural surveys shall be conducted in accordance with the requirements listed herein. Regardless of the size of the facility, the surveyor shall enter and inspect all ballast tanks, buoyancy chambers, and other spaces which are enveloped by primary structural members.

5.6.5.1 Structural survey of steel docks. Structural surveys of steel docks shall be conducted in accordance with 5.6.5.1.1 through 5.6.5.1.6.

5.6.5.1.1 Special case, initial certification. For special cases, initial certification shall be in accordance with 5.6.5.1.1.1 and 5.6.5.1.1.2.

5.6.5.1.1.1 New docks. For docks that have been constructed within the 2 years preceding the FCR submission, the survey requirements of the following paragraphs may be waived, if surveyed by an independent engineering firm during construction or if built under class of a major classification society, unless visual inspection of the dock provides reason for conducting detailed surveys. The surveyor shall summarize the results of visual surveys and nondestructive tests carried out prior to acceptance of the dock by its owner. These summaries shall include results of NDT of welds carried out by magnetic particle inspection, ultrasonic testing, or radiographic testing.

5.6.5.1.1.2 Facilities recently overhauled. If the floating dock has been docked and overhauled within 2 years preceding FCR submission, the underwater surveys may be deferred until time for the next recertification, but only if a survey was conducted during the overhaul by an independent engineering firm or major classification society and a report prepared by them is submitted, indicating that all deficient items have been corrected.

5.6.5.1.2 Underwater hull survey (steel). An underwater hull survey shall be conducted every 5 years. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined and any intakes with 25 percent or greater restriction shall be cleaned out and reported. In addition, every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking or careening. Also, after the dock is 20 years old and every 5 years thereafter, thickness measurements of one complete belt for each 100-foot length of dock shall be taken, utilizing a process which is acceptable to the U.S. Navy. The belts shall be equally spaced, but located at different places along the dock for each survey. For each belt, a minimum of two readings shall be taken on each plate if the plates are longitudinally oriented; three on each if transversely oriented. Additional thickness readings, between belts, shall be taken on locations found or suspected to be deficient by visual inspection. The results shall be included in the survey results. The date of the most recent drydocking or complete careening shall be reported. The underwater hull survey shall consist of one or more of the following methods as required below:

(a) The underwater portion of the hull shall be examined after exposing it by docking, self-docking, or careening.
(b) The underwater portion of the hull shall be examined by systematic audiogauging or ultrasonic testing (see 5.6.5.1.5) of the hull, utilizing a qualified process which is acceptable to the U.S. Navy.
(c) Divers meeting the qualifications in 4.4.3.3 and underwater survey techniques shall be used to examine the submerged surface of the hull.

5.6.5.1.3 Visual inspection. The surveyor shall examine the design data and records of repairs to define areas to be visually inspected. The plating, strength members, joints, foundations, sea chests, areas under blocks, crane rails, and structure associated with mooring, which are chosen for visual surveys, shall be checked. If the preservative coating appears to be blistering, flaking, or peeling, the paint shall be scraped to bare metal, exposing the steel for inspection to determine the extent of corrosion, pitting, thinning of edges, loose rivets, cracked welding, and elongation of bolt holes. Bent, buckled, torn, or otherwise damaged structural elements shall be identified. All doubler plates shall also be identified by size and location.

5.6.5.1.4 Evaluation of results from visual inspection. The information collected by the visual examination shall be analyzed and, if possible, compared with results of past surveys to determine whether the spot surveys shall be followed up by detailed surveys in any area. If necessary, detailed surveys shall be carried out after proper cleaning and removal of deteriorated coatings. The reasons and results for these detailed surveys shall be included in the certification report.

5.6.5.1.5 Gauging. If visual surveys provide reasons to suspect that the loss of thickness of plates or other structural members is significant, gauging by caliper-type instrumentation or by ultrasonic measurements shall be conducted to determine the extent of deterioration. The reasons for conducting these tests, the process of selection of points where thicknesses were measured, drawings showing the positions of the readings, tables showing original (designed) and

current thicknesses and percentages of wastage, and the conclusions reached by comparing these measurements with the design data shall be included in the certification report. The surveyor shall also demonstrate that the ultrasonic testing procedures employed meet Navy requirements.

5.6.5.1.6 Corrosion criteria. The acceptance criteria (to determine how much material loss is acceptable) are dependent upon the safety margin in the original design, the nature and consequences of the failure of a given structural member, and the rate of material loss. These factors shall be taken into account (and explained in the certification report) in determining if a structural member is considered satisfactory, unsatisfactory (to be corrected prior to the next docking event), or marginal. However, in general, strength members or portions thereof which have suffered a reduction of 25 percent or greater from their original dimensions shall be considered unsatisfactory.

5.6.5.1.7 Temporary use of doubler plates. The use of doubler plates is not recommended for the repair of wasted plating; however, they may be used as a temporary repair in accordance with the following criteria:

(a) The doubler plate shall be of the same material and not less than the thickness of the original design plate.

(b) The doubler plate shall be seal welded to prevent seepage of water/moisture between the two plates.

(c) The corners of doubler plates shall be radii.

(d) Where doubler plate dimensions exceeds 4 feet, plug welds are required. Plug welds shall be spaced 2 feet on centers.

5.6.5.2 Structural survey of timber docks. Structural survey of timber docks shall be in accordance with 5.6.5.2.1 through 5.6.5.2.3.

5.6.5.2.1 Underwater hull survey (timber). An underwater hull survey shall be conducted every 5 years. At least every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking the facility and taking off all of the sheathing. Divers meeting the qualifications in 4.4.3.3 using underwater survey techniques shall be used for a 5-year survey. The internal and external surfaces of the underwater hull shall be examined for rot, marine borers, wear, cracks, and condition of fastening devices. Areas subject to decay caused by rainwater leakage and inadequate ventilation shall be examined. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined, and any intakes with 25 percent or greater restriction shall be cleaned out and reported. Rationale used for selecting specific hull areas for inspection, how the inspections are conducted, and the results of these inspections shall be stated in the survey results. The date of the most recent drydocking shall also be reported.

5.6.5.2.2 Visual inspection of structural members. The strength members, including steel trusses and tie-rods, shall be cleaned and examined for corrosion, buckling, fracture, or damage of any other form. Particular attention shall be given to the examination of fastenings and the condition of preservatives.

5.6.5.2.3 Caulking. The seams of planking shall be examined, noting the condition of caulking, to determine the watertightness of the dock. (This is especially important in the case of side walls that are generally not submerged and which tend to dry out, allowing seams to open.)

5.6.5.3 Structural survey of concrete docks. Structural survey of concrete docks shall be performed in accordance with 5.6.5.3.1 through 5.6.5.3.3.

5.6.5.3.1 Underwater hull survey (concrete). An underwater hull survey shall be conducted every 5 years. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined and any intakes with 25 percent or greater restriction shall be cleaned out and reported. An extensive underwater survey of the external hull surface may not be necessary if, by examining the hull from the inside, it can be determined that there is no leakage in the dock, and if cracking or spalling are not evident. If cracking or leakage is

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witnessed, the external hull shall be examined by drydocking or careening (if the dock can be safely careened). At least every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking or careening. Qualified divers and qualified underwater survey techniques may be used for a 5-year survey. The date of the most recent drydocking or complete careening shall be reported.

5.6.5.3.2 Visual inspection. A thorough visual examination of the hull from the inside shall be conducted to detect occurrences of cracking, spalling, rust stains, exposed reinforcing bars, and leakage. This examination shall include inspection of foundations and anchor bolts, strainers and sleeves.

5.6.5.3.3 Detailed examination. Detailed examination of slabs, joints, and foundations shall be made if the visual inspections indicate a need for it.

5.6.6 Inspection of blocking. Blocking shall be inspected in accordance with 5.6.6.1 through 5.6.6.4.

5.6.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting, or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

5.6.6.2 Composite blocks. Concrete cores of composite blocks shall be inspected for spalling, cracks, and chipped or damaged concrete. Wood of composite blocks shall be inspected for deterioration, as described in 5.6.6.1. The condition of bolts holding timber caps and base blocks to concrete cores shall be noted. Similarly, steel portions of composite blocks shall be inspected.

5.6.6.3 Block securing methods. Except for composite blocks which remain in place because of their weight, all fixed blocking shall be secured in place. Securings, supports, nuts, boltheads, and other fasteners shall be sound. There may be considerable deterioration under blocks which are fixed in place. The inspection of blocking shall include lifting a number of blocks, selected at random, to determine the presence and extent of such deterioration. In the event that the blocking does not land on transverse strength members of the pontoon deck, an investigation shall be made to ensure that provisions have been made to the use of adequate grillage to distribute loading to adjacent strength members.

5.6.6.3.1 Steel dock blocking. Securing and bolt connections through the wood shall be inspected on steel docks where blocks are bolted to clip angles or plates are welded to the pontoon decks. When blocks are set on T-beam supports, the bolts and supports shall be inspected.

5.6.6.3.2 Concrete dock blocking. On concrete docks, the condition of the metal fasteners securing blocks to the bearers shall be reported.

5.6.6.3.3 Wooden dock blocking. On timber docks, the state of preservation of links, staples, angle pieces, lag screws, dogs or other fasteners for securing the blocking to the keel tracks or other support members shall be checked.

5.6.6.4 Hauling blocking. Hauling blocking, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

5.6.7 Inspection of mechanical and electrical systems. Mechanical and electrical systems shall be inspected in accordance with 5.6.7.1 through 5.6.7.12.

5.6.7.1 Test of piping systems. Vital piping systems such as fire protection and ballast or deballast systems shall be hydrostatically tested to 135 percent of the system's design pressure. As an alternate, ballast and deballast system piping may be visually inspected or ultrasonically tested. Where deterioration of the pipe walls exceeds 25 percent of the original thickness, their continued use shall be substantiated by calculations (see NSTM 0901-LP-480-0015).

5.6.7.2 Tests of ballasting and deballasting systems and gauges. The surveyor shall observe at least one complete ballasting and deballasting cycle and provide a report on the following:

(a) Actual ballasting and deballasting times. If these are markedly different from ballasting and deballasting times for which the system was originally designed, reasons for this variation shall be explained in the survey results (see appendix A, 30.4.8).
(b) Adequacy of the power supply, determine by operating all applicable pumps (and the fire pump, if installed on dock) at the same time.
(c) Smoothness of the operation of all pumps, motors, valves and generators by remote as well as local control.
(d) The accuracy and reliability of water level indicators when compared with actual soundings of the water level in each tank. Variations shall be included in survey results.
(e) A satisfactory deflection system exists on both wingwalls. The deflection targets shall be set at such a height that the zero points on all targets, on both wingwalls, are all in the same plane when the dock is in the unstressed condition.
(f) Tightness of air-cushioned boundaries, if they are required, in the tanks.

5.6.7.3 Detailed inspection of electrical and mechanical systems. If the generators, pumps, motors, and so forth show excessive noise, vibration or other signs of malfunction, they shall be opened and examined in detail. The tests and inspections shall follow criteria and procedures furnished by the equipment manufacturers or technical manuals.

5.6.7.4 Controls. The control systems shall be inspected as follows:

(a) Control panel: Check wiring, relays, bulbs and lenses for dust collection and abrasion of wires.
(b) Motor controls: Check contactors, relays, electrical and mechanical interlocks and manual overrides.
(c) Limit switches: Check panel limit switches and switch activator mechanisms.

5.6.7.5 Communication systems and alarms. The communication systems and alarms shall be checked thoroughly and tested for proper operation.

5.6.7.6 Fire protection systems. The fire protection systems intended for fighting fire on the dock or ship shall be thoroughly checked and tested for conformance to all requirements of 5.3.14. A flow and pressure test shall be conducted and the data submitted.

5.6.7.7 Crane stops, rails, supports and securing systems. The crane rails, supports, stops and securing systems shall be inspected for structural soundness. The forces on the crane securing systems shall be calculated to verify that these systems are adequate to hold under conditions of maximum list or heel and trim.

5.6.7.8 Mooring and anchoring systems. The mooring and anchoring systems shall be examined thoroughly for adequacy and for signs of local buckling and excessive loading.

5.6.7.9 Electric power systems. The adequacy of both the primary and alternate power supply systems shall be determined. Both the primary and alternate electric power systems shall be inspected.

5.6.7.10 Stern or bow closures. In the case of docks which have stern or bow closures, the operation of the closures shall be observed and the structure and machinery shall be inspected.

5.6.7.11 Ship positioning gear. Bitts, bollards, winches and cleats shall be inspected for fatigue, looseness, or other signs of excessive loading.

5.6.8 Site survey. The site survey shall include inspection of pier and mooring attachments, electrical power supply feeders and fire protection system interfaces. The results of the site survey shall be included in the survey results.

5.6.9 Hydrographic survey. The hydrographic survey shall be conducted underneath the dock and in the approach channel by an adequate number of soundings referenced to Mean Low Water on the Atlantic coast and Mean Lower Low Water on the Pacific coast and a sounding chart shall be included in the survey results. Complete tidal ranges, approach channel width and depth configuration, dredging frequency, and any irregularities shall be noted. Where a history of hydrographic data is available, rates of siltation shall be noted.

5.6.10 Docking or undocking evolutions. The surveyor shall observe one complete docking or undocking evolution in order to determine the effectiveness of the equipment and procedures during ship handling.

5.6.11 Sectional docks and launch pontoons. If it can be scheduled, the surveyor should observe the assembling and disassembling process of dock sections; the connections shall be examined for structural soundness.

(a) Designed flooding time.
(b) Flooding tunnels. Arrangement of tunnels, air vents, access.
(c) Stop logs or other features which serve as backup to flooding valves. Arrangement, method of operation, possibility of operation under differential head (following sluice gate failure), corrosion protection, and seals.
(d) Flooding valves and gates. Arrangement, structure, calculations showing structural adequacy, operation, corrosion prevention, seals, and adequacy of stems. Also, power required for operation of sluice gates and possibilities of manual operation in the event of power or equipment failure.
(e) Draft gauges.
(f) Super flooding features, if applicable.
(g) A line diagram of the flooding system.

6.3.6 Dewatering and drainage systems. Dewatering and drainage systems shall be in accordance with the following:

6.3.6.1 General data. Drawings or sketches shall be provided which show pumphouse configuration with equipment, piping and valve arrangement, discharge tunnel and controls. This may be in the form of a line diagram. In any case, a line diagram of the whole system shall be provided. If the system serves several docks, the entire system shall be described as follows:

(a) Pumps and piping. The following information shall be provided for dewatering, drainage, and sump pumps: number of pumps, types of pumps, capacity, head rating, lubrication systems, power requirements, and controls. Valves and piping shall be described by type, size, function and how controlled.
(b) Discharge tunnels. The size, number and arrangement shall be provided for tunnels, grated inlets, and discharge end of the tunnels. If the tunnels show signs of degradation, evaluation shall be made of structural adequacy. A description of backup or redundant features shall be provided.
(c) Controls. A description of both primary and backup controls shall be provided.
(d) Alarms. A description of all alarm systems shall be provided.
(e) Water level sensing systems. U.S. Navy operated graving docks, which are capable of docking nuclear powered ships, shall have two independent water level sensing systems. The primary sensing system, which must operate from station power, shall be designed to activate both the pumps and the alarm. A backup or secondary sensing system shall have an independent power source and operate the alarm only. Both systems shall announce locally and at a central location that is continuously manned.

6.3.7 Power supply. Sketches, diagrams, and descriptions shall be provided showing that the primary power supply is adequate for normal operation and that adequate alternate power capacity is available for the operation of all essential equipment; that is, power-operated communications, alarms, lights, fire protection systems, auxiliary drainage systems, and vital shipboard equipment (where applicable).

6.3.8 Flooding protection systems. The dock shall be isolated from all potential flooding sources, such as flooding and dewatering systems, by two methods of protection. One of these protective methods shall be a positive means of closure which can be operated under dynamic or static conditions. Both methods shall be utilized (except on those systems necessary for normal operations, such as the removal of drainage and underdrainage water, of the dock or interconnecting docks). The systems without two methods of protection

in place at all times shall be provided with a constant monitoring capability, along with provisions for a quick emergency-response capability to combat a system casualty. Docks for which firm orders for construction are placed after the effective date of this document shall include provisions for installing two methods of protection in all systems in which a potential flooding threat exists, as specified in 6.3.8.1 or 6.3.8.2.

6.3.8.1 Flooding protection for docks flooded through sluice gates. Docks flooded through sluice gates shall have a backup sluice gate installed in each flooding tunnel. If the design of the facility precludes the installation of backup sluice gates, stop logs or similar closure devices shall be installed over the inlet of each flooding tunnel. Locks shall be provided and shall be used to secure sluice gate operators or controllers prior to the completion of each docking operation. Operators or controllers shall be locked or electrically isolated in the closed or off position and shall be tagged out until the next scheduled flooding operation, controlled maintenance operation or inspection. Qualified operating personnel shall be present during all controlled maintenance operations or inspections. Individual control functions and positions shall be identified and clearly labeled on control consoles and other operating stations. Activities shall exercise discretion in the distribution and stowage of keys to locks securing any of the above systems or controllers or operators. The installation or operation and securing of flooding protection systems shall be reflected in the operating and maintenance procedures.

6.3.8.2 Flooding protection for docks flooded through the caisson. Docks flooded through the caisson shall utilize a secondary method to ensure isolation of the dock from each flooding source. Secondary or backup flood valves shall be installed in each flooding tube. If the design of the facility precludes the installation of secondary flood valves, blank covers, drop gates or other suitable means shall be installed in or over each flooding tube. Locks shall be provided for controls or disconnects to the flooding valves. Prior to the completion of each docking operation the controls or disconnects shall be locked or electrically isolated in the closed or off position and shall be tagged out until the next flooding operation, controlled maintenance operation or inspection. Qualified operating personnel shall be present during all controlled maintenance operations or inspections. Individual control functions and positions shall be identified and clearly labeled on control consoles and other operating stations. Activities shall exercise discretion in the distribution and stowage of keys to locks securing any of the above systems or controllers or operators. The installation or operation and securing of flooding protection systems shall be reflected in the operating and maintenance procedures.

6.3.9 Fire protection systems. The fire protection systems installed to combat fire in all areas of the dry dock, including the pump room, control station, and on the ship, shall be described in the survey results along with the requirements of 6.5.7.3. This description shall include minimum available water pressure, location of connections, location and size of fire stations, total available pump capacity, redundancies and backup features, and number, type and capacity of portable extinguishers.

6.3.9.1 Requirements for a graving dock's fire protection water. The minimum available capacity for supplying a surface ship or submarine firemain (either permanently installed or temporary) shall be at least 300 gal/min per 100 feet of maximum docked ship length, except that only 300 gal/min are required for submarines less than 500 feet in length. The capacity available to

serve a ship's firemain (either permanent or temporary) may also serve the fire stations in the dry dock, but in no case shall the total capacity be less than 1,000 gal/min. Where the fire protection water supplies to a submarine and the dock are separate, at least 300 gal/min of water shall be supplied to the submarine firemain and a minimum of 1,000 gal/min of water shall be supplied to the dock. Hull insulation fires can best be extinguished with water, preferably applied as a fog. Either of the following shall be available for fire watches assigned to hot work in areas where hull insulation on submarines is endangered:

(a) A portable fresh water extinguisher of either pressure type (NSN 4210-00-720-1815) or pump (NSN 4210-00-251-7904) with a 2.5 gallon minimum capacity; or
(b) A minimum 3/4-inch hose fitted with a fog nozzle supplied from a fresh water source.

Application of a given extinguishing agent to a shipboard fire shall conform to restrictions specified in the current contract or specifications. Fresh water supply and adequate hose for complete coverage shall be available for use in the event a reactor compartment fire cannot be controlled by carbon dioxide extinguishers. Hose lines for fighting fires in way of the reactor compartment shall be restricted to fresh water sources. The pressure at the pier outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. Booster pumps may be used at the dry dock outlets to boost pressure to a ship's firemain (either permanently installed or temporary). A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies for electric-driven pumps, shall be provided to ensure that the full water capacity for fire protection is available if there is a power interruption or failure of a single pump. Electrical installations shall conform to NFPA-20.

6.3.9.2 Fire stations. Dock fire stations shall consist of 2-1/2 inch hose valves with 2-1/2 inch supply outlets and 1-1/2 inch hose outlets. If fire protection is supplied to aircraft carriers through hose to the carriers' salt water systems, then 4-inch outlets are required. Fire stations are required in the dry dock so that any area can be reached with a 20-foot fog stream from 100 feet of hose. Fire stations serving the bottom of the dry dock shall preferably be hard piped from the water supply sources. However, portable stations which are securely lashed down and supplied by jumper hoses will be considered satisfactory in meeting this requirement.

6.3.9.3 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the dry dock. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO2 extinguisher shall be located in pump rooms and any other spaces having electrical equipment; and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at locations subject to liquid fuel fire (for example, near diesel-engine-driven equipment).

6.3.10 Communication systems and alarms. System diagrams and descriptions shall be provided showing that the system is adequate for: bringing the ship in and out of the dock, as well as aligning the ship into the docking position; control of both flooding and dewatering; and dealing with emergency situations. The

communication systems shall include both primary and backup systems, for example, telephone and portable two-way radio systems connecting the dock control station with each manned operating station and with security and fire personnel. The certification report shall include a complete listing of the types and locations of all alarms which are installed in the dock and shall describe how they are monitored.

6.3.11 Essential lighting systems. System descriptions shall be provided for lighting systems essential for the safe operation and security of the facility. Lighting systems shall provide approximately 2 foot-candles of illumination for security.

6.3.12 Caisson. The following information, as applicable to the caissons, shall be provided:

(a) General arrangement showing type, size, compartmentation and seats.
(b) Structural material, fabrication process, corrosion protection system (both protective coating and cathodic protection, if applicable).
(c) Ballast-deballast systems; including pumps, piping, valves, and valve operating mechanisms.
(d) Power supply.
(e) Systems for through-the-caisson flooding, flooding protection and super flooding.
(f) Seals.
(g) Controls, indicators, alarms (including the types and location of high and low water annunciator alarms) and communications systems.
(h) Systems for removing and positioning the caisson in place.
(i) In the event that a spare caisson exists at this site, its material condition and the date it was last utilized shall be described.
(j) Backup and redundant features shall be described.
(k) A line diagram of the pumps, valves, and piping system shall be provided.

6.3.13 Blocking. Descriptions of the docking blocks and block hauling system shall be provided which show physical characteristics of the blocks, including material and dimensions. Calculations shall be provided in order to verify that the blocks are stable and structurally adequate to withstand the loading used in the docking capacity calculations and that the side blocks (and shores, if used) are adequate in number to provide sufficient bearing area to resist seismic and hurricane overturning moments as required by NAVSEA S9086-7G-STM-000/CH997. Additional calculations shall be provided if higher blocks are to be used for docking at a lower capacity. Expected arrangement and adequacy of systems used for securing the keel and side blocks in place shall be described.

6.3.14 Seismic effects. In the case of docks located in seismic zones 2 or above, the operator shall demonstrate that equipment foundations, cable and pipe supports shall withstand seismic shocks. For guidance, see NAVFAC P-355 and NAVFAC P-355.1.

6.5.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

6.5.6.2 Composite blocks. Concrete cores of composite blocks shall be inspected for spalling, cracks and chipped or damaged concrete. Wood of composite blocks shall be inspected for deterioration, as described in 6.5.6.1. The condition of bolts holding timber caps and base blocks to concrete cores shall be noted. Similarly, steel portions of composite blocks shall be inspected.

6.5.6.3 Hauling blocks. Hauling blocks, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

6.5.7 Inspection of electrical and mechanical systems. Electrical and mechanical systems shall be inspected in accordance with 6.5.7.1 through 6.5.7.10.

6.5.7.1 Detailed examination of electrical and mechanical systems. Controls, pumps, motors, capstans, and so forth in the dock, pump house, and caisson shall be opened for inspection only if, after observing them in operation, the operator has noted abnormal behavior that justifies this action.

6.5.7.2 Controls. The control systems shall be inspected for the following:

(a) Control panel: Check wiring, relays, bulbs and lenses. Check for dust collection and abrasion of wires.
(b) Motor controls: Check contactors, relays, electrical and mechanical interlocks, and manual overrides.
(c) Limit switches: Check panel limit switches and switch activator mechanisms.

6.5.7.3 Fire protection equipment. Fire protection equipment shall be checked during the surveys for conformance to the requirements of 6.3.9. A flow and pressure test shall be conducted and the data submitted. The test data shall be described, indicating where and under what conditions pressure and flow were measured.

6.5.7.4 Communication systems and alarms. Communication systems and alarms shall be checked during the surveys.

6.5.7.5 Flooding and pumping systems. Pumps, valves, sluice gates, sluice valves, check valves and stop logs or gates shall be inspected and tested for proper operation. Trash racks and intake screens shall be inspected.

6.5.7.6 Electric power systems. The adequacy of both primary and alternate power supply systems shall be determined. Both the primary and alternate electric power systems shall be inspected.

6.5.7.7 Draft gauges. The legibility and accuracy of the draft gauges shall be determined.

6.5.7.8 Mooring systems. The capstans, cleats, bollards, bitts, chocks and roller chocks shall be examined for adequacy.

6.5.7.9 Ventilation systems. The adequacy of the ventilation system shall be determined.

6.5.8 Evaluation of survey results. The operator shall review the survey results and take the following action:

(a) Determine whether there is a significant likelihood of major structural failure.
(b) Develop a systematic plan for monitoring the soil and ground-water conditions.

6.6 Operating procedures. In addition to the general requirements specified in 4.8.1, the operating procedures shall set forth, in sequence, the actions required by each manned operating station during the docking cycle. The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of dock systems, prior to flooding the dock, and continuing with the events through the docking of the ship until the ship is secure on the blocks and ready for industrial work. The operating procedures shall also list events, commencing with prerequisite checks prior to the undocking operation, and continuing until the graving dock has been pumped dry and secured. Specific flooding and dewatering procedures described herein shall be keyed to a single-line diagram of the piping and electrical systems operated. These operating procedures shall describe the methods of communication used between personnel at the various docking stations on the dock, the ship, and tugs, as applicable. Information shall also be provided describing alternate communications systems used in case of failure of the primary communications system. Such systems may include sound-powered telephones, dial telephones, radios, loudspeakers, and alarm systems.

6.6.1 Detailed requirements for graving docks. The detailed requirements for graving docks specified in the following paragraphs shall be incorporated into operating procedures and checksheets. The operator of a graving dock shall establish procedures which include:

(a) Lineup checksheets for use prior to docking or undocking, at the completion of docking, and during the lay period shall be prepared and shall include the requirement for independent checks of the valve position by two individuals for valves of the dewatering, flooding, and drainage systems.
(b) Valves on sluice gates interconnecting graving docks and valves utilized for ballasting or deballasting the caisson shall be included in these checksheets.

6.6.2 Flooding precautions during the lay period. The operator of a graving dock shall prepare a written procedure and shall have qualified personnel readily available to maintain the dry condition of the ship and dock during the

8.3.17 Equipment for ship handling. The equipment for accomplishing the alignment of a ship during docking on the platform shall be described. The structure and associated fittings of the transfer cradle and carriage shall be shown to be structurally adequate. The transfer towing equipment shall also be described.

8.4 Operational limitations. Operational limitations shall be described as indicated in appendix A, 30.4.3. These shall consist of, but not be limited to, the following:

(a) Wind, tide and current conditions under which docking and undocking shall not be carried out.
(b) Limits of local, concentrated block loads in LT per linear foot of blocking length.
(c) Limits on dock deflection, if applicable.
(d) Limits for electrical current being drawn by machinery.

8.5 Surveys. Surveys shall be conducted in accordance with 8.5.1 through 8.5.10.

8.5.1 Checkoff list. A summary checkoff list shall be included in the certification report. A sample checkoff list for material condition surveys is provided in appendix H. This list shall be expanded or modified to suit the needs of a particular facility.

8.5.2 Observation of a vertical lift in operation. At least one complete docking, undocking, and ship transfer cycle shall be observed by the surveyor.

8.5.3 Hoists. Unusual running noises, status of means for corrosion prevention, lubrication and damage or misaligned parts shall be noted. Lubrication and preservation of wire rope shall be inspected. Wire rope with two or more broken wires shall be considered unsatisfactory. The wire rope on one hoist shall be pull tested until it breaks. If it breaks at 90 percent or less of the designed breaking strength, it and all wire rope of equal age shall be considered unsatisfactory. One hoist shall be weight tested. If the hoist will not lift a design capacity load, it shall be considered unsatisfactory. Additional hoists shall be tested to satisfy the surveyor that the system will safely lift the certified rated capacity. Bearings, pawl mechanisms, brakes, and gears shall be inspected. Soundness of bolts and foundation shall be checked.

8.5.4 Platform. Soundness of basic structure and effectiveness of means for corrosion prevention shall be checked. A test of 110 percent of CRC of the facility shall be observed by the surveyor.

8.5.5 Controls. The control systems for the following shall be inspected:

(a) Control panel: Check wiring, relays, bulbs and lenses. Check for dust collection and abrasion of wires. Inspect cams and check their operation.
(b) Motor control: Check contactors, relays, electrical and mechanical interlocks, and motor cables.
(c) Limit switches: Check panel limit switches and switch actuator mechanisms.

8.5.6 Inspection of blocking. The type of blocking, bearing area, means of buildup, cribbing and shoring shall be noted.

8.5.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

8.5.6.2 Block securing methods. Fixed blocking shall be secured in place. Securings, supports, nuts, boltheads and other fasteners shall be sound. There may be considerable deterioration under blocks which are fixed in place. The inspection of blocking shall include lifting a number of blocks, selected at random, to determine the presence and extent of such deterioration.

8.5.6.3 Hauling blocks. Hauling blocks, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

8.5.7 Electric power system. The adequacy of the power supply shall be determined.

8.5.8 Communication and alarm systems. Communication and alarm systems shall be checked during the survey.

8.5.9 Fire protection system. The fire protection systems intended for fighting fire on the dock or ship shall be thoroughly checked and tested for conformance to all requirements. A flow and pressure test shall be conducted and the data presented.

8.5.10 Deflection measuring system. If installed, the deflection measuring system shall be inspected and its accuracy shall be determined.

8.6 Operating procedures. In addition to the general requirements specified in 4.8.1, the operating procedures shall set forth, in sequence, the actions required by each manned operating station during the docking cycle (for example, dockmaster, lift operator, electrician). The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of the vertical lift subsystems prior to lowering the platform for receiving the ship and continuing with the events through landing the ship, lifting the platform, transferring the ship to the work berth, and, finally, securing the operation for industrial work. The operating procedures shall also list events, commencing with prerequisite checks prior to the undocking operation, and continuing through transfer, lowering the platform to refloat the ship, and, finally, raising the platform to its secured position. These operating procedures shall describe the methods of communication used between personnel at the various docking stations on the vertical lift, the ship, and tugs, as applicable. Information shall also be provided which describes alternate communication systems used in case of failure of the primary communication system. Such systems may include sound-powered telephones, dial telephones, two-way radios, loudspeakers and alarm systems.

(d) Major storms and earthquakes and their effects as experienced by by the facility, including maximum water levels and maximum seismic intensity.
(e) Nature and dates of incidents which resulted in a change to the facility and which affected its capability for safe operation, or those incidents which resulted in damage exceeding $50,000 in repair costs. Technical drawings which depict the repairs or modifications of the facility as a result of the incident shall be provided. Steps taken to prevent recurrence of these incidents shall be described.
(f) Past use of the facility, dates and displacement or docking weight, and type of ships docked or built.

In the case of the FRR, similar historical data shall be provided for the period since last certification. Status of repairs and modifications required during the last certification period shall be reported.

30.4.2 Enclosure II: Design data. For FCRs, the design data, as required by the detailed requirements sections, shall substantiate that the facility as designed and built; and in its present condition, considering material deterioration and modifications, has the capability to safely handle a ship with a displacement equal to the certified rated capacity. For FRRs, similar data shall be provided if any facility modifications have been undertaken during the past certification period.

30.4.3 Enclosure III: Operational limitations. Operational limitations which are necessary for safe operation of the facility (taking into account the design of the facility, its intended use, and its material condition) shall be listed in this enclosure (see 4.2.4.2). Appropriate operational limitations shall be posted at the control station.

30.4.4 Enclosure IV: Organization and manning. This enclosure shall contain information as specified in 4.7.

30.4.5 Enclosure V: Normal maintenance schedule and procedures. A brief description shall be provided of the major maintenance schedule and procedures. For floating docks, it shall describe the procedures used for underwater hull inspection and maintenance.

30.4.6 Enclosure VI: Operating procedures. This enclosure shall describe operating procedures as required by 4.8 and as amplified by the applicable detailed requirements sections. The procedures described in this enclosure shall be consistent with the operational limitations specified in enclosure III and with the manning described in enclosure IV.

30.4.7 Enclosure VII: Protection of the ship during the lay period. This enclosure shall contain information as specified in 4.9 or 4.9.5, as applicable.

30.4.8 Enclosure VIII: Survey results. This enclosure shall be typed on company letterhead, signed by the chief surveyor or the chief executive of the surveying firm, and shall contain the following information:

(a) Experience and qualifications of organizations that conducted the surveys.

(b) Experience and qualifications of surveyors and divers in areas of specialty as related to the task.

(c) Dates and major milestones in surveys.

(d) Scope of the survey effort; reasons for this choice.

(e) Conclusions drawn from the survey results, supported by inclusion of the relevant survey data and evaluation of survey results. A summary evaluation of the material condition of the facility and a recommended CRC shall be included in the survey report.

(f) Recommendations on required repairs, facility modifications, changes in operational limitations, and changes in the operating procedures and supporting rationale.

(g) Listing of items that should have been surveyed or tested, but were not checked because of scheduling difficulties. Recommended actions, if any, concerning these items.

(h) Summary checkoff lists with a description of marginal and unsatisfactory items. Summary checkoff lists shall also be annotated accordingly.

Note that this enclosure is not a repository for raw survey data. The raw data shall be maintianed by the facility operator for a period of 5 years.

30.4.9 Enclosure IX: Corrective action plan. This enclosure shall provide a list and schedule for:

(a) Facility repairs and modifications which are to be completed before the next use of the facility for docking a Navy ship.

(b) Facility repairs and modifications which will be undertaken during the certification period.

30.4.10 Enclosure X: Monitoring plan. This enclosure shall provide brief descriptions and proposed schedules for the monitoring items described in 30.4.8.

40. Documentation for small facilities. This paragraph is applicable to facilities with a CRC of 500 long tons or less. Its purpose is to set forth the reduction in requirements for certification documentation, as compared with the large facilities whose requirements have been listed in 20 through 30.4.10.

40.1 Small facility certification report format. The operator of a small faiclity may prepare a certification report by adhering to the provisions of 20. However, the operator is invited to take advantage of the following relaxation of requirements. The original documentation only shall be submitted instead of multiple copies, as required by 4.3.3.5. Drawings, technical manuals, brochures, and photographs which may have been prepared for other purposes, but which are handily available and serve to describe the facility in its present condition, shall be utilized.

40.2 Small facility certification report content. The operator of a small facility may prepare a certification report by meeting the minimum requirements listed below:

APPENDIX B

SUMMARY OF STEPS LEADING TO FACILITY CERTIFICATION

10. General. Typical steps leading to certification or certificate renewal of a facility are listed in the following paragraphs.

10.1 Preliminary FCR. When the operator desires to obtain Navy guidance on the necessary content of the design data package, the following steps shall be taken:

(a) The facility operator assembles available facility data to satisfy appendix A requirements.
(b) A surveyor reviews facility data and conducts a preliminary survey.
(c) The facility operator proposes the CRC and also specifies deviations considered necessary. He shall forward the preliminary FCR package to NAVSEA via SUPSHIP, where applicable.
(d) NAVSEA will review the preliminary FCR and rule upon the deviation requests and requirement changes. NAVSEA will respond to the operator via SUPSHIP, where applicable.

10.2 Certification report preparation. When the operator desires to obtain certification, the following steps shall be taken:

(a) The facility operator assembles the necessary facility data to satisfy appendix A requirements.
(b) The operator notifies NAVSEA of the scheduled date for a material condition survey in order to permit arrangement for a concurrent visit by a NAVSEA technical representative, if desired by NAVSEA.
(c) A surveyor conducts the necessary surveys of the facility (that is, site, soil, hydrographic, structural, and so forth).
(d) A surveyor conducts tests, observes operation of the facility, and evaluates the survey results. A summary evaluation of the material condition of the facility shall be included in the survey report.
(e) The operator reviews the survey results, lists corrective actions to be taken, and provides a schedule for the accomplishment of those actions.
(f) The operator reviews the survey results, defines operational limitations, and prepares operating procedures.
(g) The operator prepares corrective action and monitoring plans.
(h) A surveyor reviews the adequacy of the corrective action and monitoring plans, and prepares a surveyor's endorsement.
(i) The operator assembles the certification package and forwards it to NAVSEA via SUPSHIP, where applicable.

APPENDIX B

10.3 Certification report review and certification. When NAVSEA receives a certification request, the following steps shall be taken:

(a) NAVSEA initially reviews the request packages for completeness of required information and, if necessary, requests the operator to provide any omitted data.
(b) NAVSEA evaluates the certification report with special regard to: CRC, operational limitations, operating procedures, manning, corrective action plan and monitoring plan. If necessary, NAVSEA requests the operator to revise portions of these items.
(c) NAVSEA issues a facility certification to the operator, which defines CRC, the certification period, and the conditions for sustaining certification.

10.4 Operation of a certified facility. During the certification period the operator shall:

(a) Complete repairs and modifications needed prior to the next docking of a Navy ship.
(b) Prepare facility repair reports and forward these reports to NAVSEA via SUPSHIP, where applicable.
(c) Operate the facility in accordance with procedures described in the certification report.
(d) Implement and adhere to provisions of the corrective action plan and the monitoring plan.
(e) Report to NAVSEA via SUPSHIP, where applicable, when any of the following occurs: accidents or incidents; design changes; key personnel changes; operating procedure or manning revisions; repair or modification completions, as specified in this standard.
(f) Initiate action for recertification (an FRR) with an appropriate lead time prior to expiration of the current certification period, if an uninterrupted certification is necessary.

APPENDIX C

FACILITY OPERATIONS SUPERVISOR QUALIFICATION DOCUMENTATION

10. GENERAL. As specified in 4.7.2.2, the operator shall provide a resume of the training and experience of each individual designated by him as a facility operations supervisor. This appendix outlines the requirements for such a resume.

10.1 Training. Training shall be in accordance with 10.1.1.

10.1.1 Calculations. It shall be demonstrated that the designee has received formal schooling in the mathematics of stability calculations within the previous 3 years or has utilized such mathematics within the previous 1 year. As an alternative, evidence shall be provided that the designee has the support of an individual or agent who meets either of the above criteria. In addition, it shall be demonstrated that either of the above can perform the calculations required by paragraph 5.5 of this standard and Naval Ships' Technical Manual, Chapter 997 (current revision).

10.2 Work experience. It shall be demonstrated that a dockmaster or launch supervisor designee (as applicable) meets one of the following criteria:

(a) Served as a dockmaster on the same type of facility in which qualified for a period during which time a total of at least 10 ship dockings were accomplished, one of which shall have been conducted within the previous 6 months. (The "same type of facility" means that if the individual is the designated facility operations supervisor for a graving dock, he must have the requisite experience in graving docks. Likewise for marine railways, vertical lifts and floating dry docks. Additionally, in the case of floating dry docks, they must be of similar size or design, e.g., single or multiple section.) Additionally, supervised or assisted in the docking of at least two ships with a large deadrise e.g. CG-47, FFG-7, YTB and two using keel blocks at least 8 feet high.

(b) Serving under a dockmaster in an apprentice or assistant role, operated a facility for a period during which time a total of at least 20 ship dockings were accomplished, 10 of which shall have been completed in the same type of facility (with comparable or greater size and similar methods of operation, i.e., single or multiple-section floating dry dock, graving dock, marine railway, vertical lift, etc.) in which the designee is seeking qualification. One docking shall have been conducted within the previous 6 months. Additionally, assisted in the docking of at least two ships with large deadrises and two using keel blocks at least 8 feet high.

(c) Served as a launch supervisor, for at least two previous successful launching of ships, with comparable or greater tonnage, prior to the launching of a U.S. Navy ship. One launching shall have been conducted within the previous 5 years.

APPENDIX C

10.3 Retaining qualifications. Retaining qualification shall be as follows:

(a) To remain qualified, a facility supervisor shall participate in at least one docking every year on the type of facility for which he is qualified. This qualification requires the review of a docking drawing and checking corresponding build-up requirements, as well as active involvement in the actual docking operation. Facility supervisors who fail to maintain their qualifications in accordance with the requirements of this standard shall requalify prior to docking a U.S. Navy ship by assisting in the docking of a minimum of 2 ships in the type of facility he is operating.

(b) To remain qualified, a launching supervisor shall participate in at least one launching every 5 years on the type of facility for which he is qualified. Launching supervisors who fail to maintain their qualification in accordance with the requirements of this standard shall requalify prior to launching a U.S. Navy ship by assisting in the launching of a minimum of one ship.

10.4 Operational experience. Dockmasters/dockmaster designees shall provide a list of ships that they have docked or assisted in docking, including dates, drydocking facility and displacement.

APPENDIX J

ACCIDENT/INCIDENT REPORT FORMAT

10. SCOPE

10.1 Scope. This appendix contains a sample format for reporting accidents/incidents.

APPENDIX J

ACCIDENT/INCIDENT REPORT FORM

ACTIVITY _____ DATE OF REPORT _____
REPORT NO. _____ DATE OF INCIDENT _____
DRYDOCK I.D. _____ TIME OF INCIDENT _____
SHIP INVOLVED _____

PRELIMINARY _____ FINAL _____

1. SUMMARY OF INCIDENT:

2. DESCRIPTION OF INCIDENT, GENERAL DESIGNATION, AND DISCUSSION OF NATURE AND APPARENT CAUSE:

(DESIGN _____ MATERIAL _____ PERSONNEL _____ PROCEDURE _____)

A. Description of Incident:

B. Discussion of Apparent Cause:

Accident/Incident Report Format (1 of 3)

APPENDIX J

3. OPERATING CONDITIONS OF DOCK AND/OR SHIP IN DOCK OR SHIP BEING DOCKED AND/OR STATUS OF SYSTEM OR COMPONENT AT TIME OF INCIDENT:

4. IMMEDIATE TEMPORARY CORRECTIVE ACTION TAKEN AND RESULTS:

5. PERMANENT CORRECTIVE ACTION:

6. EFFECT ON FACILITY'S CAPABILITY FOR SAFE OPERATION AND CAPACITY:

7. AREAS REQUIRING FURTHER EVALUATION:

8. ACTIONS TAKEN OR RECOMMENDATIONS TO PRECLUDE FUTURE INCIDENTS:

9. SIMILAR INCIDENTS/ACCIDENTS AT THIS ACTIVITY/DOCK.

10. OUTSTANDING DEFICIENCIES:

11. PERSONNEL INJURIES:

12. COST OF REPAIRS:

13. REPORT ORIGINATED BY: _____
TITLE/ACTIVITY

REPORT APPROVED BY: _____
TITLE/ACTIVITY

RECOMMENDATION FOR CONTINUING CERTIFICATION: _____
TITLE/ACTIVITY