

JOINT FLEET MAINTENANCE MANUAL
VOLUME IV
TESTS AND INSPECTIONS
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- (2) An adequate and dedicated administrative work area to allow the Assessment Team to assemble.
- (3) Parking for the Assessment Team.
- (4) A telephone with off-ship and long distance capability.
- (5) Access to Maintenance Resource Management System.
- (6) Clerical personnel to assist. These personnel will report to the Assessment Team Leader for assignment of working hours and duties.
- (7) Copying services.
- (8) Access to all Controlled Work Packages (CWP) and standard Formal Work Packages (FWP), including the index of FWPs.
- (9) Access to selected Repair Department training records and the departmental weekly training schedule for the week of the assessment.
- (10) A list of all non-nuclear Technical Work Documents performed since the last assessment.
- (11) A list of key personnel and telephone numbers.
- (12) A list of capabilities required per references (a) and (b), but not held.
- (13) A list of all critical path jobs scheduled during the assessment.
- (14) A list of all production/management meetings scheduled during the assessment.
- (15) In the Assessment Team work area, provide:
 - (a) One desk top computer and a laser printer.
 - (b) A copy of the following reference documents:
 - 1 The previous TYCOM/Fleet Assessment report with corrective actions.
 - 2 Equipment out of commission lists.
 - 3 All FMA instructions and notices, including those pertaining to safety, production and repair functions, and the Command Availability Guide (if applicable).
 - 4 Activity manpower documents.
 - 5 Navy Afloat Maintenance Training Strategy-Training Reports.
 - 6 FMA Capabilities (currently titled IMA Capabilities) and WC Validation Reports for all applicable WCs.
 - 7 Joint Fleet Maintenance Manual.
 - 8 TYCOM Training Manual.
 - 9 Repair Department Equipment Status Log.
 - 10 FMA Audit and Surveillance Program records.
 - 11 FMA self-assessments.
 - 12 Departure from Specification files.
- d. Initiate action to systematically correct each assessment deficiency finding (Appendix D of this chapter) in accordance with paragraph 2.5.1 and 2.5.2 of this chapter.

2.5 ASSESSMENT FINDINGS/CORRECTIVE ACTION.

- a. For each noted deficiency in an assessment area, a finding will be written and classified as either “Immediate Corrective Action Required” or “Corrective Action Required”.

- b. Audit cards must clearly “stand on their own” and indicate if certification is or is not impacted by the finding when the audit card deals with SUBSAFE, Deep Submergence Systems or Fly-By-Wire deficiencies. All audit cards annotating a certification issue will be classified as “Immediate Corrective Action Required”.
- c. The FMA will annotate in the corresponding assessment report enclosure, the corrective actions taken for each finding.
- d. The Commanding Officer will also submit a findings status report to the TYCOM via the administrative chain of command within 60 days following receipt of the official assessment report.
- e. Unless a delay is specifically authorized by the TYCOM, all findings will be corrected within the time limits specified in paragraphs 2.5.1 and 2.5.2 of this chapter.

2.5.1 Immediate Corrective Action Required. A deficiency that poses a significant safety hazard or results in a total loss or extreme degradation of the FMA’s readiness to perform work or provide a service within an area of required capability. Findings classified as “Immediate Corrective Action Required” require the immediate attention of the Commanding Officer and must be corrected within 15 days following the date of the assessment out-brief. Additionally, the TYCOM may direct the immediate suspension of work in any area(s) pending resolution of critical deficiencies.

2.5.2 Corrective Action Required. A deficiency which poses a potential hazard to personnel safety or has a significant impact on the FMA’s readiness to perform work or provide a service within an area of required capability. Findings classified as “Corrective Action Required” require the prompt attention of the Commanding Officer to preclude them from developing into “Immediate Corrective Action Required” deficiencies and must be corrected within 60 days following receipt of the official assessment report.

- b. Do not enter any part of a boiler or De-Aerating Feed Tank (DFT) until it has been fully ventilated and certified by a Naval Maintenance Facility Gas Free Engineer/National Fire Protection Agency marine chemist as safe for entry in accordance with references (e) and (f), as applicable, and Chapter 25 of this volume.
- c. Ensure the idle boiler is tagged out (valves wired shut and danger tagged). Observe two-valve protection per reference (g) where applicable. Open to the atmosphere the drain connections on all dead interconnecting piping to observe drainage.
- d. The use of unshielded or non-approved portable lighting in an open boiler is prohibited. Portable lighting shall be watertight. (National Stock Number (NSN) 9S-6230-00-701-2947 applies.)
- e. Ensure all precautions cited in Section 2.24 of reference (b) are followed before entering an idle boiler.
- f. There shall be a safety observer outside the boiler entrance to provide assistance whenever personnel are inside a boiler (steam drum, water drum, firebox or smokepipe).
- g. Maintain an inventory log for accountability of all items taken into a boiler. The pockets of all personnel working in a boiler shall be emptied and all jewelry removed. The removal of all items from the boiler shall be verified from the inventory log prior to the close-up inspection. The Chief Engineer or his designated representative shall inspect the boiler prior to final close-out.
- h. Cleaning of firesides or repairs conducted to the pressure vessel exterior of a boiler is acceptable with a steaming boiler in the same space provided the precautions cited in Section 2.7 of reference (b) are observed. Water washing of the firesides is not authorized without NAVSEA approval.
- i. Requiring personnel to enter the steam/water side of a boiler with an adjacent steaming boiler is considered an unnecessary risk and will be avoided unless operations dictate otherwise. The decision to override normal safety precautions will be made by the Commanding Officer/Officer In Charge and will be reported to the TYCOM by message.
- j. Keep the area under the boiler clean and dry.
- k. Place signs warning that personnel are working in the boiler at the Boiler Console Operating station in the boiler operating space. The sign shall remain there until the work has been completed and personnel are clear of the secured boiler.

3.6 **BOILER INSPECTIONS AND REQUIREMENTS.** Main propulsion, auxiliary, waste heat and training site boiler inspections conducted per the requirements of this chapter shall fulfill all other requirements for comprehensive inspections of propulsion, auxiliary and waste heat boilers. All boiler inspections, including pre- and post-operational assessments, should be scheduled for coincidental performance. Appendix C of this chapter is a summary of boiler inspection scheduling and responsibilities. Propulsion, auxiliary and waste heat boilers will be inspected by a certified SGPI at the following intervals:

3.6.1 **Routine Inspection.** Routine Inspections will be conducted at least once every Fleet Readiness Training Plan and shall not exceed 30 months from its last inspection. For newly constructed ships, the period shall begin at the completion of the Board of Inspection and Survey (INSURV) Acceptance Trials. The normal interval between routine boiler inspections shall be 24 months. To provide scheduling flexibility, boiler inspections may be performed as early as 12 months or as late as 30 months after the previous inspection. Inspections that exceed the 24 month interval will require a minor DFS to the TYCOM with recommendation from NSWCCD-SSES. Extensions shall not result in the inspection interval exceeding 30 months. Any boiler which exceeds the inspection interval shall be placed out of commission until inspected by a certified SGPI. A major DFS with NAVSEA Technical Warrant Holder approval is required to operate a boiler beyond 30 months without a Routine Boiler inspection.

- a. The boiler inspection will be scheduled by the cognizant ISIC.
- b. The boiler inspection will be performed by the cognizant SGPI.
- c. The TYCOM may utilize PSAIs, CAIs, and Strength and Integrity Inspections which are documented in BIRMIS, to satisfy the pressure vessel portion of a routine boiler inspection. This will reduce the number of boiler openings. A Routine Inspection will not be considered completed until an SGPI has

certified all items required in NSTM 221-2.1.2.3 Ship's Pre-inspection Checklist For Up-coming Routine Boiler Inspection by U.S. Navy Steam Generating Plant Inspector and reference (c), Appendix E, F and Figure E-6 addressing Operational Assessments has been accomplished. Once completed, this resets the periodicity required for the next inspection to 24 months not to exceed 30 months.

3.6.2 Pre-start of Availability Inspection. The PSAI may be required at the discretion of the TYCOM to support early bid specification and work package development.

- a. The PSAI will be scheduled by the ISIC, as approved by the cognizant TYCOM.
- b. The PSAI will be performed by the NSWCCD LCEM Inspector and the RMC SGPI.

3.6.3 Start of Availability Inspection. The SAI may be required to be accomplished at the beginning of an overhaul/availability to better define or re-evaluate the boiler bid specifications and/or work items at the discretion of the ISIC with TYCOM concurrence.

- a. The SAI will be scheduled by the ISIC, as approved by the cognizant TYCOM.
- b. The SAI will be performed by the NSWCCD LCEM Inspector and the RMC SGPI.

3.6.4 Strength and Integrity Inspection. The normal interval between Strength and Integrity Inspections shall be 60 months. Strength and Integrity Inspections may be performed as early as 48 months or as late as 72 months after the last Strength and Integrity Inspection to provide scheduling flexibility. Inspections that exceed the 60 month interval will require a minor DFS to the TYCOM with recommendation from NSWCCD-SSES. Strength and Integrity Inspections **shall not** exceed 72 months since the last inspection. Any boiler which exceeds the inspection interval shall be placed out of commission until inspected by an NSWCCD LCEM Inspector and a certified SGPI. A major DFS with NAVSEA Technical Warrant Holder approval is required to operate a boiler beyond 72 months without a Strength and Integrity Inspection.

- a. The Strength and Integrity Inspection will be scheduled by the cognizant ISIC.
- b. The Strength and Integrity Inspection will be performed by an NSWCCD LCEM Inspector and the cognizant RMC SGPI.

3.6.5 Industrial Support Visit Inspection. The ISV inspection shall be scheduled during the availability, but may be waived by the TYCOM for availabilities of short duration.

- a. The ISV inspection will be scheduled by the industrial activity or Supervising Authority as applicable.
- b. The ISV inspection will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

3.6.6 Completion of Availability Inspection. The CAI will be conducted before reinstallation of steam drum internals and de-superheater for the Strength and Integrity Inspection.

- a. The CAI will be scheduled by the industrial activity or Supervising Authority, as applicable, and may be conducted in conjunction with a Routine Inspection.
- b. The CAI will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

3.6.7 Inactivation or Reactivation Inspection. The Inactivation/Reactivation Inspection shall be conducted on all boilers prior to completion of the inactivation/reactivation.

- a. The Inactivation/Reactivation Inspection will be scheduled by the industrial activity, Supervising Authority or Inactive Ship Facility as applicable.
- b. The Inactivation/Reactivation Inspection will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

3.6.8 Engineer Officer Inspection. The Engineer Officer Inspection shall be conducted per PMS and situational requirements of references (b) and (c), but does not qualify as a Routine Inspection described in paragraph 3.6.1 of this chapter. This inspection will be scheduled and performed by the ship's Engineer Officer. All results are to be documented in the Boiler/Water Feedwater logs and the Engineering Logs.

- (2) For Submarine CNO Availabilities greater than six months.
- (a) The Pre-Availability Inspection shall be integrated into the Shipyard's work definition period and shall be considered the **material health assessment** for the EDG.
 - (b) SUBMEPP shall enter this Pre-Availability Inspection in the applicable 000-Series SWLIN as a **material health assessment** assigned to Forces Afloat.
 - (c) The DEI shall include the Executing Shipyard (Code 260) and the Supervisor of Shipbuilding/NAVSEA Shipyard Representative's Office, as applicable, on distribution for all DEI reports conducted as a Pre-Availability Inspection or during the availability.
 - (d) As Lead Maintenance Activity, the executing shipyard will work with the TYCOM to assign all deferred inspection deficiencies to the appropriate repair activity for repair.
 - (e) The Shipyard's technical review of this inspection report may satisfy the Pre-Availability technical assessment requirement of reference (c).
- b. Post Casualty/Pre-Overhaul. When major internal engine malfunctions have occurred or are suspected (e.g., crankcase explosion, major bearing, blower or crankshaft failure), or there are indications that the engine is in need for overhaul. Extent of disassembly/inspection is at the discretion of the DEI based on the casualty or observed indications. For Post Casualty Inspections, the DEI must determine the full extent of damage and the cause, along with recommendations for repairs. For Pre-Overhaul Inspections, the TYCOM may require the DEI confirm that an overhaul is required and determine the scope of the overhaul. Partial inspections do not satisfy the requirement for a complete Routine Inspection and this fact will be annotated in the DEI's written report.
- c. Post Overhaul/Repair. When an engine has been overhauled or significant maintenance/repair has been completed. A Post Overhaul/Repair Inspection shall be conducted by a DEI prior to continuous operation. The DEI will make the final determination of whether the overhaul/repair was extensive enough to warrant a Post Overhaul/Repair Inspection. The inspection shall consist of a review of actions taken to complete the overhaul/repair, external visual inspection, tests of safety devices, review of required readings/clearances and a Phase III operational test. Unless there are indications of internal discrepancies, Phase II (internal inspection) is waived and the Routine Inspection periodicity requirement in paragraph 4.3.2.a of this chapter will be considered complete and valid. The Post Overhaul/Repair inspection should be an integral part of the overhaul/repair vice a separate inspection. Specifically, the Phase III operational test should be part of the final operational testing of the overhaul/repair vice a separate operational test.
- (1) For contractor accomplished work, the contractor specification will contain requirements for the contractor to document required readings/clearances on applicable forms and have appropriate check points made by a DEI/Industrial Subject Matter Expert (SME) during the overhaul/repair. If there is evidence of poor workmanship, use of improper parts, discrepancies in reassembly/test documentation or missing information as part of the repair process or during the inspection, the DEI/Industrial SME will advise the Repair Project Manager of the quality issues and required actions. The Repair Project Manager will coordinate required actions with the RMC Technical Authority and Maintenance Team. The RMC shall liaise with the TYCOM and obtain TYCOM concurrence on all required actions and shall advise the TYCOM of all potential cost and schedule impacts.
 - (2) For Ship's Force/Fleet Maintenance Activity accomplished engine overhauls, a Post Overhaul/Repair Inspection will be conducted by a DEI prior to starting the engine. The scope of the inspection will be as specified in paragraph 4.3.2.c of this chapter. Commanding Officer (or designated representative) permission is required to perform Phase II (internal inspection) when requested by the DEI.
- d. New Construction (Acceptance Inspection).

- (1) Prior to the delivery of a newly constructed ship, when requested by the Board of Inspection and Survey. An acceptance inspection will normally be conducted in conjunction with the open-and-inspect phase of Board of Inspection Survey acceptance trials. The acceptance inspection does not satisfy the requirements of a routine inspection.
 - (2) The initial Routine Inspection on a new construction unit shall occur prior to initial start up by Ship's Force. The cognizant Supervisor of Shipbuilding should incorporate the DEI as part of the Government Test Plan/Acceptance Plan. The cognizant Supervisor of Shipbuilding shall notify the DEI for new construction acceptance test prior to Ship's Force accepting responsibility of the diesel engine. This will ensure that an inspection baseline is established and construction discrepancies are identified/corrected early in the life of the unit.
 - (3) For submarine and CVN construction programs, the initial Routine Inspection on a new construction unit shall occur prior to initial start up by Ship's Force. For ships with temporary systems in place or less than 95 percent load available, the Phase I (see paragraph 4.3.4a of this chapter) and Phase II (see paragraph 4.3.4b of this chapter) inspections shall occur in conjunction with crew Operational Control Transfer including an operational test at available load. The Phase III (see paragraph 4.3.4c of this chapter) inspection shall occur prior to ship delivery when sufficient loading is available. Any as found conditions requiring corrections shall be adjudicated via the normal shipyard Operational Control Transfer inspections adjudication process. The routine diesel inspection periodicity shall commence upon completion of all three diesel engine inspection phases.
- e. Reactivation of Engines in Inactive Equipment Maintenance. Prior to the first operation of engines which have been placed in Inactive Equipment Maintenance. The inspection consists of a Phase I review of the actions taken to place the engine in and out of lay-up status, external visual inspection, test of safety devices and a Phase III operational test. Unless there are indications that an internal inspection (Phase II) is required, the inspection will be considered complete. This inspection should be requested far enough in advance of the first key event requiring use of the diesel. This will ensure any significant discrepancies found can be corrected prior to the start of the key event. This inspection does not satisfy the requirements of a routine inspection as per paragraph 4.3.2.a of this chapter unless a complete Phase II is accomplished.

4.3.3 Inspection Scheduling.

- a. Diesel inspections are scheduled by the ship with RMC, via ISIC when appropriate, in accordance with reference (a) and the Planned Maintenance System (PMS). As part of this process, units shall contact the local RMC/ISIC Diesel Inspector to schedule the diesel inspection 120 days prior to the desired inspection date and submit a work request (OPNAV 4790/2K) to the appropriate RMC a minimum of 90 days in advance of the desired dates to allow for DEI scheduling.
- b. It is the responsibility of the Fleet Maintenance Managers (the ship, ISIC, and Ashore Ships Maintenance Managers, as appropriate) to schedule the diesel inspection with the RMC during a period where the inspection's condition assessment can be best utilized for repair planning. The inspection may require that each engine being inspected normally be placed out of commission for five to seven days at the minimum. This time frame may increase when significant Repair Before Operating (RBO) discrepancies are discovered that require extensive repairs. Sufficient time must be allowed for the performance of the operational phase of the inspection which requires specific load testing as defined by PMS. SSDGs normally have the operational phase performed inport, whereas operational assessment of MPDEs requires the ship to be underway for a minimum of one day. Units with MPDEs must allot underway time to allow the DEI to complete the operational phase. The operational phase of the inspection must be completed within 90 days of the start of the inspection. If the operational phase cannot be completed within these 90 days, a TYCOM approved Departure From Specification (DFS) per Volume V, Part I, Chapter 8 of this manual is required. Without a DFS, the inspection will be terminated and rescheduled. Ships should integrate the operational phase of the inspection into the Fleet Response Training Plan underway schedule.
- c. A Diesel Inspection shall be accomplished by an ISIC/RMC DEI. It is encouraged that persons holding the DEI NEC that may be assigned to the ship being inspected be part of this inspection.

VOLUME IV
CHAPTER 10

WORK AUTHORIZATION AND CONTROL

REFERENCES.

- (a) NAVSEA S9002-AK-CCM-010/6010 - Industrial Ship Safety Manual for Submarines
- (b) S0400-AD-URM-010/TUM - Tag-Out User's Manual
- (c) MIL-STD-1625 - Safety Certification Program for Drydocking Facilities and Shipbuilding Ways for U.S. Navy Ships
- (d) COMSUBFORINST 5400.38 - Standard Submarine Organization and Regulations Manual (SSBN)
- (e) COMSUBFORINST 5400.39 - Standard Submarine Organization and Regulations Manual (SSN)
- (f) COMSUBFORINST 5400.48 - Standard Submarine Organization and Regulations Manual (SSGN)
- (g) NAVSEA MS 6310-081-015 - Submarine Preservation
- (h) NAVSEA S9505-AF-MMA-010 - Submarine Non-Nuclear Piping Systems Test Manual
- (i) OPNAVINST 5100.19 - Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat
- (j) OPNAVINST 5100.23 - Navy Occupational Safety and Health (NAVOSH) Program Manual
- (k) NAVSEA S9165-AC-HBK-010 - Submarine Sonar Dome Handbook
- (l) NAVSEA SE300-AZ-MMA-010 - Description, Operation and Maintenance SSN21 Class Sonar Bow Dome
- (m) NAVSEA SE300-MA-MMA-011 - Glass Reinforced Plastic (GRP) Bow Sonar Dome
- (n) COMSUBPACNOTE 9086 - COMSUBPAC Engineering Notes and Technical Notes

LISTING OF APPENDICES.

- A Work Authorization Form
- B Technical Work Document Record Sheet
- C Work Authorization Form Continuation and Revision Sheets
- D Barrier Criteria for Hull Penetrations
- E Safety of Ship Maintenance Item List Example
- F Safety of Ship Maintenance Item List
- G Procedures and Safety Precautions for Entering Submarine Spaces, Tanks and Voids
- H Close-out Inspection Check-off List

10.1 **PURPOSE.** To provide the procedures for authorization and control of shipboard work.

10.2 **WORK AUTHORIZATION.** Work on ship's systems and components, as defined in Volume I, Chapter 1, Appendix D of this manual, must be properly authorized and controlled in order to ensure rigorous personnel and ship safety standards are met at all times. All outside activity work on ship's systems and components, regardless of who performs the work, requires formal authorization through a Work Authorization Form (WAF) for the specific work to be accomplished. This applies to all U.S. Naval ships in all types of maintenance availabilities, public and private. The Work Authorization System and preparation of the WAF are discussed below. For the purpose of this chapter, the term "Repair Activity" is any activity other than Ship's Force involved in the construction, testing, inspection, repair, overhaul, refueling or maintenance of the ship.

10.3 **WORK AUTHORIZATION CONTROL.** Work on the Fleet's ships is conducted under positive Work Authorization Control in order to ensure rigorous personnel and ship safety standards are met at all times. The following considerations apply in meeting these standards:

- a. Work requiring formal authorization may include Planned Maintenance System (PMS), troubleshooting, corrective maintenance (repair) or alterations. It may also include removal of system components for repairs.

- b. As many ship systems, such as hydraulics and high-pressure air, are operationally interrelated, caution must be exercised in planning work so that other systems are not unintentionally disabled when setting work boundaries for the system to be worked.

10.4 WORK AUTHORIZATION SYSTEM. Work Authorization shall be controlled as follows:

- a. Designation of Work Requiring Formal Control. The WAF is the vehicle by which work requiring formal control is authorized for accomplishment and tracked to completion or otherwise no longer requiring isolation or authorization.
- b. A WAF, shown in Appendix A, is required to authorize the start of work on all ship systems and equipment by activities other than Ship's Force. Work includes all maintenance, repairs or modifications and installation or removal of temporary support systems and equipment. Repair activity non-intrusive work (e.g., painting, lagging, sheet metal work, deck plate, structural foundation) that does not affect ship or personnel safety does not normally require a WAF.
- c. For Ship's Force maintenance conducted in nuclear propulsion plants, the Engineering Department Manual contains the requirements regarding when a WAF is needed. For Ship's Force work conducted outside the nuclear propulsion plant, the cognizant department head shall determine the necessity for a WAF.
- d. For availabilities where a repair activity is assigned responsibilities for work authorization control by Memorandum of Agreement (MOA), the requirement regarding when Ship's Force must submit a WAF shall be specified in the MOA.

10.4.1 Administration. The following administrative process is to be used in executing Work Authorization Control:

10.4.1.1 Work Authorization Form. The WAF, shown in Appendix A, shall be filled out by the organization conducting the work, or Ship's Force, as determined by the MOA signed for the availability per Volume II, Part I, Chapters 3 and 4 of this manual.

10.4.1.2 Work Authorization Log. The Work Authorization Log(s) shall be maintained at the same location and administered by the same individuals as the ship's tagout logs or, when the repair activity is assigned responsibilities for work authorization control by MOA, the repair activity shall retain original WAFs with a copy of all WAFs (or as specified by local MOA) and the WAF index shall be provided to Ship's Force either by hard copy or electronically via a database that can be easily accessed by the Ship's Duty Officers.

NOTE: FOR SHIP'S FORCE GENERATED WAFS, THE SERIAL NUMBER SHALL USE THE SAME PREFIXES USED FOR THE TAGOUTS THAT SET THE SYSTEM ISOLATION FOR THE WORK. WHEN A REPAIR ACTIVITY IS ASSIGNED RESPONSIBILITIES FOR WORK AUTHORIZATION CONTROL, THAT ACTIVITY WILL SPECIFY THE SERIALIZATION PROCESS USED BY ALL ACTIVITIES INCLUDING SHIP'S FORCE FOR THE AVAILABILITY.

10.4.1.3 Technical Work Document Record Sheet. When the job description on the WAF covers multiple components and their associated Technical Work Documents (TWD), a TWD Record Sheet (Appendix B) in addition to the WAF may be used to document this work.

10.4.1.4 Work Authorization Form Continuation and Revision Sheets. If necessary, a WAF Continuation Sheet similar to the one shown in Appendix C may be used when information on the initial original WAF will not fit in the blocks provided in the WAF form in Appendix A. The WAF Continuation Sheet shown in Appendix C depicts the minimum blocks that must be filled out. Additional blocks may be utilized as deemed appropriate. Any changes necessary to the information on the WAF form after Block 14 is signed will be on the WAF Revision Sheet or changes to the existing WAF as described in paragraph 10.4.4 of this chapter. Existing WAF Continuation Sheets may be used until exhausted if desired. The WAF Revision Sheet, similar to the one shown in Appendix C, may be used to accomplish WAF revisions as permitted by paragraph 10.4.4 of this chapter. The WAF Revision Sheet shown in Appendix C depicts the minimum blocks that must be filled out. Additional blocks may be utilized as deemed appropriate.

10.4.1.5 Numbering Work Authorization Form Continuation and Revision Sheets. Revisions and continuation sheets generated by computer software may be numbered as determined by the software programming. Paper WAF continuation and revision sheets are to be numbered as follows:

NOTE: BARRIER CRITERIA REQUIRED BY REACTOR PLANT AND STEAM AND ELECTRIC PLANT MANUALS HAVE PRECEDENCE OVER REFERENCE (b) CRITERIA.

- b. (Submarines only) Specific guidance for hull penetrations is located in Appendix D.

10.4.8 Safety of Ship Maintenance Item Identification, Listing and Control (Submarines only).

- a. Safety of Ship Maintenance Item List (SOSMIL). Safety of Ship maintenance items are those evolutions having significant potential to impact the ship's watertight integrity, damage control capability or which require special attention to ensure ship safety.

NOTE: DESIGNATION OF SAFETY OF SHIP MAINTENANCE ITEMS FOR BOTH SHIP'S FORCE AND ANY OUTSIDE ORGANIZATION IS REQUIRED WHEN FLEET MAINTENANCE ACTIVITY (FMA), INDUSTRIAL ACTIVITIES AND CONTRACTOR PRODUCTION WORK IS IN PROGRESS. REQUIREMENTS OF PARAGRAPH 10.4.8 OF THIS CHAPTER OR A SHIP'S PLAN OF THE DAY, IF REFERENCE (a) IS IN EFFECT, WILL BE IMPLEMENTED ANY TIME WORK AFFECTING SAFETY OF SHIP ITEMS IS PERFORMED REGARDLESS OF AVAILABILITY STATUS.

- b. Safety of Ship Maintenance Items. The ship's Commanding Officer's permission is required prior to authorizing the maintenance evolution. The following, as a minimum, shall be scheduled on the SOSMIL:
- (1) All maintenance involving single closure isolation from sea.
 - (2) All maintenance which removes a means of blowing main ballast tanks.
 - (3) All maintenance requiring the use of flat patches, hull blanks or cofferdams, with specific entries identifying the actual installation and removal of these items.
 - (4) All maintenance which removes the capability to dewater the ship using either the trim or the main drain systems.
 - (5) All maintenance which removes the ship's installed firefighting capability (e.g., maintenance which prevents pressurization of the trim system).
 - (6) Bleeding or charging oxygen banks.
 - (7) Handling or loading of explosives or weapons.
 - (8) All maintenance which removes portions of, or the entire Emergency Air Breathing system.
 - (9) Fueling or defueling.
 - (10) Diver operations.
 - (11) Pumping or flooding the sonar dome.
 - (12) Battery charges.
 - (13) Nitrogen load.
 - (14) Refrigerant on/off load.
 - (15) Evolutions with an expected draft change of >3 inches (e.g., ballasting, lead load, etc.).
 - (16) Securing the Emergency Diesel Generator.
 - (17) Other maintenance or evolutions which require special coordination between Ship's Force and maintenance providers to ensure safe accomplishment of authorized work (e.g., Loading Vertical Launch System Platform).
 - (18) All maintenance that violates the integrity of the pressure hull, watertight bulkhead or watertight doors, excluding the routine operations of access hatches.
 - (19) All maintenance that disables any bilge alarm or any portion of an emergency announcing circuit when temporary alarms or indications are not installed.

- (20) All maintenance that secures normal or emergency lighting circuits in a compartment or space such that damage control response would be significantly impacted.

NOTE: USE OF TEMPORARY SYSTEMS TO REPLACE FUNCTIONS OF SHIP'S INSTALLED SYSTEMS SHOULD BE CONSIDERED WHEN DEEMED NECESSARY. CLASS SUBMARINE ORGANIZATION AND REGULATIONS MANUALS AND SHIP SYSTEM MANUALS MAY PROVIDE FURTHER GUIDANCE.

- c. **SOSMIL Preparation.** The SOSMIL will be prepared by a person designated by the ship's Commanding Officer using written input provided by Ship's Force divisions and the FMA representative. A new SOSMIL will be prepared prior to the FMA Daily Production Meeting of Volume II, Part I, Chapter 4, paragraph 4.4.11 of this manual. Appendix E of this chapter is provided as an example and depicts the minimum attributes that must be documented on the SOSMIL. Appendix F of this chapter may be reproduced locally for use. Prepare the SOSMIL as follows:
 - (1) Indicate ship's name, hull number, upkeep number, calculated maximum expected draft, actual morning draft and date prepared.
 - (2) For each job, list the Job Control Number/WAF number (as applicable) (operating instruction, PMS item, operating procedure), job description, scheduled end date and any remarks.
 - (3) The SOSMIL should indicate planned work for the next seven days. A thick black line shall be used on the left side of the current day to indicate the current days work.
 - (4) In the job description block, indicate in parentheses a number that corresponds to the list at the bottom of the sheet as to why the job requires a SOSMIL entry.
 - (5) Items shall remain listed on the SOSMIL until work has been verified complete and associated WAF has been completed or Block 11 of the WAF revised as no longer affects Safety of Ship.
- d. **Maximum Expected Draft.** For those items which will have an affect on ship's draft, expected draft changes greater than three (3) inches will be calculated fore and aft for that evolution and indicated in the remarks section. Draft calculations will be made by a Diving Officer of the Watch qualified individual. Additionally, for all ballasting evolutions, a second independent calculation will be performed and provided by a second Diving Officer of the Watch qualified individual. The worst-case draft change for each item will be totaled to arrive at a "maximum draft" and a maximum one foot buffer added to arrive at the "maximum expected draft". (The ship's Commanding Officer can decide to reduce the buffer as he desires. If Safety Draft Marks are in use, the bottom edge of the mark shall match the "maximum expected draft".) The "maximum expected draft" is listed at the top of the SOSMIL. Calculation sheets will be retained until the job is no longer carried on the SOSMIL. If the ship exceeds the "maximum expected draft", the Duty Officer will stop the evolution, place the ship in a safe condition and notify all parties who signed the SOSMIL and the ship's Commanding Officer.

NOTE: THIS SHALL IN NO WAY BE CONSTRUED AS LIMITING ACTIONS BY THE DUTY OFFICER OR NOTIFICATION OF THE SHIP'S COMMANDING OFFICER OF SMALLER DRAFT CHANGES. ANY UNEXPECTED DRAFT CHANGE SHOULD BE THOROUGHLY INVESTIGATED AND UNDERSTOOD.

- e. **Morning Actual Draft.** The actual ship's draft recorded each morning prior to the Daily Production Meeting. This draft will serve as a baseline value for draft changes that occur throughout the day.
- f. The Ship's Force Availability Coordinator will present the SOSMIL at the FMA daily production meeting for review and signatures. The SOSMIL will be signed by:
 - (1) Ship's Force (signed by a department head). Signature indicates that all evolutions that affect ballast have been identified, the form has been completed in accordance with this instruction and the correct drafts have been calculated and at least four feet of freeboard is available to all hull openings.
 - (2) Immediate Superior In Command (ISIC) (signed by an ISIC representative). Signature indicates that all maintenance has been identified, the form has been completed in accordance with this instruction and the draft measurements are noted.

APPENDIX D

BARRIER CRITERIA FOR HULL PENETRATIONS

1. SYSTEMS WHICH PENETRATE THE HULL. Commanding Officers will review tag-outs and work procedures for systems which penetrate the hull to the detail considered necessary for safety. Any required work or testing which violates the requirements below should not commence without prior specific approval of the Commanding Officer.

2. HULL PENETRATIONS BELOW THE WATERLINE. The principle of double closure applies to all hull penetrations except for those mechanical and electrical penetrations (such as the secondary propulsion motor shaft and cable penetrations) which are designed for single closure. Double closure is accomplished by using installed valves, blank flanges, outside closure plates or shaft seals. Positive control shall be exercised by Ship's Force to maintain closure through the use of danger tags and interlocks, gagging devices, chains, mechanical locks, hydraulic locks, blanks etc., until the work, including the required testing, on the associated system has been completed.

- a. Single closure can be used only with the specific permission of the Commanding Officer. If single closure is approved, the barrier must be verified by a satisfactory leak check of the single closure before opening the system for maintenance as follows:
 - (1) The system should be isolated using the single closure barrier.
 - (2) If the system has not been drained, open the closest system high-point vent to conduct a controlled leak check of the single closure.
 - (3) If the system has been drained, open the closest low-point drain to conduct a controlled leak check of the single closure.
- b. Prior to undocking:
 - (1) If undocking becomes necessary prior to completing all sea connected system maintenance and testing, obtain double closure through reassembly, then satisfactorily hydrostatic test all pressure boundary joints outboard of the backup valve seat and verify the integrity of the hull and backup valve seats by performing a hydrostatic seat leakage check of both valves.
 - (2) Where schedule, resources or other constraints prevent accomplishment of the above at the time of undocking, a blank flange(s) shall be installed, tested and identified external to the hull penetration to provide double closure. This condition shall be identified both internally and externally to prevent inadvertent removal. The installation of the blank flange shall be approved by the Commanding Officer. Removal of these blank flange(s) shall not commence until the required valve(s) and associated local Valve Position Indicator(s) have been reinstalled and tested to support removal of the blank and blank removal has been approved by the Commanding Officer.

3. HULL PENETRATIONS ABOVE THE WATERLINE. These penetrations/openings will also be protected by double closure or as follows:

NOTE: THE DETERMINATION OF LESS THAN OR GREATER THAN FOUR FEET FROM THE WATERLINE WILL BE DETERMINED BY A MEASUREMENT FROM THE LOWEST LIP OF OPENINGS IN A PENETRATION TO THE ACTUAL WATERLINE.

- a. Hull penetrations less than four feet above the waterline.
 - (1) Cofferdams shall be installed around all open hull access openings, including temporary hull cuts, which have less than four feet of freeboard at the opening. Cofferdams shall be constructed and tested in accordance with reference (a) to maintain watertight integrity to at least four feet above the waterline. A hull opening such as an electrical cable penetration need not have a cofferdam installed if it is adequately blanked or plugged while the system is under repair. Cofferdams will be designed to permit personnel access, temporary services and equipment shipping, as applicable, without violating the required watertight integrity. The

ship's topside freeflood structure may be used to achieve the four foot requirement, however, the opening must be controlled in the same manner as a cofferdam. Positive control to maintain closure through the use of danger tags, and gagging devices, mechanical locks and/or blanks must be exercised for all hull access openings not in an as-built condition. Removal or changes in status shall be approved by the Commanding Officer.

- (2) Other penetrations/openings which do not meet the above criteria or which cannot be isolated by some type of single closure will be attended at all times by personnel with access to equipment capable of securing flooding, should it ever occur. Exceptions require specific permission of the Commanding Officer. Single closure may be affected by any suitable temporary watertight closure.
- b. Hull penetrations greater than four feet above the waterline. Penetrations/openings not in their normal as-built condition are not required to be watertight but should be provided with protection against unwanted fluid entry.

4. INADVERTENT OPERATION OF HYDRAULIC ACTUATORS. For those conditions when the ship is waterborne with a hull and/or backup valve below the waterline installed but the associated inboard piping is not complete and the hull and/or backup valve hydraulic actuator lines are disconnected, the following guidance is provided for reconnecting the hydraulic actuators (which may cause valve movement):

- a. If an external blank flange is installed, any additional precautions should be determined by the Commanding Officer.
- b. If an external blank flange is not installed, then the hull and backup valves should be installed, hydrostatically tested and local valve position indication proven correct and reliable. Additional safety precautions such as not working the actuators for a particular hull/backup combination concurrently, shutting and danger tagging both valves at all times, isolating and danger tagging the hydraulic pressure source to the control valve for the specific actuator being worked and not pressurizing or operationally testing the actuators until the seawater system integrity has been reestablished, should be employed to provide the additional assurance required to preclude the need for an external blank.

5. INSTALLATION OF HULL FITTINGS/FLANGES. When maintenance is to be performed which requires a hull fitting/flange to be installed, the following actions will be taken:

- a. Ship's Force will identify the hull opening by noun name, docking plan number, frame number, side and distance off centerline and item number (as obtained from the ship's docking plan) and provide this information to the FMA.
- b. The FMA planning division will verify the data provided by Ship's Force and calculate the circumferential distance from the centerline.
- c. The FMA LWC will provide the verified data and the fitting/flange, including the required installation hardware, to the diving supervisor.
- d. Ship's Force shall mark the fitting location using a weighted and marked line, referenced from frame marks topside.
- e. The Ship's Duty Officer shall authorize the installation of the fitting/flange and coordinate the pre-brief for the installation evolution. As a minimum, the brief shall be attended by the Ship's Duty Officer, LWC Supervisor and Diving Supervisor. The mechanism for authorizing the hull blank installation shall be the Work Authorization Form (Appendix A), in accordance with this chapter.
- f. The divers, in conjunction with Ship's Force and the LWC Supervisor shall verify the location of the hull opening and weighted/weighted line prior to the divers entering the water.
- g. A diver accompanied by Ship's Force shall tap on the internal hull opening until the in-water diver acknowledges the location by returning the signal except where permanent markings identifiable by a diver uniquely identify a specific hull fitting/penetration (markings such as a fitting name or number welded as raised characters on/adjacent to the fitting/penetration).
- h. After installation, the hull fitting/flange location and installation shall be independently verified by a second diver.

VOLUME IV

CHAPTER 11

TECHNICAL DATA AND INFORMATION MANAGEMENT

REFERENCES.

- (a) TL130-A1-HBK-010 MSC Procedures Manual - Maintenance Support Center Library Procedures Manual
- (b) COMNAVAIRFORINST 4700.23 - Aircraft Carrier Maintenance Support Centers (MSC) Policy and Procedures
- (c) NAVSUP P2003 - Navy Stock List of Forms and Publications
- (d) SECNAVINST 5510.36 - Department of the Navy Information Security Program Regulation
- (e) NAVSEA S8800-00-GIP-000 - NAVSEA Guidance Handbook for Intermediate Maintenance Activity Technical Library Personnel
- (f) NAVSEA S0005-AG-GYD-010 - Technical Manual Users Quick Reference Guide
- (g) SECNAVINST 5510.30 - Department of the Navy Personnel Security Program
- (h) NAVSEA SL720-AA-MAN-030 - Navy Modernization Program
- (i) NAVSEA S9040-AC-IDX-010 - Ships 3-M Reference Information CD
- (j) NAVAIR 00-25-100 - Naval Air System Command Technical Manual Program
- (k) NAVSEAINST 4160.3 - Technical Manual Management Program
- (l) NAVSEA S0005-AA-PRO-010/TMMP - NAVSEA Technical Manual Management Program Operations and Life Cycle Support Procedures
- (m) NAVSEAINST 9210.29 - Nuclear Powered Ships and Prototypes - Responsibilities of Holders of Reactor Plant and Related Manuals
- (n) NAVSEA S9086-CV-STM-010 - Naval Ship's Technical Manual Chapter 086 Command Technical Manual Management

11.1 PURPOSE. This chapter defines the responsibilities with respect to the management of technical documentation and data and requires the establishment and operation of technical libraries. Unless otherwise noted, Aircraft Carriers are governed by references (a) and (b).

11.1.1 Discussion. Technical data and information are critical for the proper operation, maintenance, troubleshooting and repair of all plant equipment. Improper maintenance or equipment remaining not repaired and inoperative can result from a lack of proper documentation in the form of technical manuals, ship's drawings and blueprints, Military Specifications and standards, etc.

11.2 SHIPBOARD TECHNICAL DOCUMENT MANAGEMENT. Ships shall maintain the Advanced Technical Information Support (ATIS) System up to date. ATIS updates are mailed out to the ship on Compact Disks (CD/DVD). An additional system available for use is the Technical Data Knowledge Management (TDKM) system. Ship technical document distribution is based on configuration and therefore relies upon the Configuration Data Managers Database - Open Architecture being maintained up to date to accurately assign documents to the ship. To ensure ships maintain up to date technical documents, the following requirements shall be met:

- a. The ship shall assign a senior Petty Officer (E-6 or above) as the Technical Librarian who will maintain the ATIS and TDKM systems up to date under the supervision of the 3M Systems Coordinator. Assignments as a Technical Librarian should be for a minimum of 12 months. Technical Librarians on Aircraft Carriers are assigned for 18 months in accordance with reference (b). For Aircraft Carriers, the point of contact is the Maintenance Support Center (MSC) Officer and the Maintenance Officer. At Submarine Fleet Maintenance Activities (FMA), ashore and afloat, the Technical Librarian will work under the supervision of the Planning and Estimating Officer for ATIS, TDKM and other databases maintained for FMA use.
- b. The Technical Librarian shall promptly apply ATIS changes within one week of being received on board.

- c. If TDKM is activated, the Technical Librarian shall synchronize and index TDKM once per week and report completion with received changes to the 3M Systems Coordinator. For Aircraft Carriers the point of contact is the MSC Officer and the Maintenance Officer.
- d. 3M System Coordinator shall report completion of ATIS and/or TDKM updates to the Executive Officer. For Aircraft Carriers the point of contact is the MSC Officer and the Maintenance Officer.

11.3 TECHNICAL LIBRARIES. Technical Library personnel maintain a complete master technical library including electronic or hard copies of technical manuals, drawing/aperture cards, Coordinated Shipboard Allowance Lists, provisioning Allowance Parts Lists (APL), computerized databases and any other technical documents or aids which support maintenance functions. The appropriate IT system computer programs will be used to maintain the library. In general, the technical library serves the following basic functions:

- a. Acquisition of new documents and data and the updating of existing materials.
- b. Cataloging, indexing and filing all documents, data and information materials to allow for effective use of library technical information.
- c. Accountability and control to ensure continuous integrity of the library collection and to enhance periodic inventories.
- d. Central control point for all technical documents received, held, used, transferred or disposed of by the repair department (FMA only) or command. For FMAs having a Nuclear Support Facility (NSF), all Naval Sea Systems Command Nuclear Propulsion Directorate (NAVSEA 08) controlled documents shall be controlled by the NSF. For MSCs aboard aircraft carriers, all NAVSEA 08 controlled documents shall be controlled by the Reactor Department Technical Publication Library. All aircraft maintenance related documents shall be controlled by the Aircraft Intermediate Maintenance Department.
- e. Maintain access to the following computer networks/websites whenever possible.
 - (1) Technical Data Management Information System (TDMIS).
<https://mercury.tdmis.navy.mil/default.cfm>
 - (2) Military Engineering Drawing Asset Locator System.
<https://www.dlis.dla.mil/medals>
 - (3) Naval Surface Forces, Atlantic Planning and Execution of Alterations and Repair (FMA and COMNAVSURFLANT and COMNAVSURFPAC commands only)
<https://www.spear.navy.mil> click on SPEAR info.
 - (4) Maintenance and Modernization IT Systems.
 - (5) **TMDER/ACN Report Tool**.
<https://mercury.tdmis.navy.mil>
 - (6) ASSIST Quick Search <http://quicksearch.dla.mil>

11.3.1 Technical Library Supervisor. The Technical Library Supervisor is responsible for keeping current plans, prints, specifications, manuals and all other technical documents and information needed by ship and FMA departments and for managing the daily operation of the library. The Technical Library Supervisor shall:

- a. Have a sufficient understanding of technical library organization requirements in references (a) through (n) (as applicable) to supply the necessary technical information.
- b. Have a **minimum** security clearance equal to the highest security classification of any document held within the library.
- c. Supervise personnel assigned to library.
- d. Operate the technical library in the following manner:

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CHAPTER 18
SUBMARINE SALVAGE INSPECTION

REFERENCES.

- (a) NWP 1-03.1 - Naval Warfare Publication Operational Report

LISTING OF APPENDICES.

- A SSN 21 Class Submarine Salvage Inspection Check-Off List
 B SSN 688 Class Submarine Salvage Inspection Check-Off List
 C SSBN/SSGN 726 Class Submarine Salvage Inspection Check-Off List
 D SSN 774 Class Submarine Salvage Inspection Check-Off List
 E Sample Pre-Inspection Information/Certification
 F Sample Report of Salvage Inspection Forwarding Letter

18.1 **PURPOSE.** To ensure the continued readiness and quality of maintenance performed on submarine rescue and salvage equipment.

18.2 **INSPECTIONS.**

18.2.1 **Periodicity.** The readiness of submarine rescue and salvage equipment is determined by periodic salvage inspections. Salvage inspections will be conducted within a 72 month interval, or as listed below:

- a. Whenever requested by the submarine.
- b. Prior to initial builder's trials for new construction ships, prior to initial sea trials for ships in Chief of Naval Operations (CNO) Maintenance Availabilities, and prior to initial sea trials for ships in Interim Dry Docking.
- c. A partial salvage inspection will be completed for all items worked during an availability (i.e., hatches, salvage air valves, etc.).
- d. Once **every five years for SSBNs/SSGNs.**
- e. Prior to Sea Trials for repairs of damage from collision or grounding where deformation is observed to be in the hull integrity envelope or supporting structure.

18.2.2 **Procedures and Reports.** The specific rescue and salvage items to be inspected and the type of submarines to which they are applicable are identified in Appendices A through D of this chapter. Appendix E of this chapter is a sample pre-inspection form to be completed by the submarine prior to the salvage inspection. Appendix F of this chapter is a sample Submarine Salvage Inspection forwarding letter. Inspection attributes or elements of Appendices A through D may not be locally waived or have equipment substituted. Temporary changes to the attributes or elements of Appendices A through D will only be revised by the Type Commander (TYCOM) and the revision must be documented in formal correspondence. Any attributes or elements of Appendices A through D as applicable to the respective ship class not met or which fails inspection is underway limiting until corrected or waived by the TYCOM.

NOTE: IF NO QUALIFIED INSPECTORS ARE AVAILABLE, CONTACT THE TYPE COMMANDER FOR DIRECTION.

18.2.3 **Inspection Resources.** The hatch and watertight door portion of this inspection will be conducted by members of the local Ship's Maintenance Monitoring Support Performance Monitoring Team (PMT) (i.e., personnel who have successfully completed Submarine Structural Closure Inspection course or personnel designated by NAVSEA). Other portions of the inspection should be conducted by personnel who, by their rate and experience, are qualified in that particular section. Inspection teams are to be assembled, as required, from the following sources in order of the priority shown:

- a. Undersea Rescue Commands.
- b. Submarine Fleet Maintenance Activities.
- c. Immediate Superior In Command (ISIC) Staffs.
- d. Submarines of the same class.
- e. Other submarines.
- f. Salvage ships (ARS).

18.3 RESPONSIBILITIES. Responsibility for the preparation, conduct, and completion reporting for a salvage inspection is as follows:

18.3.1 Immediate Superior In Command.

- a. Schedule salvage inspections for assigned submarines as specified in paragraph 18.2.1 of this chapter. The inspection should be conducted early enough in the availability to allow for the correction of deficiencies prior to Fast Cruise.
- b. Designate the inspecting team using the guidance provided in paragraph 18.2.3 of this chapter to conduct the salvage inspection.

18.3.2 Commanding Officer/Officer In Charge.

- a. Request the ISIC to conduct a salvage inspection in accordance with the periodicity set forth in paragraph 18.2.1 of this chapter.
- b. Coordinate support requirements as may be needed by the inspecting team to fulfill the requirements of the applicable Appendix of this chapter.

NOTE: HATCHES THAT ARE FOULED WILL PREVENT THE SATISFACTORY COMPLETION OF THIS INSPECTION. COORDINATION BETWEEN THE SHIP, INSPECTING TEAM AND MAINTENANCE ACTIVITY IS THE RESPONSIBILITY OF THE COMMANDING OFFICER/OFFICER IN CHARGE.

- c. Complete and forward a pre-inspection information letter to the Senior Inspecting Officer using the sample provided in Appendix E of this chapter as a guideline. Modify Appendix E as necessary to align required attributes with the applicable class-specific checklist.
- d. Assemble all ship's data indicated in the applicable Appendix of this chapter prior to the inspection for ease of reference by the inspecting team.
- e. Upon receipt of the Senior Inspecting Officer's report, take action to correct the discrepancies found and report by letter or message their corrections to the ISIC with a copy to the TYCOM and Supervising Authority (when assigned) prior to commencement of Fast Cruise.
- f. Submit a Casualty Report (CASREP), if applicable, in accordance with reference (a) for each item which degrades the Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System (SRDRS) capability.

18.3.3 Senior Inspecting Officer.

- a. Assemble the inspecting team designated by the ISIC.
- b. Conduct the salvage inspection in accordance with the applicable Appendix of this chapter. Ensure Appendix E of this chapter is received prior to commencement of the inspection. The inspection should be completed at least 14 days prior to commencement of Fast Cruise, or for new construction ships and ships in a CNO Maintenance Availability, at least 28 days and no sooner than 60 days, prior to the scheduled commencement of Sea Trials. This examination should normally be performed close to Phase I crew certification, if possible.
- c. At the completion of the salvage inspection, report the following to the Commanding Officer/Officer In Charge of the inspected ship:

PART II: DISABLED SUBMARINE (DISSUB) 7-DAY SURVIVAL, ESCAPE AND RESCUE

INSPECTION ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>1. <u>Submarine Rescue Chamber (SRC)/Submarine Rescue Diving and Recompression System (SRDRS) Fittings:</u></p> <p>a. Verify four rescue vehicle holddown sockets are installed per plan or authorized alteration on all escape trunk seating surfaces. From one socket per hatch, remove capscrew and plug; demonstrate guide is free. (SSN 23 and SSN 21 Class with S/A 4274.) Verify 4 padeyes installed for rescue vehicle in upper hatch free flood areas (SSN 21 Class prior to S/A 4274).</p> <p>b. Remove plug from hatch fairing. Check condition of SRC downhaul shackle. Verify downhaul shackle is free of corrosion and can be operated by hand. Use of plastisol on downhaul shackle is not authorized as it prevents visual inspection of shackle for corrosion and promotes corrosion. The shackle must be powder coated white.</p> <p>c. AN/BQN-13.</p> <p>(1) Inspect AN/BQN-13 Beacon to ensure that:</p> <p>(a) Cable is free of abrasions, cuts or damage.</p> <p>(b) Cable plug and encapsulation are free of defects.</p> <p>(c) Unit has no physical damage.</p> <p>(d) Transducer is free of oil leaks, bubbles and paint.</p> <p>(2) Verify from ship's records that all applicable AN/BQN-13 PMS has been performed and witness satisfactory performance of all procedures (except R-1).</p> <p>(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.</p>	<p>Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594</p> <p>Ship's Plans Note 8</p> <p>Ship's Plans Note 8</p> <p>MIP SO-104/902</p> <p>Ship's COSAL Note 9</p>						

An asterisk (*) will be used in addition to a check mark (✓) in the unsat column to identify any exceptions. An explanation of the exception will be provided with the Salvage Inspection Report, Appendix F of this chapter.

INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>a. Witness demonstration that all valves with external gagging devices can be gagged from open to shut with the inspecting command's salvage wrench and with the number of turns specified on the ship's salvage system arrangement plan. Record number of turns to operate. _____</p> <p>b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.</p> <p>7. <u>Air Bank Dew Points:</u></p> <p>a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.</p> <p>8. <u>Towing Equipment</u></p> <p>a. <u>Perform Inspection of Towing Equipment.</u></p>	<p>Notes 2 and 5</p> <p>Note 6</p> <p>MIP 5542/911 MRC 7BDB</p> <p>(MIP) 5821/688</p>				

An asterisk (*) will be used in addition to a check mark (✓) in the unsat column to identify any exceptions. An explanation of the exception will be provided with the Salvage Inspection Report, Appendix F of this chapter.

PART II: DISSUB 7-DAY SURVIVAL, ESCAPE AND RESCUE

INSPECTION ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>1. <u>Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System (SRDRS) Fittings.</u></p> <p>a. Verify four rescue vehicle holddown sockets are installed per plan or authorized alteration on all escape trunk seating surfaces. From one socket per hatch, remove capscrew and plug; demonstrate guide is free.</p> <p>b. Remove plug from hatch fairing. Check condition of SRC downhaul shackle. Verify downhaul shackle is free of corrosion and can be operated by hand. Use of plastisol on downhaul shackle is not authorized as it prevents visual inspection of shackle for corrosion and promotes corrosion. The shackle must be powder coated white.</p> <p>c. AN/BQN-13.</p> <p>(1) Inspect AN/BQN-13 Beacon to ensure that:</p> <p>(a) Cable is free of abrasions, cuts or damage.</p> <p>(b) Cable plug and encapsulation are free of defects.</p> <p>(c) Unit has no physical damage.</p> <p>(d) Transducer is free of oil leaks, bubbles and paint.</p> <p>(2) Verify from ship's records that all applicable AN/BQN-13 PMS has been performed and witness satisfactory performance of all procedures (except R-1).</p> <p>(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.</p>	<p>Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594</p> <p>Ship's Plans Note 7</p> <p>Ship's Plans Note 7</p> <p>MIP SO-104/902</p> <p>Ship's COSAL Note 8</p>						

An asterisk (*) will be used in addition to a check mark (✓) in the unsat column to identify any exceptions. An explanation of the exception will be provided with the Salvage Inspection Report, Appendix F of this chapter.

INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>a. Witness demonstration that all valves with external gagging devices can be gagged from open to shut with the inspecting command's salvage wrench and with the number of turns specified on the ship's salvage system arrangement plan. Record number of turns to operate.</p> <p>b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.</p> <p>7. <u>Air Bank Dew Points:</u></p> <p>a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.</p> <p>8. <u>Towing Equipment</u></p> <p>a. Perform Inspection of Towing Equipment.</p>	<p>Notes 2, 5, and 6</p> <p>Notes 6 and 7</p> <p>For SOF hulls: MIP 5542/974 MRC 7CVM (Banks 1 and 2) MRC 7CVN (Banks 3 and 4)</p> <p>For non-SOF hulls: MIP 5542/975 MRC 7AAC</p> <p>(MIP) 5821-774</p>				

An asterisk (*) will be used in addition to a check mark (✓) in the unsat column to identify any exceptions. An explanation of the exception will be provided with the Salvage Inspection Report, Appendix F of this chapter.

PART II: DISSUB 7-DAY SURVIVAL, ESCAPE AND RESCUE

INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>1. <u>Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System (SRDRS) Fittings:</u></p> <p>a. Verify four rescue vehicle holddown sockets are installed per plan or authorized alteration for all escape trunk seating surfaces. From one socket per hatch, remove capscrew and plug; demonstrate guide is free.</p> <p>b. Remove plug from hatch fairing. Check condition of SRC downhaul shackle. Verify downhaul shackle is free of corrosion and can be operated by hand. Use of plastisol on downhaul shackle is not authorized as it prevents visual inspection of shackle for corrosion and promotes corrosion. The shackle must be powder coated white.</p> <p>c. AN/BQN-13.</p> <p>(1) Inspect AN/BQN-13 Beacon to ensure that:</p> <p>(a) Cable is free of abrasions, cuts or damage.</p> <p>(b) Cable plug and encapsulation are free of defects.</p> <p>(c) Unit has no physical damage.</p> <p>(d) Transducer is free of oil leaks, bubbles and paint.</p> <p>(2) Verify from ship's records that all applicable AN/BQN-13 PMS has been performed and witness satisfactory performance of all procedures (except R-1).</p> <p>(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.</p>	<p>Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594</p> <p>Ship's Plans Note 8</p> <p>Ship's Plans Note 8</p> <p>MIP SO-104/902</p> <p>Ship's COSAL Note 9</p>						

An asterisk (*) will be used in addition to a check mark (✓) in the unsat column to identify any exceptions. An explanation of the exception will be provided with the Salvage Inspection Report, Appendix F of this chapter.

VOLUME IV
CHAPTER 21
SUBMARINE OXYGEN GENERATING
PLANTS

REFERENCES.

- (a) NAVSEA S9515-AA-MMO-010/021/022/030/040 - 6L16 Electrolytic Oxygen Generator (EOG) Technical Manual, Volumes 1 through 4
- (b) NAVSEA S9515-A1-MMO-010/020/030 - Automated Electrolytic Oxygen Generator (AEOG) Treadwell Corporation Preliminary Technical Manual, Volumes 1, 2 and 3
- (c) NAVSEA S9515-A4-MMA-010/020 - Low Pressure Electrolyzer (LPE) Oxygen Generator Technical Manual Volumes 1 and 2
- (d) NAVSEA S9515-AL-MMA-010/020 - Integrated Low Pressure Electrolyzer (ILPE) Preliminary Technical Manual, Volumes 1 and 2
- (e) NAVPERS 18068 - Manual of Navy Enlisted Manpower and Personnel Classifications and Occupational Standards
- (f) COMNAVSUBFORINST 5400.25 - Standard Submarine Supply Department Organization and Regulations Manual
- (g) COMNAVSUBFORINST 5400.29 - Standard Submarine Navigation/Operations Department Organization and Regulations Manual
- (h) COMNAVSUBFORINST 5400.40 - Standard Submarine Combat Systems Department Organization and Regulations Manual (SSN)
- (i) COMNAVSUBFORINST 5400.41 - Standard Submarine SSBN 726 Class Weapons Department Organization and Regulations Manual
- (j) COMNAVSUBFORINST 5400.47 - Standard Submarine Combat Systems Department Organization and Regulations Manual (SSGN)

21.1 **PURPOSE.** To establish the prerequisites and procedures for qualification of personnel, operation and maintenance of shipboard submarine oxygen generating plants designated 6L16 Electrolytic Oxygen Generators (EOG), 6L16 Automated Electrolytic Oxygen Generators (AEOG), Low Pressure Electrolyzers (LPE) and Integrated Low Pressure Electrolyzers (ILPE).

21.1.1 **Policy.** Type Commander (TYCOM) policy regarding the operation and maintenance is:

- a. All current technical documentation shall be available at the oxygen generator for operator use. As a minimum, the on hand documentation will include reference (a), (b), (c) or (d), as required, and the MRCs that support the installed unit.
- b. Planned Maintenance System (PMS) shall be maintained current to the latest Periodic Force Revision and all scheduled/situational planned maintenance requirements must be accomplished.

NOTE: OXYGEN GENERATOR OPERATORS AND MAINTENANCE TECHNICIANS SHALL BE LIMITED TO THOSE INDIVIDUALS HOLDING THE NAVY ENLISTED CLASSIFICATIONS (NEC) REQUIRED BY REFERENCE (e) FOR THE TYPE OF OXYGEN GENERATOR PLANT OPERATED AND/OR MAINTAINED. REFERENCE (e) REFERS.

- c. At least two qualified operators and one qualified technician shall be onboard during oxygen generator operation. Two qualified operators meet this requirement if at least one of the operators is also a qualified maintenance technician.
- d. **Safety related deficiencies must be corrected prior to oxygen generator operation.**
- e. There shall be a minimum of two qualified Oxygen Clean Workers on board to conduct maintenance on oxygen systems and the oxygen generator (except submarines with LPEs and ILPEs).

- f. For VIRGINIA Class submarines, the following hulls shall be required to maintain a minimum of two qualified Oxygen Clean Workers on board: SSN 776, SSN 777, SSN 778, SSN 779, SSN 782 and SSN 784 or as determined by TYCOM.

21.1.2 Background.

- a. Oxygen generator casualties result primarily from improper maintenance, operation or insufficient operator familiarization with current operating instructions and safety precautions. The recurring nature of these casualties necessitates that positive action be taken to ensure operating and maintenance personnel are properly trained and qualified. Additionally, technical documentation must be continuously updated for use by the ship's oxygen generator operating, maintenance and support personnel.
- b. Naval Sea Systems Command (NAVSEA) and TYCOM Technical Notices and Advance Change Notices (ACN) provide the Fleet with the latest technical information and operating instructions concerning oxygen generators. These Notices and ACNs will remain in effect until cancelled by a subsequent Notice or ACN, or are incorporated as a revision to the applicable technical manual.

21.2 RESPONSIBILITIES.

21.2.1 Immediate Superior In Command.

- a. Ensure assigned units are in compliance with the policy stated in paragraph 21.1.1 of this chapter.
- b. Conduct periodic inspections and audits to ensure that:
 - (1) Operating and maintenance personnel proficiency is being maintained.
 - (2) Technical manuals, operating and maintenance notices and PMS documentation are current.
 - (3) Operation and maintenance is in accordance with this chapter, reference (a), (b), (c) or (d), as required, and the supporting PMS.
- c. Ensure Performance Monitoring Team (PMT) inspectors perform material inspections of the ship's oxygen generators approximately 90 days prior to entry and departure from a Chief of Naval Operations (CNO) Maintenance Availability. The material inspection, prior to the availability, will identify material deficiency corrective actions which must be corrected prior to completion of the availability.

21.2.2 Performance Monitoring Team.

- a. Conduct periodic and pre/post-CNO Maintenance Availability material inspections. Ensure a review of the inspected units Material Maintenance Log is part of the material inspection.
- b. Initiate a quarterly monitoring program for those units receiving an unsatisfactory grade during the material inspection. Maintain the units on the quarterly monitoring program until two consecutive satisfactory evaluations, with no safety related deficiencies noted.
- c. Provide copies of all reports following material inspections, monitoring periods and On Site Analysis Reports to the TYCOM and the ISIC.
- d. Ensure appropriate TYCOM personnel are contacted regarding safety related issues.
- e. Conduct an operational inspection in accordance with the applicable PMS prior to Fast Cruise during a CNO Maintenance Availability. Conduct oral interviews with all oxygen generator qualified personnel to determine individual knowledge levels and training effectiveness. The operational inspection will include:
 - (1) Start up checks.
 - (2) Power-Off maintenance check out.
 - (3) Start up.
 - (4) Operation to maximum allowable amperage.
 - (5) Performance of operational PMS.