

JOINT FLEET MAINTENANCE MANUAL
VOLUME IV
TESTS AND INSPECTIONS
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APPENDIX A
LIST OF ACRONYMS

3-M	Maintenance and Material Management
ABC	Automatic Boiler Control
ABO	Aviators Breathing Oxygen
ACN	Advance Change Notice
AEL	Allowance Equipage List
AEOG	Automated Electrolytic Oxygen Generator
AIMD	Aviation Intermediate Maintenance Department
ALRE	Aircraft Launch and Recovery Equipment
ALREMP	Aircraft Launch and Recovery Equipment Maintenance Program
APL	Allowance Parts List
ATIS	Advanced Technical Information Support
AWR	Automated Work Request
BIRMIS	Boiler Inspection and Repair Maintenance Information System
CAFSU	Carrier And Field Service Unit
CAI	Completion of Availability Inspection
CASREP	Casualty Report
CD-ROM	Compact Disk
CHT	Collection, Holding and Transfer
CMAV	Continuous Maintenance Availability
CNO	Chief of Naval Operations
COMNAVAIRLANT	Commander Naval Air Force Atlantic
COMNAVAIRPAC	Commander Naval Air Force Pacific
COMNAVRESFOR	Commander Naval Reserve Force
COMNAVSURFLANT	Commander Naval Surface Force Atlantic
COMNAVSURFPAC	Commander Naval Surface Force Pacific
COMPACFLT	Commander, Pacific Fleet
COMSUBLANT	Commander Submarine Force Atlantic
COMSUBPAC	Commander Submarine Force Pacific
COMSUBRON	Commander Submarine Squadron
COMUSFLTFORCOM	Commander, United States Fleet Forces Command
COSAL	Coordinated Shipboard Allowance List
CPO	Chief Petty Officer
CSMP	Current Ship's Maintenance Project
CWP	Controlled Work Package
DCA	Damage Control Assistant
DDS	Dry Deck Shelter
DEI	Diesel Engine Inspector
DFS	Departure From Specification
DFT	De-Aerating Feed Tank
DISSUB	Disabled Submarine
DLSS	Diver Life Support System
DMP	Depot Modernization Period
DO	Duty Officer
DOD	Department of Defense
DOP	Designated Overhaul Point
ECI	Eddy Current Inspection
EDG	Emergency Diesel Generator
EDO	Engineering Duty Officer
EOG	Electrolytic Oxygen Generator

EOOW	Engineering Officer Of the Watch
EOSS	Engineering Operational Sequencing System
ESU	Elevator Support Unit
FMA	Fleet Maintenance Activity
FWP	Formal Work Package
GFE	Gas Free Engineering
GS	Gas Turbine Technician
GTB	Gas Turbine Bulletin
GTRR	Gas Turbine Readiness Review
HSC	Hierarchical Structure Code
ILPE	Integrated Low Pressure Electrolyzer
ILS	Integrated Logistics Support
INSURV	Board of Inspection and Survey
IRAC	Interim Rapid Action Change
ISIC	Immediate Superior In Command
ISV	Industrial Support Visit
ITP	Index of Technical Publications
JCN	Job Control Number
JFMM	Joint Fleet Maintenance Manual
JSN	Job Sequence Number
LCEM	Life Cycle Engineering Manager
LET	Logistics and Escape Trunk
LMD	Library Management Database
LPE	Low Pressure Electrolyzer
LWC	Lead Work Center
MDS	Maintenance Data System
METCAL	Metrology and Calibration
MGTI	Marine Gas Turbine Inspector
MGTIS	Marine Gas Turbine Information System
MI	Material Inspection
MILSPEC	Military Specification
MIP	Maintenance Index Page
MOA	Memorandum of Agreement
MPA	Main Propulsion Assistant
MPDE	Main Propulsion Diesel Engine
MR	Maintenance Requirement
MRC	Maintenance Requirement Card
MS	Maintenance Standard
MSC	Maintenance Support Center
MSD	Marine Sanitation Device
NATEC	Naval Air Technical Data and Engineering Service Command
NAVAIR	Naval Air Systems Command
NAVAIRWARCEN	Naval Air Warfare Center
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NAVSEA 08	Naval Sea Systems Command Nuclear Propulsion Directorate
NAVSUP	Naval Supply Systems Command
NEC	Navy Enlisted Classification

NFPA	National Fire Protection Agency
NMF	Naval Maintenance Facility
NSDSA	Naval Systems Data Support Activity
NSF	Nuclear Support Facility
NSN	National Stock Number
NSTM	Naval Ship's Technical Manual
NSWCCD	Naval Surface Warfare Center, Carderock Division
NSWCCD-SSES	Naval Surface Warfare Center, Carderock Division - Ship System Engineering Station
NTE	Nuclear Test Equipment
O ₂ -N ₂	Oxygen - Nitrogen
OEM	Original Equipment Manufacturer
OJT	On the Job Training
OOD	Officer Of the Deck
OPNAVINST	Office of the Chief of Naval Operations Instruction
PLAD	Plain Language Address Directory
PMS	Planned Maintenance System
PMT	Performance Monitoring Team
POAM	Plan of Action and Milestones
PQS	Personnel Qualification Standard
PSAI	Pre-Start of Availability Inspection
QA	Quality Assurance
QPL	Qualified Products List
RBO	Repair Before Operating
REC	Re-Entry Control
RIRMIS	Reboiler Inspection and Repair Management Information System
RMC	Regional Maintenance Center
RMCSG	Regional Maintenance Center Support Group
RPM	Reactor Plant Manual
RSG	Regional Support Group
RTE	Remote Temperature Element
SAI	Start of Availability Inspection
SAMM	Shipboard Automated Maintenance Module
SCA	System Certification Authority
SCIRMIS	Steam Catapult Inspection and Repair Maintenance Information System
SCSC	System Certification Survey Cards
SDI	Ship's Drawing Index
SEIE	Submarine Escape Immersion Ensemble
SEMAT	Systems and Equipment Material Assessment Team
SGPI	Steam Generating Plant Inspector
SME	Subject Matter Expert
SOC	Scope Of Certification
SOSMIL	Safety Of Ship Maintenance Item List
SRC	Submarine Rescue Chamber
SRDRS	Submarine Rescue Diving Recompression System
SSDG	Ship Service Diesel Generator
SSES	Ship System Engineering Station
SUBSAFE	Submarine Safety
SWL	Safe Working Load
TDKM	Technical Data Knowledge Management

TDMIS	Technical Data Management Information System
TRF	TRIDENT Refit Facility
TWD	Technical Work Document
TYCOM	Type Commander
VLA	Visual Landing Aids
VRT	Voyage Repair Team
VSV	Variable Stator Vane
WAF	Work Authorization Form
WC	Work Center
WHE	Weight Handling Equipment

4.3.3.1 Inspection Deferrals. Surface and Carrier Forces shall submit a minor DFS for approval by the respective TYCOM for diesel inspections in the 18 to 24 month window. When an inspection cannot be accomplished within 24 months, Surface, Carrier and Submarine units shall submit a DFS request to the TYCOM no later than the 23rd month since the last inspection, that includes satisfactory operating trend data reviewed by a DEI confirming that the engine is in sound operating condition. For inspection deferrals of greater than 24 months, the TYCOM will forward endorsement to NAVSEA 05Z for approval of the DFS.

4.3.4 Inspection Phases. The diesel inspection consists of a detailed records check, internal material condition inspection and observation of engine operating characteristics. During all phases of an inspection, all safety precautions with the engine and space shall be strictly adhered to. The degree of the inspection shall be decided by the DEI based on the results of reference (b) mandatory check points, TYCOM directed check points, if any, operating data and other records maintained on the diesel engine. The inspection will include the following phases (For LSD-41/49 Class ships and LPD-17 Class ships see Appendix A):

- a. Phase I - Administrative Inspection. This is a complete review of the administrative records associated with the diesel engine(s).
- b. Phase II - Secured Inspection (partial disassembly). Based on the results of Phase I, the inspector will decide the degree of disassembly and will conduct a thorough evaluation of the internal condition of the engine as warranted by Phase I and Phase II findings. In accordance with reference (b), disassembly of the engine will be minimized. Submarines shall have a complete Phase II Inspection in accordance with reference (b).
- c. Phase III - Operation Inspection. The DEI will observe and analyze operating data on all inspected engines in accordance with reference (b) and PMS Maintenance Requirement Card (MRC) for performance testing/troubleshooting the engine. If no PMS guidance exists, then 100 percent or maximum attainable load on all inspected engines should be achieved.

4.3.5 Preparation for Diesel Engine Inspection.

- a. The DEI shall meet with the inspected ship's Commanding Officer or his designated representative, Engineer Officer and a diesel system expert prior to the start of the inspection. Where appropriate, either the Reactor Officer or the Engineer Officer may fulfill this role. This visit will ensure that Ship's Force is aware of the extent of the inspection, what PMS is to be accomplished, required support to be provided to the DEI and interference to be removed to allow access to the diesel engine. Coordination between the ship and the DEI can significantly reduce the time the diesel will be out of commission for inspection purposes and maximize the training to Ship's Force. Ship's Force will perform diesel engine disassembly, reassembly and operation, as well as correcting Ship's Force capable discrepancies concurrent with the inspection. It is the responsibility of Ship's Force to order all software and repair parts for Ship's Force capable work, to include all gaskets, lockwire, etc., for engine reassembly. Discrepancies beyond Ship's Force capability will be scheduled to be corrected through the Fleet Maintenance Managers, utilizing the Current Ship's Maintenance Project. At all times during the inspection, safety precautions with the engine and the space will be strictly adhered to. The DEI will meet with the Main Propulsion Assistant or Engineer Officer on a daily basis to ensure the unit's leadership is informed and produce optimal coordination efforts.
- b. The ship will:
 - (1) Prepare the diesel engine for inspection.
 - (2) Provide the DEI with dedicated time and the appropriate personnel to conduct the inspection. The inspection will be structured to maximize training of shipboard personnel. The ship should ensure continuity of personnel is maintained during the inspection/assessment.
 - (3) Assign a Job Control Number for accomplishing the inspection and record all parts usage through the Maintenance and Material Management system.

- (4) Ensure all equipment directly associated with the engine(s) is operable.
- (5) Ensure all records are available and in good order.
- (6) Ensure that the tools listed on the appropriate MRCs, technical manuals, and DEI check sheets are available for use during the inspection.
- (7) Ensure that all applicable MRCs and technical manuals for the engine and related support systems are available.
- (8) Test diesel engine lubricating oil in accordance with the applicable Lube Oil Quality Management program, as defined by PMS, prior to the inspection. In most cases, this requires Navy Oil Analysis Program results of recent oil sample be available.
- (9) Test jacket water treatment in accordance with PMS prior to the inspection.
- (10) For SSN/SSBN/SSGN Class Submarine EDGs, the unit should evaluate existing conditions of battery capacity, propulsion plant status and shore power reliability. Based upon this evaluation, if conditions warrant, the ship will submit a request for a stand-by generator for emergency power during the diesel inspection.

4.3.6 Inspection Findings. The inspection will report “as found” conditions.

4.3.6.1 Repair Before Operating. RBO discrepancies include those for which continued unrestricted operation could endanger personnel and/or cause serious damage to the engine or associated equipment. If there is not an immediate or near future danger to personnel or equipment the discrepancy shall be assigned as Major and a DFS submitted by Ship’s Force. Discrepancies that may cause an RBO include but are not limited to:

- a. Malfunctioning overspeed governor or trip.
- b. Inoperative alarms or safety devices.
- c. Low lube oil pressure.
- d. Readings that exceed the limits of PMS or manufacturer specifications that are unsafe for continued unrestricted operation.
- e. Uncontrollable lube oil or fuel oil leaks. Reference (d) provides guidance for lube oil and fuel oil leaks.
- f. Lube oil fuel dilution (five percent or greater) and/or lube oil unfit for further use. (For additional guidance on LSD-41/49 Class, see Appendix A.)
- g. Evidence of serious internal failure (bearing, connecting rod, crankshaft, or piston failure).

4.3.6.2 Major Deficiency. This finding is made when major problems exist, but the engine is still operable with restrictions approved by the TYCOM. Any deficiency that has been noted as major shall require either immediate correction within 30 days of discovery or reported by Naval message in accordance with paragraph 4.4.b(3) of this chapter. This requirement does not alter the normal Casualty Reporting or DFS reporting requirements. In accordance with references (a) and (b), major deficiencies include, but are not limited to:

- a. Engine unable to maintain rated load.
- b. Automatic equipment inoperative or not functioning properly.
- c. Critical components exceed prescribed limits but do not meet the RBO criteria.
- d. Temperature and/or pressure between cylinders are not within specification.
- e. Either Remote or Local engine starting (one of two must be operational) or remote securing devices are inoperative.
- f. Excessive blower clearance readings.
- g. Air box exhaust belt/muffler is excessively dirty or oil laden.
- h. Clogged valves or ports.
- i. Malfunctioning fuel injection system.

- b. The active revision/advance change notice level of the reference to which the equipment was built shall be specific enough to allow verification of the effects of future reference revisions. For example, while the RPM or reference (a) may be at revision 480, a figure showing test equipment details may be revision 453. The reference should be stated as the exact figure number and 453 should be recorded as the revision level.
- c. Existing records that contain proper certification data are acceptable and need not be replaced.

7.6 ACCOUNTABILITY.

- a. Electrical and electronic test equipment shall be fitted with tamper resistant seals where unauthorized access to calibration settings or internal components may invalidate certification.
- b. Requests for test equipment are normally made using an OPNAV 4790/2L form and identifying the appropriate Master Job Catalog routine Job Sequence Number. The OPNAV 4790/2L form requesting the test equipment must be specific with respect to the fittings or other associated components required in addition to the specific piece of test equipment. For hydrostatic test equipment, sufficient information must be provided to complete the check list requirements of Chapter 9 of this volume.
- c. Equipment should be issued for a specified period and delinquent equipment recovered as soon as possible.
- d. Activities receiving NTE must be briefed that only the issuing activity is authorized to repair NTE and that tampering will invalidate certification.
- e. Equipment Check-out/Check-in Forms will, as a minimum, contain the attributes contained in Appendix A of this chapter.
- f. Verification that the equipment is in accordance with the current revision of the controlling reference shall be accomplished by:
 - (1) Review of the NTE Certification Record prepared in accordance with Section 7.5 of this chapter above to demonstrate that the item has been certified.
 - (2) Compare the revision level stated on the NTE Certification Record to the current revision of the reference.
- g. When equipment is returned, those items of the issue and receipt procedure necessary to determine the condition of the equipment shall be repeated. This will ensure that equipment requiring repair is identified in a timely manner. A check-in operational test need not be performed in every case, but would be appropriate if visible physical conditions indicate possible damage affecting operability.
- h. Prior to issue by the repair facility, mechanical NTE which is expected to be subjected to pressure greater than 10 pounds per square inch will be operationally pressure tested to the highest pressure expected during use in the propulsion plant. Individual gages are excluded provided they are issued as individual components without adapters or hoses (for normal installation in a system) and are properly calibrated.
- i. The activity requesting mechanical NTE will be specific when requesting NTE. The following data (at a minimum) will be specified as applicable:
 - (1) Maintenance for which the NTE is required.
 - (2) Gage range and required tolerance.
 - (3) Set-points of protective devices.
 - (4) Length of hose.
 - (5) Size and style of fittings for attachment to ships system (e.g., swagelock SS 1/8" inverted 37 Degrees SAE flare fitting).
 - (6) Maximum temperature the NTE is expected to be subjected to during use.
 - (7) Date required.

(8) Any special requirements.

7.6.1 Lost/Damaged Test Equipment. Lost/damaged test equipment must be repaired or replaced in a timely manner. Equipment requiring repair will be entered in the Equipment Deficiency Log, assigned a Job Sequence Number and entered in the Current Ship's Maintenance Project. Out-Of-Commission equipment that results in an inability to provide necessary test equipment for reactor plant testing shall be given high repair priority. Maintenance of NTE will only be accomplished by the issuing activity.

7.6.2 Cleanliness and Foreign Material Exclusion. Mechanical Test Equipment/Assemblies attached to Nuclear Propulsion Plant Systems must meet the requirements for cleanliness control and foreign material exclusion specified by reference (b). Verification of cleanliness will be incorporated into check-out/check-in forms and into FWP's and Technical Work Documents.

7.6.3 Stowage. NTE shall be stowed in a location segregated from non-NTE. Ready For Issue equipment will be stowed apart from non-Ready For Issue equipment. Segregated stowage shall be such that it precludes inadvertent mixing of equipment.

7.6.4 Inventory. NTE will be inventoried at least annually. A record of the most recent inventory will be retained by the Nuclear Repair Officer.

VOLUME IV
CHAPTER 8
WEAPONS AND CARGO ELEVATOR ASSESSMENTS

8.1 PURPOSE. To provide guidance in the preparation for and execution of shipboard weapons and cargo elevator assessments and assist visits by the Elevator Support Unit (ESU).

8.1.1 Background. Shipboard weapons and cargo handling elevators are supported through the elevator assessment and repair program, which is executed by the ESU. The ESU program, formerly the Program to Assess and Repair Shipboard Elevators for the Atlantic Fleet, and Weapons Elevator Support Unit for the Pacific and Atlantic Fleets, provides direct fleet support for the maintenance and modernization of shipboard elevators. The program is executed by the ESU on a per ship cycle, as dictated by the individual ship's deployment and maintenance schedules. Although ESU scheduled milestones are based on the maintenance cycle, the primary focus of the program is to achieve peak system readiness at the time of deployment by evaluating and repairing elevators throughout the ship's cycle. Additionally, DDG-51 Class 5"/54 and 5"/62 Ammunition Strike Down Equipment, which are similar to elevators, are supported through the ESU program.

8.2 ELEVATOR SUPPORT UNIT. The Regional Maintenance Center ESU is composed of skilled technicians qualified in the operation, repair, testing and training of weapons and cargo elevator systems. The ESUs are responsible for periodic material assessments, repair, technical assistance, on board operator maintenance training, and verification of Integrated Logistics Support (ILS) elements under this program.

8.3 SHIP'S FORCE ASSESSMENT RESPONSIBILITIES.

- a. Ensure that the Current Ship's Maintenance Project (CSMP) is up to date.
- b. Ensure operators and maintenance personnel are available to assist the Assessment Team.
- c. Require operators and maintenance personnel to accompany the Assessment Team for on the job training to increase self-sufficiency.
- d. Prepare and submit an OPNAV 4790/2K for each deficiency not corrected prior to completion of the assessment. Provide a listing of Job Control Numbers to the ESU.

8.4 ELEVATOR SUPPORT UNIT EVOLUTIONS. The specific components of each ESU evolution are defined below. These evolutions are designed to ensure deficiencies are identified and repaired in a timely manner. Prior to commencement of any ESU evolution, a pre-brief will be conducted by the ESU representative and attended by the ship's Maintenance Manager and all applicable departmental representatives. The pre-brief will cover, but is not limited to, the following topics:

- a. Key evolution elements.
- b. Roles and responsibilities of:
 - (1) ESU technical personnel.
 - (2) Ship's Force personnel.
- c. Working relationship between ESU technical personnel and Ship's Force.
- d. Overall safety practices and precautions applicable to the evolution.

8.4.1 Material Condition Assessment Visit. A Material Condition Assessment visit will be used to determine a baseline and establish the scope of follow-on actions. This visit is accomplished once per Fleet Readiness Training Plan. The ESU uses assessment guidelines to determine the system's material condition, while ensuring the following is accomplished:

- a. The CSMP is validated to avoid redundancies during the assessment.
- b. The elevator system is assessed, repaired, groomed and operationally tested. The ESU will make every effort to correct all deficiencies prior to the end of the visit.
- c. On the Job Training (OJT) is conducted with Ship's Force to promote self-sufficiency.

- d. Working with the ship's cognizant Department(s) Maintenance Manager, and TYCOM coordinators, determine the preliminary level of effort required to correct the discrepancies.
- e. All discrepancies and corrected items have been documented in the ship's CSMP using the appropriate IT System.
- f. The Commanding Officer, or an officer designated by the Commanding Officer, is briefed on the elevator system material condition.
- g. A final report is issued to the ship, ISIC and TYCOM following the Material Condition Assessment visit. The report shall address the following:
 - (1) Safety of systems, including "safe to operate" conditions.
 - (2) Major discrepancies found during the visit.
 - (3) System Operability Test results.
 - (4) Training status of Ship's Force with respect to Personnel Qualification Standards (PQS) and practical elevator system maintenance and operation.
 - (5) Status of authorized, completed, and/or programmed Ship Alterations.
 - (6) Recommendations to the In-Service Engineering Agent for system changes.
 - (7) In-Service Engineering Agent.

8.4.2 Repair Visit. The Repair Visit is designed to correct discrepancies identified in the ship's CSMP that could not be repaired during the assessment visit.

- a. Conduct multiple visits, as receipt of material permits, to repair as-found conditions.
- b. Provide logistics assistance as necessary.
- c. Conduct OJT with Ship's Force.

8.4.3 In Process Review. This review will be conducted on a case-by-case basis, contingent on the scope of repairs programmed for the maintenance availability. When tasked, the ESU will review the elevator system work package prior to the start of an availability. During the availability the ESU will:

- a. Monitor the progress and Quality Assurance of the repair contractor, coordinating with Supervisor of Shipbuilding and industrial activity representatives, Naval Surface Warfare Center, Carderock Division, and TYCOM Maintenance Manager, as applicable.
- b. Provide technical and logistic support to Ship's Force.
- c. Monitor the CSMP status.
- d. Witness elevator tests, as tasked.

8.4.4 On-Board Maintenance Training. On-board maintenance training will be conducted at least once per Fleet Readiness Training Plan with each ship receiving training as a host ship or by having their personnel participate in training on another ship of the same class. It consists of operator and maintenance classroom instruction followed by hands-on training. The ship class on-board maintenance training documentation is tailored to be ship specific, giving the ship the most accurate and coherent training possible.

8.4.5 Integrated Logistics Support.

- a. A one-time ILS validation of elevator configuration, Allowance Parts Lists (APL), Coordinated Shipboard Allowance Lists (COSAL) and technical manuals will be conducted.
- b. Follow-on ILS visits will be accomplished at the TYCOM's request.

8.5 VISIT SCHEDULING. The ISIC will schedule all ESU visits through the TYCOM sponsored Quarterly Scheduling Conference. Visits shall not be authorized without prior approval by the cognizant TYCOM.

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 Submarine 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:

- a. The WAF (Appendix A) will be identified as “Sheet 1”.
- b. Continuation sheets will be identified as “Sheet 1A, Sheet 1B”, etc.
- c. Revision sheets will be identified as “Sheet 2, Sheet 3”, etc.

10.4.2 Work Authorization Procedure. The following procedure is to be followed for properly authorizing work:

- a. The WAF is presented to the Watch/Duty Officer by the division/repair activity tasked with the work.
- b. (Submarines Only) For Safety of Ship items, as defined in paragraph 10.4.8 of this chapter and reference (a), the Watch/Duty Officer shall obtain the Commanding Officer’s permission prior to authorizing work. When assigned, the Repair Activity’s Ship Safety Officer signature is required.
- c. The Watch/Duty Officer will then determine if adequate isolation and plant/system conditions exist to safely and properly conduct the work including that the system is drained, deenergized and depressurized. The tagout is then established in accordance with reference (b). The work is not to be authorized if doubt exists on either of these points. For high energy systems (i.e., >200°F, >1000 psi) that could have the potential for trapped energies, the repair activity after consulting with Ship’s Force, may provide a written plan (i.e., valve lineup, procedure, marked up drawings) to Ship’s Force to ensure all parties are satisfied the system is properly drained and depressurized.
- d. When system isolation and plant conditions are satisfactory to conduct the work (e.g., tagout complete, system depressurized, drained and deenergized), the Watch/Duty Officer authorizes the work and signs the WAF. For repair activity generated WAFs, the Repair Activity Representative (RAR) also signs the WAF. The Watch/Duty Officer and RAR signature indicates that, based on personal observation, certified records or direct report from watchstanders or divisional personnel, that system isolation and plant/ship conditions are set and the division/repair activity is authorized to start work.

NOTE: ELECTRICAL SAFETY CHECKS (E.G., VOLTAGE CHECKS TO ENSURE CIRCUITS ARE DE-ENERGIZED) ARE PART OF THE WORK PROCESS, NOT PART OF THE TAGOUT PROCESS, AND THEREFORE SHOULD BE PERFORMED AFTER BLOCK 14 OF THE WAF IS SIGNED.

- e. Some component contractor personnel who perform work on ships are not knowledgeable of ship systems and are not qualified to determine if plant/ship conditions are satisfactory to conduct work. For such cases, the contractor’s signature will be based on a direct report or briefing they receive from Ship’s Force or the Lead Maintenance Activity (if assigned), unless another method of providing the information to the contractor is specified in a MOA. The contractor’s signature represents confirmation that the contractor understands the hazards presented by the ship’s systems on which he will be working, and that he/she has received assurances the work area has been appropriately isolated, depressurized, de-energized or drained. As an alternative, the contractor may specifically agree via their contract or MOA that all repair activity responsibilities as defined in this chapter will be assigned to a Lead Maintenance Activity per paragraph 10.4.5 of this chapter. In all cases, appropriate information should be provided to the contractor prior to initiating work to ensure the contractor understands the hazards involved.
- f. The original WAF is placed in the Work Authorization Log and a copy shall be maintained with the TWD until the work is completed.
- g. Once the work is completed, the WAF is signed by the repair activity as work complete and forwarded to Ship’s Force for clearing of Tagout Record Sheet line items in accordance with reference (b).
- h. Following completion of testing (if there is no formal test program) and setting of appropriate system status (e.g., clear tags and perform valve line-ups as appropriate for the situation), the WAF is signed as closed and forwarded to the cognizant department head for review.

10.4.3 Transfer of Non-Nuclear Systems and Nuclear Instrumentation and Control Systems (Depot availabilities only). During depot availabilities, large amounts of work will be performed on ship’s systems. Formal work control practices in place by a shipyard enable Ship’s Force to transfer non-nuclear systems and Nuclear Instrumentation and Control systems to the shipyard. Transfer of systems is the process by which Ship’s Force transfers the

authority to approve all actions within a system or portion of a system to a shipyard and subsequent return of systems back to Ship's Force prior to major events. Systems, or portions of systems, are transferred with or without transferring the ability to operate ship's equipment. By transferring a system or portion of a system to the shipyard, the shipyard is responsible for authorizing all work, testing and equipment operation within the boundary transferred. Transfer of systems does not diminish a Commanding Officer's overall responsibility for the safety of personnel, equipment and the ship. Although other activities may perform work within the boundaries and Ship's Force normally retains responsibility for operating ship's equipment, all actions (i.e., work, testing, equipment operations, etc.) within the boundary must be approved by the shipyard.

- a. The MOA between the shipyard and ship for the availability shall include the following minimum attributes regarding transfers:
 - (1) Clearly state that all actions performed within the boundary being transferred must be approved by the shipyard.
 - (2) Normally, Ship's Force retains responsibility for operating ship's equipment. If any transfers with operations are planned, the MOA shall define the extent to which the shipyard will operate ship's equipment within the boundaries.
 - (3) Normally, Ship's Force retains responsibility for PMS, unless otherwise specified in the MOA.
 - (4) Delineate who is responsible to maintain system status within the boundary.
 - (5) Identify the process (e.g., Joint Fleet Maintenance Manual Volume IV, Chapter 10, paragraphs 10.2 through 10.4.5) by which work control shall be administered, including interface between the shipyard, Ship's Force and other applicable activities.
- b. A WAF shall be used to transfer a system or portion of a system to the shipyard. Block 7 of the WAF shall clearly state this intent (i.e., specify "transfer" or "transfer including operations"). Ship's Force formally transfers a system or portion of a system to the shipyard by signing Block 14 of the WAF. Unless Block 7 of the WAF states the transfer is "including operations", the shipyard is not authorized to operate ship's equipment within the transferred boundary.
- c. The shipyard returns a system or portion of a system back to Ship's Force by completing all authorized work and testing specified on the WAF and signing Blocks 16, 17 and 18 of the WAF. Ship's Force indicates acceptance of the work and testing and, if applicable, operation by signing Block 18 of the WAF. For nuclear powered ships, the Engineering Department Manual contains requirements for accepting operational control from the shipyard.
- d. When the shipyard is responsible for operating ship's equipment as specified in the transfer MOA, operation of ship's equipment shall be in accordance with shipyard or Naval Sea Systems Command (NAVSEA) procedures (e.g., test procedures, ship's operating instructions, Steam and Electric Plant Manual, etc.).
- e. When waterborne, Ship's Force shall retain operation of hull and back-up valves.
- f. When portions of a system are required to be operational to support propulsion plant key events in accordance with NAVSEA Instruction 4730.1 and 4730.2 series, those portions of the system shall be transferred back to Ship's Force.
- g. Ship's Force shall have the capability to isolate the transferred area from components and systems under Ship's Force control. The valves, switches, breakers, fuses, blanks, etc., that provide this capability shall remain under Ship's Force control.
- h. Any ship system which could directly affect the reactor plant or conduct of reactor plant testing shall not be transferred to a shipyard until required nuclear temporary support systems are installed and the system is isolated from the reactor plant.
- i. Within the boundaries transferred to the shipyard, Ship's Force shall be notified prior to commencing testing and when testing is interrupted and completed.
- j. All transfers on submarines shall be consistent with ship's safety requirements and reference (a).

- k. In order to minimize subsequent changes to the WAF and ensure that Ship's Force is aware of the work scope, the WAF which transfers systems or portions of systems should include all known customer authorized work within the specified job description.
- l. This authority applies to all work performed by or sub-contracted by the shipyard.
- m. Within the boundaries approved by the WAF, the shipyard can add additional work to the WAF without Ship's Force approval by adding additional TWDs to a TWD Record Sheet (Appendix B) provided the additional work is within the original description of work and tagout boundaries (i.e., no additional tags are required). This method is applicable only when two independent reviews of the additional work by the shipyard confirms that the existing WAF and its associated tagout(s) provide adequate isolation and conditions for the work (see paragraph 10.4.5 of this chapter). TWDs (Task Group Instructions (TGI), Deficiency Logs, Deficiency Reports, etc.) that meet this criteria and require work control per paragraph 10.3 of this chapter will be added to the TWD Record Sheet. To ensure Ship's Force remains informed of all work being performed on ship's systems, the shipyard shall verbally notify Ship's Force at the time work is added to the TWD Record Sheet and subsequently provide a hard copy of the changed TWD Record Sheet if it cannot be printed by the Ship's Duty Officer from an electronic database. Work added to the TWD Record Sheet does not need to be added to the associated Tagout Record Sheet.
- n. When other activities perform work and testing within boundaries transferred to a shipyard and the shipyard is acting as their RAR, the shipyard may add the other repair activity's work to the TWD Record Sheet. Otherwise, a separate WAF shall be generated and a new line item shall be added to the existing Tagout Record Sheet.
- o. Ship's Force performing work, testing or equipment operations within boundaries transferred to a shipyard shall prepare a separate WAF processed as described in paragraph 10.4.2 of this chapter, add a new line item to the existing Tagout Record Sheet and obtain shipyard concurrence in Block 12 of the WAF. RAR signature is not required on the Tagout Record Sheet.
- p. For small depot availabilities (e.g., conventional surface ship availabilities less than six months in duration, submarine Selected Restricted Availabilities and Extended Refit Periods, Aircraft Carrier upkeep), the above provisions may be applied on a case basis where the amount of work on a system is extensive and warrants transferring a portion of a system. These exceptions require Type Commander approval.

10.4.4 Work Authorization Form Revisions. Changes to the scope of the existing job description or system transfer boundary shall be authorized by a formal revision to the existing WAF. Except as noted below for minor administrative changes, changes to conditions (i.e., Blocks 7, 8, 11, 13 and/or 14) established by an authorized WAF, including the associated tagout(s), also require a formal revision to the existing WAF. A formal revision to a WAF can be accomplished by either preparing a new WAF with the same number or revising the existing WAF.

- a. Prepare a new WAF. A new WAF with the same number will be used primarily for major changes to Block 7, Job Description or other major changes which warrant reverification of all aspects of the work authorization.
 - (1) A new WAF with the same number will be generated with changes included.
 - (2) In Block 9, enter revision (REV A, REV B, REV C, etc.) and reason for and description of the change.
 - (3) Authorize the new WAF in accordance with the requirements of this chapter.
 - (4) Mark superseded WAF(s) "SUPERSEDED" and retain with the new WAF.
- b. Revise Existing WAF. The revised existing WAF will be used primarily for tag shifts or other minor changes.
 - (1) Enter all required changes. Include initials, date and revision with each entry.
 - (2) Line-out all changed or invalidated information. Include initials, date and revision with each line-out.

- (3) Remake all affected signatures.
 - (4) In Block 9, enter reason for and description of the change. Sign and date the entry.
 - (5) Obtain authorization including verification of "Plant/Ship Conditions Set" by resigning Blocks 13 and 14 of the WAF.
- c. Revise existing WAF using the WAF Revision Sheet.
- (1) Fill in the information required by the WAF Revision Sheet, including the revision (REV A, REV B, REV C, etc.). Add additional blocks as deemed appropriate.
 - (2) Enter the reason for and description of the change. Sign and date the entry.
 - (3) Obtain all required signatures.
 - (4) Once the WAF Revision Sheet has been completed, it must be maintained with the original WAF in the WAF log.
- d. Minor Administrative Changes to Existing WAFs. The Watch/Duty Officer or the RAR may make pen and ink changes that are editorial and/or administrative in nature to the original WAF without processing a new or revised WAF. These changes must not affect the scope or sequence of shipboard work, and include items such as obvious typographical errors, erroneous job order numbers or spelling errors. Either the Watch/Duty Officer or Repair Activity may make these changes on the original WAF without resigning Blocks 13 and 14. The changes shall be initialed and dated by the person entering the changes.
- e. Iterative Tagouts. When using the reference (b) Iterative Tagout procedure, a revision to the WAF is not required provided the specific tests or maintenance evolutions are controlled by a formal process. This process is to be defined and concurred with by a MOA established between Ship's Force and the Lead Maintenance Activity. The process shall ensure that isolation is re-established and system conditions verified prior to recommencing work.

10.4.5 Centralized Work Control Procedures. It is the responsibility of the Lead Maintenance Activity to determine the need for centralized work control and to assign the responsibility for work authorization control. During depot availabilities, a centralized work control team will be established. For other availabilities, this decision is based on the number of repair activities performing work during the availability and the complexity of the work. When centralized work control procedures are invoked, the following process shall be used:

- a. Work by all repair activities is processed by the centralized work control team including work covered by paragraph 10.4.3 of this chapter. Ship's Force involvement will be defined by MOA.
- b. The Lead Maintenance Activity will specify participation and supervision of the centralized work control team by MOA. Ship's Force is an integral part of the centralized work control team and should man the team with experienced officers or senior petty officers.
- c. The repair activity performing the work shall prepare the WAF, sign as RAR on the Tagout Record Sheet and sign the WAF, Blocks 10, 14, 16 and 17 if applicable, unless specified otherwise by MOA (e.g., repair activity does not maintain qualified personnel). The Lead Maintenance Activity assigned responsibility for centralized work control is responsible for processing the WAF and signing all other repair activity blocks on the WAF.
- d. For work covered by paragraph 10.4.3 of this chapter, the Ship's Force member(s) of the centralized work control team would notify the responsible Division or Work Center Supervisor and Duty Officer of added work to a TWD Record Sheet to ensure that Ship's Force remains informed of all work being performed on ship's systems.

10.4.6 Equipment Tagout Procedures. Tagouts shall be accomplished in accordance with the requirements of reference (b).

10.4.7 Barrier Criteria.

- a. Barrier criteria for maintenance is located in reference (b) and applicable Reactor Plant and Steam and Electric Plant manuals.

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 submarine 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.

- (3) Maintenance Organization (signed by appropriate senior level person of the repair activity, normally the Production Officer, as he leads the FMA Daily Production Meeting). Signature indicates all authorized Safety of Ship work items are listed. If any additional items are to be worked, a formal change to the SOSMIL will be required.
- g. Following review and signature, the Ship's Force Availability Coordinator will provide the original copy to the ship's Duty Officer. Reproduced copies for distribution shall be made from the "original document" only. Copies will be provided to:
 - (1) Each Production Meeting attendee listed below:
 - (a) FMA Division Officers
 - (b) FMA Repair Duty Officer/Repair Duty Chief Petty Officer
 - (c) FMA Regional Maintenance Team Leader. He/she shall receive enough copies to make further distribution to the FMA Duty Officers and each FMA Division Officer having work listed on the SOSMIL.
 - (d) Supply Repair Other Vessel Officer
 - (e) Ship's Force Availability Coordinator
 - (f) ISIC Material/Squadron Representative
 - (g) FMA Availability Coordinator
 - (2) The ship's Engineering Duty Officer.
 - (3) The ship's Below Decks Watch.
 - (4) The ship's Petty Officer of the Deck.
 - (5) Naval Submarine Support Center Representative.
- h. SOSMIL Use and Pre-Job Briefs. None of the evolutions or maintenance specified in paragraph 10.4.8.b of this chapter shall commence unless it is scheduled on the current SOSMIL. The activity performing any maintenance or evolutions listed on the SOSMIL is responsible for a pre-job brief prior to commencing work. A pre-job brief is required for all items listed on the SOSMIL and will be attended by all parties involved as desired by the Ship's Duty Officer.

10.4.9 Ship in Dry Dock (Submarines Under Joint Fleet Maintenance Manual Controls).

- a. When the ship is in dry dock, Chapter 0872 of Navy Regulations requires the closing of all valves and other openings in the ship at the end of working hours when such closing is practical. In situations where there is extensive disruption of watertight integrity, making daily closing impracticable, it is prudent to protect the dry dock, rather than the ship, from inadvertent flooding. To this end, shipyards shall maintain dry docks in accordance with reference (c).
- b. Temporary fluid systems shall be considered a controlled constant fluid supply provided the following conditions exist:
 - (1) The temporary fluid supply contains two in-line isolation valves external to the ship between the source and the ship.
 - (2) The two isolation valves shall be located to facilitate rapid isolation (e.g., close to the ship).
 - (3) The temporary fluid system, including both off hull isolations, shall be formally transferred to, including operation of, Ship's Force.
 - (4) The supplied ship system shall be tested to the temporary system operating pressure.
- c. Dry dock simulated waterborne conditions exist when water is introduced to the dry dock and kept at a level below that necessary to lift the vessel off the blocks. During this condition the following minimum requirements shall apply:

- (1) The event shall be authorized on the SOSMIL, contained in section 10.4.8 of this chapter (Submarines only).
 - (2) Hull openings shall be maintained in accordance with reference (a).
 - (3) Seawater valves should normally be operated using ship's systems. A temporary system may be used to operate seawater valves after obtaining Commanding Officer's permission.
 - (4) Ship's dewatering capability meets the requirements of references (d) through (f).
- d. Dewatering capability. Each compartment shall be capable of being dewatered at a rate of at least 200 GPM with pumping started within three minutes of the flooding being called away. Ship's Force will demonstrate adequate dewatering capability by planning and scheduling flooding drills to be observed by the ISIC and Lead Maintenance Activity Representative at the following times:
- (1) Within seven days of docking and temporary systems being delivered.
 - (2) Just prior to undocking, normally within one week.

10.5 FINAL CERTIFICATION, CLOSE-OUT AND RE-ENTRY OF SUBMARINE SPACES, TANKS AND VOIDS.

10.5.1 Purpose. To establish procedures for the final certification, close-out and re-entry of submarine spaces, tanks and voids.

10.5.2 Discussion. Historically during space, tank or void close-out, a large number of diverse and inconspicuous items have been overlooked. These items have, at times, seriously degraded both material readiness and acoustic signature of submarines. This section establishes a procedure to ensure a thorough certification of all spaces prior to final close-out and provides a check-off list when re-entry is required. The check-off list/sheet is not all inclusive. Common sense and effective use of personnel experience and knowledge must be used to ensure complete and thorough inspections. Non-steel damping and acoustic restraining covers are not required to be painted. Accidental overspray is acceptable. Full paintout of damping restraining covers and acoustic tile covers is not the intent. If damping and acoustic tiles are painted they must be checked to ensure that the paint will not bridge the gap between the rubber and the restraining cover more than 75% over an area. Degradation of the performance of tiles is possible. A suggested way to repair the area is to score the gap between the restraining cover and the damping tile and between the acoustic tile covers and the rubber. Previously painted serviceable tiles may remain in service. Reference (g) allows paint on piping.

NOTE APPENDIX G MAY BE USED AS AN AID FOR ENTERING SUBMARINE SPACES, TANKS AND VOIDS.

10.5.3 Action.

- a. The Damage Control Assistant (DCA) is designated the coordinator for the close-out of all spaces. As such he is responsible for the following:
 - (1) Assigning responsible personnel to close-out or assist in closing out specific spaces, tanks and voids.
 - (2) Providing personnel designated to conduct tank, void, or space close-outs with a copy of Appendices G or H as applicable.
 - (3) Ensuring personnel performing close-outs are aware of their responsibilities and are adequately trained. He shall provide, by periodic notice, a list of personnel qualified to perform close-out inspections.
 - (4) Maintaining a folder for completed copies of Appendix H. This folder will serve as a space, tank and void close-out certification record. Only the most recent copies of these Appendices are required to be retained. This folder should also include an index of all spaces, tanks and voids applicable to close-out certification and their status.

INSTRUCTIONS FOR COMPLETING WORK AUTHORIZATION FORM

Block 1. USS: Enter name or the hull number.

Block 2. SYSTEM: Enter the system noun name, abbreviation or identification number.

Block 3. WAF NO.: Enter the WAF serial number.

Block 4. JSN: Enter the Job Sequence Number or job order.

Block 5. DIVISION/Lead Work Center (LWC)/REPAIR ACTIVITY (RA): Enter ship's Division, LWC or repair activity Point of Contact responsible for conducting the maintenance.

Block 6. TECHNICAL WORK DOCUMENT: Enter the TWD (e.g., Controlled Work Package (CWP)/Formal Work Package (FWP), Task Group Instruction (TGI)) number(s) or enter "see attached TWD Record Sheet". If a TWD Record Sheet is used, it shall be referenced in Block 6.

Block 7. JOB DESCRIPTION: Enter a description of work to be performed detailed enough for the Authorizing Officer and/or RAR to understand the scope of the work boundary and prepare/concur in the isolation established for this work. If necessary, use of an additional Continuation Sheet per Appendix C is authorized. Description of work can contain either a description of work boundaries or a description of components (see paragraph 10.4.3a of this chapter).

Block 8. POST WORK TESTING IS AS SPECIFIED: Check BELOW and identify test requirements when retest is not contained in a TWD or formal test program. Check FORMAL TEST PROGRAM if retesting will be tracked or completed in a program administered by the repair activity. If FORMAL TEST PROGRAM or NO TEST REQUIRED is checked, Block 17 is N/A.

Block 9. RESTRICTIONS/PRECAUTIONS/REMARKS (OPENING): Enter any restrictions or precautions associated with the work item. If any information is entered in this block, the person making the entry must enter name, organization and date. If necessary, use of an additional Continuation Sheet per Appendix C is authorized.

Block 10. DIVISION/REPAIR ACTIVITY READY TO COMMENCE WORK: Signature by Leading Petty Officer/Division Officer for Ship's Force work or repair activity indicates that sufficient prerequisites are met to commence isolation for production work.

NOTE: SHIPYARDS IMPLEMENTING SAFETY OF SHIP REQUIREMENTS FOR SURFACE FORCE SHIPS PER LOCAL MOAS MAY MODIFY AND USE BLOCK 11 TO DOCUMENT SHIP SAFETY DETERMINATIONS.

Block 11. SAFETY OF SHIP: For submarines, when required by paragraph 10.4.8 of this chapter and/or reference (a), check YES.

- (1) If the SPOD is used, the Repair Activity's Ships Safety Officer will sign concurrence.
- (2) If the SOSMIL is used, the qualified Watch/Duty Officer will verify that work is listed on the SOSMIL for that day and sign the block. **NON-SAFETY OF SHIP WORK CONTROLS. Check NO. When safety of ship qualified RA or Ship's Force work control personnel process their respective WAFs, they may sign concurrence for non-safety of ship maintenance.**

Block 12. CONCURRENCES: Concurrence signatures may be entered as necessary (e.g., nuclear/non-nuclear interface, assist work center(s), two cognizant department heads). The Authorizing Officer or RAR should define any needed concurrences by noting the concurring organization beneath the signature line in Block 12 and obtain the concurrences. Enter N/A if no concurrences are required.

Block 13. TAGOUT REQUIRED: If tagout is required, mark YES. When tagout is hung, enter tagout number(s) (Log Serial Number/Shift Operations Management System line item number) and Watch/Duty Officer will sign block. If no tagout is required, mark NO. Enter N/A in TAGOUT NO., and Watch/Duty Officer will sign block.

Block 14. PLANT/SHIP CONDITIONS (e.g., drained, de-pressurized, de-energized) SET, FMA/DIVISION/REPAIR ACTIVITY ARE AUTHORIZED TO START WORK: The Watch/Duty Officer signs in all cases for authorizing the start of all work. Note any restrictions and/or precautions in Block 9. If

Block 11 is checked YES, the Watch/Duty Officer shall ensure the work of the WAF is listed on the SOSMIL/Ship's Plan of the Day prior to authorization of the WAF. RAR signs for authorizing the start of work when the WAF is for repair activity work.

Block 15. RESTRICTIONS/PRECAUTIONS/REMARKS: Enter any general conditions (e.g., outstanding work) that may affect system restoration. If any information is entered in this block, the person making the entry must enter name, organization and date. If necessary, use of an additional Continuation Sheet per Appendix C is authorized.

Block 16. WORK IS COMPLETE: A signature by Ship's Force or the repair activity is entered when the work described in Block 7 is verified complete and tags may be cleared with any exceptions listed in Block 15.

Block 17. TESTING IS COMPLETE: A signature by the activity performing the retest is entered when testing of Block 8 is completed. Block 17 is marked N/A if Formal Test Program is in effect or no test required.

Block 18. WAF CLOSED OUT: When work specified in Block 7 and testing as specified in Block 8 is completed, including all exceptions listed in Block 15, repair activity signature is entered to indicate the WAF is closed out. Ship's Force signature indicates acceptance of the work and testing and that appropriate system status has been set (e.g., clear tags and perform valve lineups as appropriate for the situation). Block 18 may be signed prior to completion of testing covered by a formal test program. A copy of the closed out WAF shall be provided to Ship's Force if the repair activity is maintaining the original WAF.

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APPENDIX E

SAFETY OF SHIP MAINTENANCE ITEM LIST EXAMPLE

Ship name: USS Bigcity Hull #: SSN-799	Upkeep #: 802	Maximum expected draft: Fore: 32'0" aft: 34'6"	Actual Morning Draft: Fore: 32'0" aft: 32'0"	Date Wednesday prepared: 23 SEP 98
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NOTE: THE MAXIMUM EXPECTED DRAFT SHALL IN NO WAY BE CONSTRUED AS LIMITING ACTIONS BY THE DUTY OFFICER OR NOTIFICATION OF THE SHIP'S CO OF SMALLER DRAFT CHANGES. ANY UNEXPECTED DRAFT CHANGE SHOULD BE THOROUGHLY INVESTIGATED AND UNDERSTOOD.

JCN/ WAF #	Job Description Reason on SOSMIL	Days work planned							Scheduled end date	Remarks
		28 Mon	29 Tue	23 Wed	24 Thurs	25 Fri	26 Sat	27 Sun		
EA01-2345/ WAF #	TD-101 repair (1,3)			testing	Remove flange				24SEP98	Restoration in progress
EM01-3456/ WAF #	Divers: inspect screw for fouling (2,10)			Brief 0830					23SEP98	
WQ01-1986/ WAF #	Inspect sonar dome/ (11)			Pump down dome, brief 0830					23SEP98	Draft change expected: 1' up fore 1.5' down aft
EA01-3509/ WAF #	TD-1 ball/seat repair (4,5)	Trim system restored					Stage temp firefighting	Testing	28SEP98	Valve worked in place; temporary firefighting capability staged
WK01-4568/ WAF #	Off-loading countermeasures (7)					Off-load			25SEP98	through weapons shipping hatch
EA01-3525/ WAF #	LP Blower MRC M-2, change oil on LP Blower (2)	Down for 1 hour at 1300							28SEP98	

The following items are Safety of Ship:

- | | | |
|---|---|---|
| 1. Single closure from sea | 8. EAB system maintenance | 15. Refrigerant on/off load |
| 2. MBT blow removed | 9. Fueling or defueling | 16. Evolutions with an expected draft change of >3 inches (e.g., ballasting, lead load, etc.) |
| 3. Belly bands, hull blanks, cofferdams | 10. Diver operations | 17. Securing the Emergency Diesel Generator |
| 4. Dewatering ability removed | 11. Pumping or flooding sonar dome | 18. Pressure hull watertight bulkhead/doors maintenance |
| 5. Firefighting capability removed | 12. Special coordination btwn S/F and FMA | 19. Bilge alarm/emergency announcing circuit maintenance |
| 6. Bleeding charging Oxygen banks | 13. Battery charges | 20. Normal/emergency lighting maintenance |
| 7. Weapons handling | 14. Nitrogen load | |

Review and approval (all parties must sign):

ISIC Rep:	FMA Rep:	Ship's Force DH:
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APPENDIX F

SAFETY OF SHIP MAINTENANCE ITEM LIST

1. Ship name: Hull #:	2. Upkeep #:	3. Maximum expected draft: Fore: aft:	4. Actual Morning Draft: Fore: aft:	5. Date prepared:
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NOTE: THE MAXIMUM EXPECTED DRAFT SHALL IN NO WAY BE CONSTRUED AS LIMITING ACTIONS BY THE DUTY OFFICER OR NOTIFICATION OF THE SHIP'S CO OF SMALLER DRAFT CHANGES. ANY UNEXPECTED DRAFT CHANGE SHOULD BE THOROUGHLY INVESTIGATED AND UNDERSTOOD.

6. JCN/WA F #	7. Job Description Reason on SOSMIL	8. Days work plan: Enter description or item # (1-20) that impacts Safety of Ship during the next seven days. Examples include but are not limited to Hang Diver Tags, Testing, Fuel on-load or off-load, Install Flange, Remove Flange, System Restoration, Install Temp System, etc.							9. Scheduled end date	10. Remarks
		Mon	Tue	Wed	Thurs	Fri	Sat	Sun		

The following items are Safety of Ship:

- | | | |
|---|---|---|
| 1. Single closure from sea | 8. EAB system maintenance | 15. Refrigerant on/off load |
| 2. MBT blow removed | 9. Fueling or defueling | 16. Evolutions with an expected draft change of >3 inches (e.g., ballasting, lead load, etc.) |
| 3. Belly bands, hull blanks, cofferdams | 10. Diver operations | 17. Securing the Emergency Diesel Generator |
| 4. Dewatering ability removed | 11. Pumping or flooding sonar dome | 18. Pressure hull watertight bulkhead/doors maintenance |
| 5. Firefighting capability removed | 12. Special coordination btwn S/F and FMA | 19. Bilge alarm/emergency announcing circuit maintenance |
| 6. Bleeding charging Oxygen banks | 13. Battery charges | 20. Normal/emergency lighting maintenance |
| 7. Weapons handling | 14. Nitrogen load | |

Review and approval (all parties must sign):

ISIC Rep:	FMA Rep:	Ship's Force DH:
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APPENDIX G**PROCEDURES AND SAFETY PRECAUTIONS FOR ENTERING
SUBMARINE SPACES, TANKS AND VOIDS**

NOTE: IN ADDITION TO THE PRECAUTIONS NOTED IN THE STEPS BELOW, SHIP'S FORCE SHALL COMPLY WITH SAFETY PRECAUTIONS IDENTIFIED IN REFERENCES (i) THROUGH (n).

1. Prior to entry into any free-flood area or main ballast tank, check with the Engineering Duty Officer to ensure radiological surveys have been conducted to determine the radiological controls, if required.
2. Verify REC requirements, if any.
3. Obtain permission from the Duty Officer prior to entering any tank.
4. Ensure atmosphere surveys have been completed and adequate ventilation is available prior to entering the tank.
5. Obtain the necessary tools and equipment (i.e., rubber mallet, explosion proof flashlight or drop light, hardhat, wrenches, screwdrivers, etc.) required to enter or close-out the space, tank or void.
6. Wear a hard hat when entering any Main Ballast Tank or free-flood area.
7. Use the buddy system with one man external to the tank or void at all times.
8. No smoking in any tanks or voids. Do not carry any naked lights or sparking electrical apparatus. Ensure all drop lights are inspected and approved by the Electrical Division.
9. While inside the tank, make maximum use of ladders and walkways provided. Do not step on valves and piping.
10. Ensure positive measures are taken to identify the access to the tank or void to be opened (ship's plans, two-man check, label plate identification).
11. Ensure **all system penetrations to the tank or void are isolated and all sources of potential pressurization danger tagged out in accordance with reference (b), to include gravity drain funnels**, and the tank or void is vented to the atmosphere.
12. Ensure the tank or void fasteners are loosened to permit breaking the gasket seal. Remove fasteners only after the seal has been broken.
13. Use lanyards on tools and tethered sealable parts pouches.
14. Prior to entering a tank or void, remove all unnecessary items from your person (i.e., combs, lighters, wallets, etc.).
15. Take an inventory of all tools and materials with which you entered the tank or void. Have a second person verify the inventory before and after each entry.
16. A rubber mallet should be used to investigate for sound shorts, rattles, etc.

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APPENDIX H
CLOSE-OUT INSPECTION CHECK-OFF LIST

Name of tank, void or space _____

	DESCRIPTION	PETTY OFFICER/ OFFICER INITIAL
1.	PAINT	
	a. Painted items and structures are completely covered.	
	b. No cracking or bubbling.	
	c. No evidence of rust under paint.	
	d. Zincs, transducers and hydrophones are not painted.	
2.	FRAMEWORK AND FOUNDATIONS	
	a. Inspect space framing and shell welds for visual defects.	
	b. Ensure nuts are lock-tight type or lockwired and screw engagement allows for at least one thread protrusion.	
3.	PIPING	
	a. Inspect all pipes for visual weld or sil-brazed joint defects. Ensure pipe walls have not been cut by grinding, denting, or struck or burned by welding equipment.	
	b. Check pipe penetrations for properly installed sleeves and weld fillets.	
	c. Pipe hangers should:	
	- prevent vibration when pipe is struck with mallet.	
	- have studs and nuts painted.	
	- have proper insulation between pipe and hanger.	
	- have stud nuts lockwired/locking cabled or have self-locking nuts used as required.	
	d. If blanks have been installed and will remain in-place following a preliminary close-out inspection, ensure the configuration has been evaluated for impact on ship conditions, system operation and are properly tracked to ensure removal during the final close-out inspection.	
4.	TRANSDUCERS, HYDROPHONES, CABLES AND CABLE WAYS	
	a. Ensure all rubber elements are not gouged, cut, scraped or painted.	
	b. Ensure all sonar transducers and hydrophones and corresponding cables are installed in accordance with ship's plans.	
	c. Ensure only CRES banding and rubber channel insulation is used on cableways.	
	d. Ensure cableways and cable are properly supported.	
	e. Ensure electrical coamings are made and tight.	
	f. Ensure cable loop boxing covers (at hull fittings) are installed with appropriate plastic spacers such that vibration does not occur when struck with a mallet.	
	g. Ensure electrical hull penetrations are properly labeled.	
5.	BAFFLE PLATES AND SOUND DAMPENING TILES	
	a. Sound dampening tiles are the proper type in accordance with reference (k).	
	b. Tiles are not cut, gouged or loosely secured.	
	c. Baffle plates are properly bolted such that they are free from vibration when struck with a mallet.	
6.	MECHANISMS	
	a. Dynamic mechanisms are installed, hooked up, and unpainted, with no evidence of damage or scraping of components.	
	b. Tank level floats, if applicable, are free to operate and have no visual defects.	

	DESCRIPTION	PETTY OFFICER/ OFFICER INITIAL
	c. Grease lines, if applicable, are installed properly with mechanical fittings tight and no evidence of leakage.	
7.	VENTS AND DRAINS	
	a. Adequate draining exists from each bay.	
	b. Vents are clear of loose gear and rags.	
	c. Ensure that vents/drains have no installed blanks.	
8.	GALVANIC PROTECTION	
	a. Zincs are properly located and installed such that vibration does not occur when struck with a rubber mallet.	
	b. Mounting straps and bolts are painted.	
	c. Surfaces behind zincs are properly painted. Sacrificial anode surfaces shall not be painted. Sacrificial anode surfaces shall not have any coatings, sealants or fairing compounds added to the backside unless approved by NAVSEA. Painting of anode straps and hardware is recommended for all sacrificial anode applications. Coatings for zinc anode straps and hardware may be omitted due to galvanizing of the strap. Painting of aluminum anode straps and hardware is required for all alternate immersion applications (e.g., Main Ballast Tanks or bilges).	
9.	CLEANLINESS	
	a. Check space clear of loose gear and rags.	
	b. Check space clean and free of dirt.	
10.	COMPLETION	
	a. All interior inspection items are clear of any discrepancies.	
	b. Take an inventory of all tools and materials with which you entered the tank or void. Verify all items carried into the tank or void have been removed.	
	c. All personnel are clear of the tank or void.	
	d. Tank or void cover gasket and gasket seat areas are in acceptable condition.	
	e. Tank or void cover studs and nuts are torqued to the specified values required and the lock tabs are properly engaged or spot welded.	
	f. Inspect the exterior for incomplete work that would require a reinspection.	
	g. Ensure that all temporary services are removed from tank.	

Signature of Senior Enlisted Inspector

Date

Signature of Officer Inspector

Date

Reviewed by DCA

Date

- (1) No-load Test.
 - (2) Static Load Test.
 - (3) Dynamic Load Test.
 - (4) Rated Load Test.
- b. Results of completed weight tests will be documented on QA form 17W, using the procedures of Volume V, Part I, Chapter 11 of this manual. The serial number (if known) of the equipment shall be recorded on the weight test record.
- c. Handling equipment that has satisfactorily passed the required inspections and load testing shall be so marked by the activity conducting the tests. As a minimum, this marking shall include the name of the testing activity, the date (year and month) tested, date of re-inspection due date, the rated load or SWL and a unique serial number that will allow it to be traced to its test and inspection documentation.
- (1) Where there is little available space for surface marking, such as on wire rope slings, the item may be marked with a Periodic Load Test Record Strap as shown in reference (e).
 - (2) Nylon webbing slings shall have etched leather tags sewn to each sling leg to identify the leg and indicate test results as described in reference (f).
 - (3) Stamped, etched or engraved metal tags, which are attached to the tested item with mechanical fasteners or adhesives, may also be used.
 - (4) Color coding, for local control only, may be used in addition to, but not as an alternate to, one of the authorized marking methods.
 - (5) Wire rope (1/32" through 3/16" diameter) may be used to attach metal tags to WHE provided that the wire rope is secured using mechanical fasteners designed to secure wire rope such as swedges. Metal tags attached using lockwire style twisted wires are prohibited.
- d. A permanent log, written or electronic, shall be maintained to record the following information:
- (1) Equipment identification.
 - (2) Date of the test or inspection.
 - (3) Description of the test or inspection.
 - (4) Weight used for the test, in pounds.
 - (5) Testing activity.
- e. New hooks, blocks, sheaves, wire rope, fiber rope, and other loose hardware or gear need not be load tested after installation if it has not been modified and has been purchased to Military Specifications (MILSPEC) or NAVSEA standard drawings through the Naval Supply System. Any load carrying loose gear procured otherwise shall be tested prior to placing in-service to 200% of the SWL of the part in question. If any sheave, block or hook assembly is received that does not bear the manufacturer's test stamp, it shall be tested to 200% of the SWL.
- f. Unless otherwise specified, load test capacity tolerance shall be +5%, -0%.

13.2.3 Load Test Types and Duration. For each test, the equipment shall withstand the load test for a minimum of two minutes (10 minutes for hoists, cranes and crane structures) with no permanent deformation. For hoists, trolleys and other moving machinery, lift (travel) through three cycles of all moving parts at maximum rated speed.

13.2.3.1 Static Load Test.

- a. Unless otherwise specified, all arrangements for handling and supporting weights (including weights of personnel), all arrangements for taking heavy strains, and all parts upon which the safety of the ship or life depend, shall be given a static load test equal to twice the rated load. In cases where the rated load is not specified, the test load shall be based on the expected duty of the auxiliary, appliance, or fitting. For hoisting arrangements, the static test load shall be suspended clear of all supports and held

suspended for a sufficient period to permit inspection of welds and other fastenings, but need not be lifted or moved by a gear under test. After relieving the static test load, there shall be no evidence of permanent deformation of structure.

- b. The equipment or system to be tested shall not be used to lift the total static test load. Static load tests shall be completed prior to performance of operational tests. Where static test loads exceed 40% of rope breaking strength, the ship's rope shall not be used for the static test.

13.2.3.2 Dynamic Load Test. Weight handling arrangements shall be tested to demonstrate capacity to withstand additional loads imposed on a system when operating under unfavorable sea conditions at reduced speed. The dynamic load test shall be conducted to demonstrate handling equipment load capabilities throughout the complete operating range. As far as practicable, test loads shall be moved completely through the equipment operating range, within the limits of all operating modes.

NOTE: IF THE EQUIPMENT USES HYDRAULIC POWER, THE SYSTEM RELIEF VALVES SHALL BE CHECKED FOR PROPER SETTINGS BEFORE PERFORMING A DYNAMIC LOAD TEST.

13.2.3.3 Rated Load Test. Following satisfactory completion of the dynamic load test, the rated load test shall be conducted to demonstrate capability to operate with a full load, at rated speed, through the complete range of operating limits. As far as practicable, test loads shall be moved completely through the equipment operating range, within the limits of all operating modes. Proper operational functions shall be demonstrated at each speed in all operating modes. The mechanical safety devices shall be tested for their ability to stop and hold when carrying rated load at rated speed.

13.2.4 Load Test Periodicity.

- a. In the interest of personnel safety and equipment protection, inspection and testing of all WHE not covered by PMS or other directives will be performed at intervals not to exceed four years. A PMS feedback will be submitted for each piece of WHE not covered by PMS.

NOTE: PER NAVSEA DIRECTION, STATIC, DYNAMIC AND RATED LOAD TESTING OF MAIN STORAGE BATTERY LIFTING GEAR INSTALLED IN SUBMARINE BATTERY COMPARTMENTS IS NOT REQUIRED UNLESS REPAIRS TO STRUCTURAL OR WEIGHT SUPPORTING COMPONENTS HAVE BEEN ACCOMPLISHED. FOLLOWING REPAIRS, LOAD TESTING WILL BE ACCOMPLISHED DURING BATTERY REPLACEMENT AFTER THE BATTERY CELLS HAVE BEEN REMOVED.

- b. Testing of the following components is required when newly installed or after major structure repair or modification.

- (1) Accommodation ladders.
- (2) Cleats.
- (3) Gangplanks.
- (4) Leadsman platform.

NOTE: LIFELINE STANCHIONS DO NOT REQUIRE WEIGHT TESTING FOLLOWING MANUFACTURE OR REPAIR.

- (5) Liferails/stanchions.
- (6) Lifelines.
- (7) Padeyes.
- (8) Portable davits.
- (9) Reversible eyebolts.
- (10) Slings.
- (11) Safety nets (not including deck edge safety nets).

VOLUME IV
CHAPTER 16

AIRCRAFT LAUNCH AND RECOVERY SYSTEMS FOR AIRCRAFT CARRIERS ONLY

REFERENCES.

- (a) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual
- (b) OPNAVINST 4790.15 - Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP)
- (c) COMNAVAIRLANTINST 4790.40/COMNAVAIRPACINST 4790.39 - Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP) Management Teams
- (d) OPNAVINST 3120.28 - Certification of the Aviation Capability of Naval Ships Operating Aircraft
- (e) COMLANTFLTINST 3500.18 - Certification and Readiness of Aviation Facilities in Naval Ships Operating Aircraft
- (f) NAVAIRINST 3120.1 - Lead Systems Command Procedures and Responsibilities for Certification of Aviation Facilities and Equipment in Naval Ships Operating Aircraft

16.1 PURPOSE. To provide guidance concerning the maintenance policies, procedures and responsibilities for Aircraft Launch and Recovery Equipment (ALRE) throughout the ship's operating cycle.

16.1.1 Scope. The Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP) is sponsored and directed by the Chief of Naval Operations, and is administered through the chain of command to provide material and technical support by the cognizant Systems Command. The ALREMP provides an integrated system for performing maintenance and related support functions on ship's installed aircraft launching and recovery systems and associated peripheral support systems and equipment.

16.2 AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT MAINTENANCE PROGRAM.

16.2.1 Applicability. The ALREMP encompasses all Navy activities concerned with the operation, rework, repair, production and support of Aircraft Carrier ALRE, including catapults, arresting gear, Visual Landing Aids (VLA), and associated deck gear and accessories.

16.2.2 Objectives. The ALREMP establishes standard procedures to control maintenance, provide quality assurance performance verification, and provide for a more effective ship's Maintenance and Material Management system in compliance with reference (a).

16.2.3 Responsibilities.

- a. Naval Air Systems Command (NAVAIR) shall provide overall ALREMP management through the ALRE Program Manager (PMA 251).
- b. The ALRE Program Manager, or his direct representative, shall establish and chair the ALREMP Working Committee.
- c. The Naval Air Warfare Center (NAVAIRWARCEN) Aircraft Division, Lakehurst will provide technical services and act as the technical manager for the ALREMP.
- d. The Type Commanders (TYCOM) shall provide ALRE Maintenance Management Teams to conduct assist visits and annual audits of all units, per the requirements of reference (b). These assist visits and annual audits will ensure operation and maintenance of ALRE is conducted within the guidelines of the ALREMP as directed by reference (b).

16.2.4 Management Team. The ALREMP Management Team consists of a qualified ALRE Maintenance Officer, and an experienced Senior/Master Chief Aviation Boatswains Mate (ABECS/ABCM), assigned to Commander Naval Air Force Atlantic (COMNAVAIRLANT) N433/Commander Naval Air Force Pacific (COMNAVAIRPAC) N435. Audit assistance may be provided to the TYCOMs by the ALRE Program Office (PMA 251) Fleet Programs Team. The ALREMP Management Team provides the following services.

- a. Pre-implementation training for the ALREMP.

- b. Assistance to ships during the ALREMP implementation phase.
- c. Assist visits during industrial availabilities.
- d. Assist visits following an industrial availability or during a ship's work-up cycle.
- e. Formal audits, in accordance with references (c), prior to or during mid-deployment.

16.2.5 Assist Visits. Assist visits will be advisory in nature and will normally be scheduled to follow a ship's Selected Restricted Availability or during the work-up cycle. Units visited are encouraged to discuss maintenance/material quality assurance problems with team members. Upon completion of the visit, the team will debrief the Air Department Officer and designated Air Department personnel. An informal report of noted problems and recommendations will be provided at the debrief. The Commanding Officer will be debriefed at the discretion of the team leader. The ALREMP Management Team may be requested for additional assist visits at the ship's discretion via the applicable TYCOM.

16.2.6 Audits.

- a. Formal audits will be conducted **upon completion of a Chief of Naval Operations availability, annually or** prior to deployment, and will evaluate the overall ALREMP and quality assurance management procedures, including compliance with current OPNAV and TYCOM instructions.
 - (1) The Commanding Officer shall be debriefed by the ALREMP Team Leader at the completion of the audit.
 - (2) A formal report listing all discrepancies will be forwarded to the Commanding Officer within fifteen days of the audit completion. A report of corrective actions taken will be submitted to the TYCOM no later than thirty days after receiving the formal audit report. Updates will be submitted monthly until all discrepancies are corrected.
- b. Semi-annually, the TYCOMs will provide the ALRE Program Office PMA 251 with an ALREMP status report detailing their respective carrier's performance. Reports will be used to evaluate overall ALREMP program effectiveness.

16.3 AVIATION CERTIFICATION. Aviation Certification, including ALRE certification, responsibilities, procedures, and waiver guidance are provided in references (d), (e) and (f).

16.4 CARRIER AND FIELD SERVICE UNIT.

- a. Carrier And Field Service Unit (CAFSU) is a branch of the NAVAIRWARCEN Lakehurst, ALRE Fleet Technical Support Competency. The organization is comprised of civilian technicians highly skilled and thoroughly qualified in the operation, maintenance, repair, installation, and testing of both shipboard and shore based ALRE and VLA systems. They are geographically located in field offices to provide instant technical assistance to Fleet personnel and industrial activities throughout the Fleet operating areas. CAFSU Field Offices are located at:
 - Naval Aviation Depot, JAX, Norfolk, VA Voyage Repair Team (VRT) Detachment
 - Naval Station, Mayport, FL
 - Naval Aviation Depot North Island, CA
 - Puget Sound Naval Shipyard Bremerton, WA
 - Ship Repair Facility Yokosuka, Japan
 - Supervisor of Shipbuilding Newport News, VA
 - Norfolk Naval Shipyard Portsmouth, VA
- b. The CAFSU Supervisor is located at TYCOM headquarters. Technicians are under the operational control of the Ship Installation Officer, TYCOM (N433/N435). CAFSU functions as the technical representatives of NAVAIR, the TYCOM and NAVAIRWARCEN in all matters which concern launch, recovery, and VLA equipment. CAFSU is required to maintain technical liaison with the above commands and is responsible for the completion of work to the satisfaction of these commands and for providing all interested parties with timely information as required. CAFSU will provide technical assistance during Chief of Naval Operations Maintenance Availabilities and other availabilities, and to ships not in a repair status. All industrial activity repairs, modifications, and operational tests of

shipboard, launching, recovery and VLAs will be monitored by a CAFSU representative. All technical questions concerning the equipment may be directed to the local CAFSU representative. CAFSU shall recommend approval or disapproval of work after consultation with the TYCOM. CAFSU will submit timely written reports concerning repairs, alterations and work accomplished to the Commanding Officer NAVAIRWARCEN for appropriate action and distribution.

16.4.1 Responsibilities.

16.4.1.1 Aircraft Carrier Commanding Officer.

- a. Request CAFSU technical assistance when required, by message, letter, or informal means from the TYCOM. In the case of a formal request direct an information copy to the local CAFSU field office.
- b. Provide appropriate berthing and messing facilities for CAFSU representatives when embarked.
- c. Pass to the TYCOM (N433/N435) any comments concerning meritorious or substandard performance of CAFSU representatives.
- d. Upon completion of the CAFSU assignment at sea, ensure timely departure from the ship.

16.4.1.2 Industrial/Repair Activity.

- a. Provide support to the CAFSU representative, as appropriate to allow for accomplishment of the objectives set forth in paragraph 16.2.2 of this chapter.
- b. Refer technical questions concerning the launching, recovery, and VLA equipment to the local CAFSU representative for timely resolution.

16.5 NAVAL AVIATION DEPOT.

- a. The Naval Aviation Depots maintain and operate facilities to perform:
 - (1) A complete range of industrial level rework operations on designated weapon systems, accessories, and equipment.
 - (2) Manufacturing of parts and assemblies as required.
 - (3) Engineering services in the development of change hardware design.
 - (4) Technical and other professional services for Aircraft Carrier maintenance and logistic problems.
 - (5) Other levels of Aircraft Carrier maintenance for eligible activities upon specific request or assignment.
 - (6) Other functions as directed by NAVAIR.
- b. In order to meet the material support needs of the operating forces, by accomplishment of the above mission, the following specific functions are assigned:
 - (1) Perform depot maintenance functions for aircraft, engines, and their components and accessories. Ground Support Equipment trainers, and training equipment as specified in appropriate Aircraft Maintenance Program directives.
 - (2) Provide engineering, technical, and professional services in support of rework of specific aircraft, engines, aeronautical components, Peculiar Ground Support Equipment, trainers, and training equipment.
 - (3) Perform shipwork designated as Ship Installations Equipment and systems with the same priority as aircraft rework.
 - (4) Serve as the major maintenance, repair, and modification point for assigned missiles.
 - (5) Provide calibration services as assigned by higher authority.

- (6) Perform as the NAVAIR Weapons System Support Officer for the overall management of the NAVAIR Engineering Support Office, Weapon Systems Management Office for assigned weapons, and Integrated Logistic Support Office.
- (7) Perform as a Cognizant Field Activity for assigned aircraft, equipment, and Peculiar Ground Support Equipment.

16.6 NAVAL AVIATION DEPOT VOYAGE REPAIR TEAM.

- a. Naval Aviation Depot Operations Instruction 13800.1 denotes organizational relationships between the TYCOM and the VRT and defines the TYCOM's responsibility, authority for workloading, and operational control of the VRT. Control is exercised through the TYCOM (N433/N435).
- b. To provide industrial level support for Ship Installation Equipment (ALRE) the VRT is used to support the following:
 - (1) Casualty Reports.
 - (2) Enroute maintenance/Underway repairs.
 - (3) Miscellaneous repairs beyond Ship's Force capability.
 - (4) Rotatable spare overhaul.
 - (5) Special reports.
 - (6) Preparation for Overseas Movement repairs.
 - (7) Service Change installations.
 - (8) Modernization/repair of components in conjunction with Chief of Naval Operations Maintenance Availabilities and Planned Maintenance System availabilities.
- c. The capabilities of the VRT are such that almost any task related to launch and recovery equipment is feasible, assuming adequate support from Ship's Force is available. The following ship's support for the VRT is required:
 - (1) Timely Current Ship's Maintenance Project deferral submission for the Maintenance Manager and TYCOM screening/programming.
 - (2) Providing sufficient V-2 Division personnel to assist the team, in such areas as providing forklifts, obtaining necessary parts, gaining machine shop assist and space access, etc.

VOLUME IV
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 48 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 three years for SSBN/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:**

- (1) Completion of the inspection. When ships are in a CNO availability, the shipyard and the Project Team must be formally notified of the scheduled date of the Salvage Inspection and any deficiencies identified.
 - (2) Which, if any, systems or equipment have not been restored to normal operating conditions (due to maintenance or required repairs, etc.).
 - (3) That an advance copy of the inspection results has been provided to the ship to facilitate early correction of deficiencies found.
- d. Submit the inspection report to the Commanding Officer/Officer In Charge of the inspected ship in the format of Appendix F of this chapter within three working days following the completion of the inspection, with a copy to the cognizant ISIC.

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APPENDIX A
SSN 21 CLASS SUBMARINE SALVAGE INSPECTION
CHECK-OFF LIST

General Information

1. Items pertaining to rescue vehicle seating surfaces and buoy cable angle tests require substantial support equipment and are designated for industrial activity accomplishment.
2. Configuration differences are noted as comments in the reference column.
3. Portions of the Salvage Inspection (as specified by the maintenance activity) may be conducted prior to the start of CNO availabilities as “pre-availability inspections” to support planning of the availability. These items need not be re-inspected provided no work was performed during the availability which affects their status. When specified, these items will be performed by Ship’s Force and written certification by the Commanding Officer provided to the maintenance activity, the ISIC and the Senior Inspecting Officer.
4. **The user is directed to use the most current revision of the Planned Maintenance System (PMS) maintenance requirement.**

PART I: SALVAGE

INSPECTION TEAM (SSN 21 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>1. <u>Salvage Drawings:</u></p> <p style="padding-left: 20px;">a. Verify salvage drawings:</p> <p style="padding-left: 40px;">(1) Have been updated during ship’s new construction period/last CNO Maintenance Availability or</p> <p style="padding-left: 40px;">(2) Latest revision is identified in ship’s plan index.</p> <p style="padding-left: 40px;">(3) Have correct distribution.</p> <p style="padding-left: 40px;">(4) Are identified as Selected Record Drawings</p> <p>2. <u>High/Low Salvage Connections:</u></p> <p style="padding-left: 20px;">a. Verify deck touch plate markings are installed and per plan.</p> <p style="padding-left: 20px;">b. Check that each valve is free to operate with the inspecting command’s salvage wrench.</p>	<p>Fleet Modernization Program Management and Operations Manual NAVSEA SL720-AA-MAN-010</p> <p>Ship Dwg. Consolidated Index Number 594 or 845</p> <p>Ship’s Plans</p> <p>Notes 1 and 2</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 21 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>6. <u>External Gagging Devices:</u></p> <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>Notes 2, 5, and 6</p> <p>Notes 6 and 7</p> <p>MIP 5542/921 MRC 7CHE</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: 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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>2. <u>Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:</u></p> <p>a. Escape trunk hatch fairings must be maintained in a condition to be easily disassembled to support submarine rescue. Verify Planned Maintenance has been completed within the required periodicity on all escape trunk hatches. Visually inspect escape trunk hatch fairings for compliance with the specifications called out in MRC HOQN. Paint fouling or corrosion of fairing fasteners must be immediately corrected. Demonstrate the ability to remove one fastener in each fairing piece required to be removed in the fairing disassembly procedure.</p> <p>b. Demonstrate that each access hatch operates satisfactorily with all respects of locking/unlocking, opening/shutting from below/above (with salvage wrench/handwheel as applicable).</p> <p>c. Demonstrate that each access hatch can be opened with 5th percentile swing force operability criteria for surfaced emergency egress (SSN 23 and SSN 21 Class with S/A 4149).</p> <p>d. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.</p> <p>(1) Demonstrate satisfactory installation of Improved Powered Hatch Operator with intensifier and compensator as one mode of hatch operation of Logistics Escape Trunks (SSN 23 and SSN 21 Class with S/A 4149).</p> <p>(a) Verify inventory of all parts.</p> <p>(b) Verify periodic pressure testing of hoses.</p> <p>(c) Verify proper operation of sensing line and trunk gage.</p>	<p>Note 10</p> <p>MIP 1671/921MR C HOQN</p> <p>Ship's Drawing MIP 1671/921 MRCs E4PH, E4PK</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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(d) Verify assembly of intensifier and gearbox to upper hatch operator.</p> <p>(e) Verify installation of upper hatch operator compensator.</p> <p>(f) Demonstrate satisfactory operational check of intensifier pump and gears.</p> <p>e. Demonstrate satisfactory operation and examine the condition of the following equipment:</p> <p>(1) Vent valves (trunk and compartment).</p> <p>(2) Blow valves (trunk and compartment).</p> <p>(3) Flood and drain valves (including remote operation mechanisms and strainer installations).</p> <p>(4) Demonstrate satisfactory operation and examine the condition of the following equipment: Conduct Hood Inflation System/Stole Charging Valve operational check to confirm valves operate properly and verify watertight caps installed.</p> <p>(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.</p> <p>(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.</p> <p>(7) 31MC installed above waterline.</p> <p>(8) Verify accomplishment of PMS to clear sea pressure sensing lines.</p> <p>f. Verify the following equipment installed:</p> <p>(1) Diver's knife.</p> <p>(2) Ballpeen hammer.</p> <p>(3) Persuader (crows foot).</p>	<p>MIP 5940/905, MRC 7DKE</p> <p>MIP 5641/921 MRC F3XS, F3XT</p> <p>Note 11</p> <p>Note 11</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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>g. Check Flood Line Orifice Size (For SSN 23 and SSN 21 Class after S/A 4149, orifice size is 1.37" for initial trials only.)</p> <p>h. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.</p> <p>i. Verify gages are in calibration as indicated on calibration label.</p> <p>j. Verify upper watertight hatch cavity drain valve operation is satisfactory.</p> <p>k. Witness satisfactory rigging and operation of escape trunk portable skirt, verify ability to remove the bubble skirt with the upper hatch shut within 5 minutes without the use of tools. (N/A if A&I N3486 has been accomplished.)</p> <p>3. <u>Emergency Communications Equipment:</u></p> <p>a. Inventory allowance of the following equipment and confirm proper stowage as indicated:</p> <p>(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).</p> <p>b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.</p> <p>(1) SEPIRB.</p> <p>4. <u>Life Saving and Safety Equipment:</u></p> <p>a. Inventory allowance (randomly, type and quantity as applicable) and witness satisfactory performance of PMS procedures on the following: (PMS procedures are to be demonstrated on one representative candidate from each of the sub groups listed below).</p>	<p>Installed</p> <p>NSTM S9086-RK-STM-010 Chapter 505</p> <p>Ship's Plans</p> <p>Ship Configuration and Logistics Support Information System (SCLISIS) & COSAL</p> <p>AEL 7-00000A434</p> <p>MIP 4413/015</p> <p>Ship's COSAL Note 12</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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(1) Life preservers.	MIPs 5832/SUB and 5832/030						
(2) Man overboard bag.	Note 13 MIP 5832/021						
(3) Qualified swimmer designated for man overboard.	Note 14 MILPERS MAN Art. 1414-010 Series						
(4) Safety harness (belts).	MIP 6231/001 MRC 2EA0						
(5) Safety track.	MIP 6111/R06 NAVSEA Dwg. 612-6408578						
(6) Distress marker lights.	MIP 5832/010						
(7) Life lines and stanchions.	MIP 6121/SUB						
(8) SEIE Suits.	MIP 5940/005						
(9) Crash Bags.	MIP 5940/005, MRC 1SC3 and AEL 2-330023072						
(10) Guard Book (Stored in same locker as Crash Bag).	Latest Revision per AEL 2-330023072						
(11) OP 61-1.							
(12) OI 638-3 (Not applicable to SSN23)							
(13) OI 638-4.							
5. <u>Escape Training:</u>							
a. Verify that all hands are trained in SEIE escape.							
6. <u>DISSUB 7-Day Survival:</u>	Note 8.						
a. Portable desalinators (2 FWD & 2 aft)	AEL 2-360033003						
(1) Verify Portable desalinator PMS has been completed within required periodicity.	MIP 5940/003						
b. <u>Atmosphere Control:</u>							
(1) Inventory quantity onboard and inspect condition of the following:							

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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(a) CO₂ absorbent canisters.</p> <p>Amount onboard for DISSUB FWD: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____</p>	<p>AELs 2-3300230 or 2-3300232 series for LiOH product.</p> <p>NON-DISSUB; (e.g., for CO-H₂ After-filter & DQA</p> <p>Note 15</p>						
<p>(b) DISSUB LiOH Deployment Kits.</p> <p>Amount onboard _____ FWD: _____ Aft: _____</p> <p>Required: _____</p> <p>Comment on condition _____</p>	<p>AEL 2-330023035 or 2-330023205 for LiOH Deploy Kits</p> <p>Note 16</p>						
<p>(c) O₂ candles.</p> <p>Amount onboard for DISSUB: FWD: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required: _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____</p>	<p>AEL 1-230013100</p> <p>NON-DISSUB - e.g., for O₂ generator or Low Pressure Electrolyzer (LPE) backup.</p> <p>Note 17</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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(d) O₂ candle furnace. Candle furnaces onboard: FWD: _____ Aft: _____ Required: _____ Comment on condition (include location - FWD and/or aft compartments). _____</p> <p>(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).</p> <p>(2) Verify CO₂ absorbent canister PMS has been completed within required periodicity. Additionally, randomly select 10% of canisters onboard and weigh them in accordance with the applicable MRC.</p> <p>(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.</p> <p>c. <u>Atmosphere Monitoring:</u></p> <p>(1) Inventory quantity onboard and inspection condition of the following:</p> <p>(a) DISSUB O₂/CO₂ Gas Monitors (Analox). Amount onboard (include location) _____ Required: (minimum) <u>1 FWD, 1 aft compartment</u></p> <p>(2) Verify Analox PMS has been completed within required periodicity.</p> <p>(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.</p> <p>7. <u>Launchers:</u></p> <p>a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.</p>	<p>Ship's COSAL</p> <p>Note 18</p> <p>Ship's COSAL MIP 5519/600 MRC G8CL</p> <p>MIP 5151/001 MRC B6CW</p> <p>AEL: 2-870003101 Stored in same locker as Crash Bag</p> <p>MIP 5940/002 MRC 9TFF</p> <p>NSN 6135-01-538-3507 (4 FWD, 4 aft)</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 ITEM (SSN 21 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
b. Verify a minimum of six Red Submarine Emergency Identification Signals and Submarine Floating Signal pyrotechnics stowed in compartment with launcher. c. Operational verification shall include a demonstrated launch (water slug) from both remote and local operating stations.							

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.

NOTES
(SSN 21 CLASS)

1. All high/low salvage valves are to be tested for freedom of operation at the frequency specified, except during the salvage inspection conducted incident to an overhaul. Salvage Air valve testing completed up to one year prior to the start of an availability will satisfy the salvage inspection requirements provided that certified records verifying the tests are available. Written certification by the Commanding Officer that specified external salvage valves have been overhauled by the industrial activity or Ship's Force and have been successfully hydrostatically tested will constitute certification that the valve operates freely, providing all inspections (Part I, items 2.b. and 2.c. of this Appendix) for each valve so certified are satisfactory. If the results of the inspection of operating gear are not satisfactory, or doubt exists concerning freedom of operation, the specific valves in question shall be checked. Provide appropriate container for collecting anti-freeze drained from salvage piping when hull valve is cycled. Ensure controlled re-assembly in accordance with Quality Assurance requirements is performed when installing salvage caps. Exercise caution to prevent liquid in salvage air piping from impinging on nearby equipment when hull valve is cycled. Ensure anti-freeze is added to piping after inspection to prevent freezing.
2. The inspected ship's, vice the inspecting command's, salvage wrench shall be used if the inspecting command is another submarine. Discrepancies in the actual, versus plan, number of turns which are greater than one full turn shall be noted in addition to the number of actual turns recorded.
3. Discrepancies between physical installation and salvage plans are to be reported to the TYCOM with an information copy to all plan holders.
4. Exercise extreme caution when testing operation of 4500 psi compartment pressurization valves.
5. When inspecting the gagging gear for the inboard ventilation exhaust valve and the inboard ventilation induction valve, the valve linkages shall be inspected and the valves shall be adjusted in accordance with the requirements in the Non-Primary Plant Valves Technical Manual or individual ship's valve drawing.
6. Prior to testing Outboard Diesel Exhaust Valve, ensure replacement spring loaded locking pin is available onboard.
7. On some designs, operation of the gagging device overrides the regular operating gear of the valve indicator in such a manner that the entire mechanism must be reset/readjusted before the normal operating gear or the valve position indicator will function as intended. If the gagging mechanism is operated or used for any reason, the mechanism shall be reset and the valve subsequently opened and closed by the normal operating gear in every manner in which the gear is designed to function to ensure the valve is in proper operating condition.
8. Unsatisfactory conditions degrade the SRC and/or SRDRS capability and require a CASREP be submitted in accordance with reference (a).
9. Shelf life is computed from date of manufacture which is printed in code on the battery. For example, a battery code "1187" means the battery was manufactured in the 11th month of 1987. For expiration dates, see Naval Supply Systems Command Publication 4105, List of Items Requiring Special Handling.
10. One or more of the Logistics and Escape Trunks (LET) will be removed during refit. When removed, the LET is isolated from service air and electric power. Communications circuits, electrical power, and charging manifold tests should be conducted prior to LET removal to ensure piping and electrical system continuity, and tested again upon reinstallation.
11. Diver's knife, timer and ball peen hammer may be stored in secure stowage in escape compartment.
12. The allowance of escape appliances for submarines with two escape compartments consists of 110 percent of complement in each compartment. Compliment for distribution shall be based on most stressing operational scenario compartment manning which is typically normal underway forward and general quarters in the aft compartment. Additionally, 20 non-inflatable life preservers are to be carried for topside use.
13. Man overboard bags to be equipped as specified in Man Overboard Casualty Procedures.
14. Man overboard swimmer to be competent as a swimmer/qualified diver as designated by Commanding Officer.
15. Lithium Hydroxide (LiOH) canister quantity, location, type and use impacts inspection acceptance criteria. The minimum number of LiOH canisters shall be obtained from the ship's COSAL and the below additional requirements:

- a. Canisters reserved for Disabled Submarine (DISSUB) use only:
 - (1) Forward LiOH canisters shall not be less than 460 - SSN21/22 (462 - SSN23) Granular (NSN 6810-00-559-3261).
 - (2) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable Ship Systems Manual (SSM) once updated. General guidance is to add four (4) additional Granular LiOH canisters for each additional crew or rider beyond normal crew manning. Additional canisters shall be stowed in the same compartment (FWD or aft) rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.
- b. A minimum of 40 Granular LiOH canisters are required onboard to support NON-DISSUB applications and may be stowed forward or aft. There is no minimum number of LiOH canisters required aft.

EXCEPTION: REDUCE TO 30 LIOH CANISTERS FOR CO-H₂ BURNER MAINTENANCE IF DIVER QUALIFIED AIR IS NOT APPLICABLE.

- c. LiOH canisters reserved for DISSUB shall be segregated from NON-DISSUB canisters with quantities and location(s) logged by the crew. Note 15 requirements do not authorize total onboard LiOH canisters reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement.
16. The minimum number of LiOH DISSUB deployment kits shall be obtained from the ship's COSAL and the below additional requirements for granular LiOH canisters reserved for DISSUB use only (if applicable):
- a. A minimum ten (10) LiOH curtain kits - SSN21/22 (11 - SSN23) are required to be stowed in the forward compartment.
 - b. Four (4) additional LiOH curtains are required in the forward compartment for crew or riders exceeding normal crew manning of 153 - SSN21/22 (166 - SSN23).

NOTE: EACH KIT CONTAINS 50 CURTAINS WITH DEPLOYMENT HARDWARE. PARTIAL OR OPENED KITS ARE UNSAT.

17. Sodium chlorate oxygen candle quantity and location impacts inspection acceptance criteria. The minimum number of candles shall be obtained from the below requirements:

- a. Oxygen candles reserved for DISSUB use only:
 - (1) Forward candles shall not be less than 192 - SSN21/22 (196 - SSN23) for normal crew manning of 153 - SSN21/22 (166 - SSN23).
 - (2) Aft candles shall not be less than 18 - SSN21/22/23 for normal crew manning of 153 - SSN21/22 (166 - SSN23).
 - (3) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable SSM once updated. General guidance is to add one and a half (1.5) additional candles for each additional crew or rider beyond normal crew manning. Additional candles shall be stowed in the same compartment (FWD or aft) the rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.

NOTE: STOWAGE OF AN OPENED OR DAMAGED CANDLE OR IGNITER IS UNSAT.

- b. Mission appropriate oxygen candle quantities reserved for NON-DISSUB shall be in excess of quantities reserved for DISSUB. Normal OPs requires a minimum of 10 days of candles, while arctic OPs require a minimum of 20 days. Oxygen candles supporting NON-DISSUB applications may be stowed forward or aft.
- c. Oxygen candles reserved for DISSUB shall be segregated from NON-DISSUB candles with quantities and location(s) logged by the crew. Note 17 requirements authorize total onboard candles reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement if mission and Note 17 requirements are otherwise met.

d. Oxygen candle igniters shall be of a quantity and location (FWD or aft) that supports onboard candle load-out at least one for one.

| 18. Oxygen candle furnace quantity and location impacts inspection acceptance criteria. The minimum number of furnaces shall be obtained from the ship's COSAL and the below additional requirements:

a. Furnaces maintained in clean and fully operating condition are necessary for both DISSUB and NON-DISSUB applications as follows:

(1) Forward furnaces shall not be less than two (2) for normal crew manning of 153 - SSN21/22 (166 - SSN23).

(2) Aft furnaces shall not be less than one (1) for normal crew manning of 153 - SSN21/22 (166 - SSN23).

| b. Note 18 requirements do not authorize total onboard furnaces to be less than the ship's COSAL requirement.

APPENDIX B
SSN 688 CLASS SUBMARINE SALVAGE INSPECTION
CHECK-OFF LIST

General Information

- 1. Items pertaining to rescue vehicle seating surfaces and buoy cable angle tests require substantial support equipment and are designated for industrial activity accomplishment.**
- 2. Configuration differences are noted as comments in the reference column.**
- 3. Portions of the Salvage Inspection (as specified by the maintenance activity) may be conducted prior to the start of CNO availabilities as "pre-availability inspections" to support planning of the availability. These items need not be re-inspected provided no work was performed during the availability which affects their status. When specified, these items will be performed by Ship's Force and written certification by the Commanding Officer provided to the maintenance activity, the ISIC, and the Senior Inspecting Officer.**
- 4. The user is directed to use the most current revision of the PMS maintenance requirement.**

PART I: SALVAGE

INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>1. <u>Salvage Drawings:</u></p> <p style="padding-left: 20px;">a. Verify salvage drawings:</p> <p style="padding-left: 40px;">(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or</p> <p style="padding-left: 40px;">(2) Latest revision is identified in ship's plan index.</p> <p style="padding-left: 40px;">(3) Have correct distribution.</p> <p style="padding-left: 40px;">(4) Are identified as Selected Record Drawings.</p> <p>2. <u>High/Low Salvage Connections:</u></p> <p style="padding-left: 20px;">a. Verify deck touch plate markings are installed and per plan.</p> <p style="padding-left: 20px;">b. Check that each valve is free to operate with the inspecting command's salvage wrench.</p> <p style="padding-left: 20px;">c. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.</p>	<p>Fleet Modernization Program Management and Operations Manual NAVSEA SL720-AA-MAN-010</p> <p>Ship Dwg. Consolidated Index Number 513 or 845</p> <p>Ship's Plans</p> <p>Notes 1 and 2</p> <p>Note 1</p>				

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INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>d. External salvage system caps:</p> <p>(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.</p> <p>(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.</p> <p>(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.</p> <p>e. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.</p> <p>3. <u>Internal Air Salvage:</u></p> <p>a. Test satisfactory operation of all internal salvage air valves.</p> <p>b. Verify all compartment pressure gages are in calibration as indicated on calibration label.</p> <p>4. <u>Bulkhead Flappers:</u></p> <p>a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.</p> <p>5. <u>Hull Access Hatches, Watertight Doors and Torpedo Loading Hatches:</u> Inspection performed by local PMT.</p> <p>a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.</p> <p>6. <u>External Gagging Devices:</u></p> <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>Note 3</p> <p>Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)</p> <p>Note 4</p> <p>MIP 1671/905, MRCs 7BYE and 7BBB</p> <p>Notes 2 and 5</p>				

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INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means. 7. <u>Air Bank Dew Points:</u> a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.	Note 6 MIP 5542/911 MRC 7BDB				

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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>						

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INSPECTION ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.</p> <p>(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064).</p> <p>(7) 31MC installed above waterline.</p> <p>(8) Verify accomplishment of PMS to clear sea pressure sensing lines.</p> <p>f. Verify the following equipment installed:</p> <p>(1) Diver's knife.</p> <p>(2) Ball peen hammer.</p> <p>(3) Persuader (crows foot).</p> <p>g. Check Flood Line Orifice Size (1.25" for SSN 688 Class with S/A 4142 installed.)</p> <p>h. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.</p> <p>i. Verify gages are in calibration as indicated on calibration label.</p> <p>j. Verify upper watertight hatch cavity drain valve operation is satisfactory.</p> <p>k. Witness satisfactory rigging and operation of escape trunk portable skirt, verify ability to remove the bubble skirt with the upper hatch shut within 5 minutes without the use of tools. (N/A if A&I N3485 has been accomplished.)</p> <p>l. Demonstrate that escape trunk upper hatch maximum hydraulic closing pressure is satisfactory. Demonstrate that the hydraulic accumulator maintains the nitrogen pre-charge as specified in OP 61-1 (rig-for-dive) and that the hand pump operates satisfactory (after S/A 4189 completed).</p>	<p>MIP 5641/9R2 MRC 9MAY and 9MAZ</p> <p>Note 9</p> <p>Note 9</p> <p>Installed</p> <p>NSTM S9086- RK-STM-010 Chapter 505</p> <p>Ship's Plans</p>						

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INSPECTION ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>3. <u>Emergency Communications Equipment:</u></p> <p>a. Inventory allowance of the following equipment and confirm proper stowage as indicated:</p> <p>(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).</p> <p>b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.</p> <p>(1) SEPIRB.</p>	<p>Ship Configuration and Logistics Support Information System (SCLISIS) & COSAL</p> <p>7-00000A434</p> <p>MIP 4413/015</p>						
<p>4. <u>Life Saving and Safety Equipment:</u></p> <p>a. Inventory allowance (randomly, type and quantity as applicable) and witness satisfactory performance of PMS procedures on the following: (PMS procedures are to be demonstrated on one representative candidate from each of the sub groups listed below).</p> <p>(1) Auto-Inflatable life preservers.</p> <p>(2) Inherently Buoyant life preservers.</p> <p>(3) Man overboard bag.</p> <p>(4) Qualified swimmer designated for man overboard.</p> <p>(5) Safety harness (belts).</p> <p>(6) Safety track.</p> <p>(7) Distress marker lights.</p> <p>(8) Life lines and stanchions.</p> <p>(9) SEIE Suits.</p>	<p>Ship's COSAL Note 10</p> <p>MIP 5832/SUB</p> <p>MIP 5832/030</p> <p>Note 11</p> <p>MIP 5832/021</p> <p>Note 12MILPERS MAN Art. 1414-010 Series</p> <p>MIP 6231/001 MRC 2EA0</p> <p>Note 13</p> <p>MIP 6111/R06</p> <p>MIP 5832/010</p> <p>MIP 6121/SUB</p> <p>MIP 5940/005</p>						

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INSPECTION ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(10) Crash Bags.</p> <p>(11) Guard Book (Stored in same locker as Crash Bag)</p> <p>(12) OP 61-1</p> <p>(13) OI 638-4</p> <p>5. <u>Escape Training</u>:</p> <p>a. Verify that all hands are trained in SEIE escape.</p> <p>6. <u>DISSUB 7-Day Survival</u>:</p> <p>a. <u>Atmosphere Control</u>:</p> <p>(1) Inventory quantity onboard and inspect condition of the following:</p> <p>(a) CO₂ absorbent canisters.</p> <p>Amount onboard for DISSUB: FWD: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____</p> <p>(b) DISSUB LiOH Deployment Kits.</p> <p>Amount onboard FWD: _____ Aft: _____</p> <p>Required: _____</p> <p>Comment on condition _____</p>	<p>MIP 5940/005, MRC 1SC3 and AEL 2-330023072</p> <p>Latest Revision per AEL 2-330023072</p> <p>Note 7</p> <p>AELs 2-3300230 or 2- 3300232 series for LiOH product.</p> <p>NON-DISSUB; (e.g., for CO-H₂ After- filter & DQA)</p> <p>Note 14</p> <p>Per AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.</p> <p>Note 15</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 ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(c) O₂ candles.</p> <p>Amount onboard for DISSUB: FWD: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required: _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____</p>	<p>AEL 1-230013100</p> <p>NON- DISSUB - (e.g., for O₂ generator backup)</p> <p>Note 16</p>						
<p>(d) O₂ candle furnace.</p> <p>Candle furnaces onboard: FWD: _____ Aft: _____</p> <p>Required: _____</p> <p>Comment on condition (include location - FWD and/or aft compartments). _____</p>	<p>Ship's COSAL</p> <p>Note 17</p>						
<p>(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).</p> <p>(2) Verify CO₂ absorbent canister PMS has been completed within required periodicity. Additionally, randomly select 10% of canisters onboard and weigh them in accordance with the applicable MRC.</p> <p>(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.</p> <p>b. <u>Atmosphere Monitoring:</u></p> <p>(1) Inventory quantity onboard and inspect condition of the following:</p>	<p>Ship's COSAL MIP 5519/600 MRC G8CL</p> <p>MIP 5151/001 MRC B6CW</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 ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(a) DISSUB O₂/CO₂ Gas Monitors (Analox).</p> <p>Amount onboard (including location)</p> <hr/> <p>Required: (minimum) 1 FWD, 1 aft compartment</p> <p>(2) Verify Analox PMS has been completed within required periodicity.</p> <p>(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.</p> <p>7. <u>Launchers:</u></p> <p>a. Demonstrate satisfactory operation of each launcher manually and hydro pneumatically as applicable.</p> <p>b. Verify a minimum of six Red Submarine Emergency Identification Signals and Submarine Floating Signal pyrotechnics stowed in compartment with launcher.</p> <p>c. Operational verification shall include a demonstrated launch (water slug) from both remote and local operating stations.</p>	<p>AEL 2-870003101 Stored in same locker as Crash Bag</p> <p>MIP 5940/002 MRC 9TFF</p> <p>NSN 6135-01-538-3507 (4 FWD, 4 aft)</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.

NOTES
(SSN 688 CLASS)

1. All high/low salvage valves are to be tested for freedom of operation at the frequency specified, except during the salvage inspection conducted incident to an overhaul. Salvage Air valve testing completed up to one year prior to the start of an availability will satisfy the salvage inspection requirements provided that certified records verifying the tests are available. Written certification by the Commanding Officer that specified external salvage valves have been overhauled by the industrial activity or Ship's Force and have been successfully hydrostatically tested will constitute certification that the valve operates freely, providing all inspections (Part I, items 2.b. and 2.c. of this Appendix) for each valve so certified are satisfactory. If the results of the inspection of operating gear are not satisfactory, or doubt exists concerning freedom of operation, the specific valves in question shall be checked. Provide appropriate container for collecting anti-freeze drained from salvage piping when hull valve is cycled. Ensure controlled re-assembly in accordance with Quality Assurance requirements is performed when installing salvage caps. Exercise caution to prevent liquid in salvage air piping from impinging on nearby equipment when hull valve is cycled. Ensure anti-freeze is added to piping after inspection to prevent freezing.
2. The inspected ship's, vice the inspecting command's, salvage wrench shall be used if the inspecting command is another submarine. Discrepancies in the actual, versus plan, number of turns which are greater than one full turn shall be noted in addition to the number of actual turns recorded.
3. Discrepancies between physical installation and salvage plans are to be reported to the TYCOM with an information copy to all plan holders.
4. Exercise extreme caution when testing operation of 4500 psi compartment pressurization valves.
5. When inspecting the gagging gear for the inboard ventilation exhaust valve and the inboard ventilation induction valve, the valve linkages shall be inspected and the valves shall be adjusted in accordance with the requirements in the Non-Primary Plant Valves Technical Manual or individual ship's valve drawing.
6. On some designs, operation of the gagging device overrides the regular operating gear of the valve indicator in such a manner that the entire mechanism must be reset/readjusted before the normal operating gear or the valve position indicator will function as intended. If the gagging mechanism is operated or used for any reason, the mechanism shall be reset and the valve subsequently opened and closed by the normal operating gear in every manner in which the gear is designed to function to ensure the valve is in proper operating condition.
7. Unsatisfactory conditions degrade the SRC and/or SRDRS capability and require a CASREP be submitted in accordance with reference (a).
8. Shelf life is computed from date of manufacture which is printed in code on the battery. For example, a battery code "1187" means the battery was manufactured in the 11th month of 1987. For expiration dates, see Naval Supply Systems Command Publication 4105, List of Items Requiring Special Handling.
9. Diver's knife and ballpeen hammer may be stored in secure stowage in escape compartment.
10. The allowance of escape appliances for submarines with two escape compartments consists of 110 percent of complement in each compartment. Compliment for distribution shall be based on most stressing operational scenario compartment manning which is typically normal underway forward and general quarters in the aft compartment. Additionally, 20 non-inflatable life preservers are to be carried for topside use.
11. Man overboard bags to be equipped as specified in Man Overboard Casualty Procedures.
12. Man overboard swimmer to be competent swimmer/qualified diver as designated by Commanding Officer.
13. Safety track inspection shall be performed as specified by MIP 6111/R06 (MRC 3JTK).
14. Lithium Hydroxide (LiOH) canister quantity, location, type and use impacts inspection acceptance criteria. The minimum number of LiOH canisters shall be obtained from the ship's COSAL and the below additional requirements:
 - a. Canisters reserved for Disabled Submarine (DISSUB) use only:
 - (1) Forward LiOH canisters shall not be less than 429 Granular (NSN 6810-00-559-3261).

(2) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable Ship Systems Manual (SSM) once updated. General guidance is to add four (4) additional Granular LiOH canisters for each additional crew or rider beyond normal crew manning. Additional canisters shall be stowed in the same compartment (FWD or aft) rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.

b. A minimum of 40 Granular LiOH canisters are required onboard to support NON-DISSUB applications and may be stowed forward or aft. There is no minimum number of LiOH canisters required aft.

EXCEPTION: REDUCE TO 30 LIOH CANISTERS FOR CO-H2 BURNER MAINTENANCE IF DIVER QUALIFIED AIR IS NOT APPLICABLE.

c. LiOH canisters reserved for DISSUB shall be segregated from NON-DISSUB canisters with quantities and location(s) logged by the crew. Note 14 requirements do not authorize total onboard LiOH canisters reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement.

15. The minimum number of LiOH DISSUB deployment kits shall be obtained from the ship's COSAL and the below additional requirements for granular LiOH canisters reserved for DISSUB use only (if applicable):

- a. A minimum nine (9) LiOH curtain kits are required to be stowed in the forward compartment.
- b. Four (4) additional LiOH curtains are required in the forward compartment for crew or riders exceeding normal crew manning of 154 onboard.

NOTE: EACH KIT CONTAINS 50 CURTAINS WITH DEPLOYMENT HARDWARE. PARTIAL OR OPENED KITS ARE UNSAT.

NOTE: STOWAGE OF AN OPENED OR DAMAGED CANDLE OR IGNITER IS UNSAT.

16. Sodium chlorate oxygen candle quantity and location impacts inspection acceptance criteria. The minimum number of candles shall be obtained from the below requirements:

- a. Oxygen candles reserved for DISSUB use only:
 - (1) Forward candles shall not be less than 200 for normal crew manning of 154.
 - (2) Aft candles shall not be less than 18 for normal crew manning of 154.
 - (3) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable SSM once updated. General guidance is to add one and a half (1.5) additional candles for each additional crew or rider beyond normal crew manning. Additional candles shall be stowed in the same compartment (FWD or aft) the rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.
- b. Mission appropriate oxygen candle quantities reserved for NON-DISSUB shall be in excess of quantities reserved for DISSUB. Normal OPs requires a minimum of 10 days of candles, while arctic OPs require a minimum of 20 days. Oxygen candles supporting NON-DISSUB applications may be stowed forward or aft.
- c. Oxygen candles reserved for DISSUB shall be segregated from NON-DISSUB candles with quantities and location(s) logged by the crew. Note 16 requirements authorize total onboard candles reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement if mission and Note 16 requirements are otherwise met.
- d. Oxygen candle igniters shall be of a quantity and location (FWD or aft) that supports onboard candle load-out at least one for one.

17. Oxygen candle furnace quantity and location impacts inspection acceptance criteria. The minimum number of furnaces shall be obtained from the ship's COSAL and the below additional requirements:

- a. Furnaces maintained in clean and fully operating condition are necessary for both DISSUB and NON-DISSUB applications as follows:

- (1) Forward furnaces shall not be less than two (2) for normal crew manning of 154.
 - (2) Aft furnaces shall not be less than one (1) for normal crew manning of 154.
- b. Note 17 requirements do not authorize total onboard furnaces to be less than the ship's COSAL requirement. |

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APPENDIX C

SSBN/SSGN 726 CLASS SUBMARINE SALVAGE INSPECTION
CHECK-OFF LIST

General Information

1. Items pertaining to rescue vehicle seating surfaces and buoy cable angle tests require substantial support equipment and are designated for industrial activity accomplishment.
2. Configuration differences are noted as comments in the reference column.
3. Portions of the Salvage Inspection (as specified by the maintenance activity) may be conducted prior to the start of CNO availabilities as "pre-availability inspections" to support planning of the availability. These items need not be re-inspected provided no work was performed during the availability which affects their status. When specified, these items will be performed by Ship's Force and written certification by the Commanding Officer provided to the maintenance activity, the ISIC, and the Senior Inspecting Officer.
4. **The user is directed to use the most current revision of the PMS maintenance requirement.**

PART I: SALVAGE

INSPECTION TEAM (SSBN/SSGN 726 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>1. <u>Salvage Drawings:</u></p> <p>a. Verify salvage drawings:</p> <p>(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or</p> <p>(2) Latest revision is identified in ship's plan index.</p> <p>(3) Have correct distribution.</p> <p>(4) Are identified as Selected Record Drawings</p> <p>2. <u>High/Low Salvage Connections:</u></p> <p>a. Verify deck touch plate markings are installed and per plan.</p> <p>b. Inspect external valve operating gear for conditions of the salvage valve; i.e., excessive paint, lack of lubrication, distortion, damaged or missing grease boots.</p>	<p>Fleet Modernization Program Management and Operations Manual NAVSEA SL720-AA-MAN-010</p> <p>Ship Dwg. Consolidated Index Number 513 or 845</p> <p>Ship's Plans</p> <p>Note 1</p>				

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INSPECTION TEAM (SSBN/SSGN 726 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>c. Check that each valve is free to operate with the inspecting command's salvage wrench.</p> <p>d. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.</p> <p>e. External salvage system caps:</p> <p>(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.</p> <p>(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.</p> <p>(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.</p> <p>f. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.</p> <p>3. <u>Internal Air Salvage:</u></p> <p>a. Test satisfactory operation of all internal salvage air valves.</p> <p>b. Verify all compartment pressure gages are in calibration as indicated on calibration label.</p> <p>4. <u>Bulkhead Flappers:</u></p> <p>a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.</p> <p>5. <u>Hull Access Hatches (Upper and Lower if installed), Watertight Doors and Torpedo Loading Hatches:</u> Inspection performed by local PMT.</p> <p>a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.</p>	<p>Notes 2 and 3</p> <p>Note 2</p> <p>Note 4</p> <p>Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)</p> <p>Note 5</p> <p>For SSBN use MIP 1671/900MRCs 7BYJ, 7CKQ</p> <p>For SSGN use MIP 1671/901 MRCs 7DEQ, 7DSG, 7DSW</p>				

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

INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	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 4 padeyes installed for rescue vehicle in upper hatch free flood areas (prior to TZ 0840). 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. (After TZ-0840).</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>Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594</p> <p>Ship's Plans Note 9</p> <p>Ship's Plans Note 9</p>								
<p>2. <u>Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:</u></p> <p>a. Escape trunk hatch fairings must be maintained in a condition to be easily disassembled to support submarine rescue. Verify Planned Maintenance has been completed within the required periodicity on all escape trunk hatches. Visually inspect escape trunk hatch fairings for compliance with the specification called out in the Maintenance Standard (MS). Paint fouling or corrosion of fairing fasteners must be immediately corrected. Demonstrate the ability to remove one fastener in each fairing piece required to be removed in the fairing disassembly procedure.</p>	<p>Note 10</p> <p>MS 1670-081-011</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>b. Demonstrate that each access hatch operates satisfactorily with all respects of locking/unlocking, opening/shutting from below/above (with salvage wrench/handwheel as applicable).</p> <p>c. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.</p> <p>(1) Demonstrate satisfactory installation of Improved Powered Hatch Operator with intensifier and compensator as one mode of hatch operation of Logistics Escape Trunks.</p> <p>(a) Verify inventory of all parts.</p> <p>(b) Verify periodic pressure testing of hoses.</p> <p>(c) Verify proper operation of sensing line and trunk gage.</p> <p>(d) Verify assembly of intensifier and gearbox to upper hatch operator.</p> <p>(e) Verify installation of upper hatch operator compensator.</p> <p>(f) Demonstrate satisfactory operational check of intensifier pump and gears.</p> <p>d. Demonstrate satisfactory operation and examine the condition of the following equipment:</p> <p>(1) Vent valves (trunk and compartment).</p> <p>(2) Blow valves (trunk and compartment).</p> <p>(3) Flood and drain valves (including remote operation mechanisms and strainer installations).</p>	<p>MIP 1671/900 or 1671/901 MRC E4PH</p> <p>Ship's Drawing</p> <p>MIP 1671/900 or 1671/901 MRC E4PK</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>(4) Demonstrate satisfactory operation and examine the condition of the following equipment: Conduct Hood Inflation System/Stole Charging Valve operational check to confirm valves operate properly and verify watertight caps installed.</p> <p>(5) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.</p> <p>(6) 31MC installed above waterline.</p> <p>(7) Verify accomplishment of PMS to clear sea pressure sensing lines.</p> <p>e. Verify the following equipment installed:</p> <p>(1) Diver's knife.</p> <p>(2) Ball peen hammer.</p> <p>(3) Persuader (crows foot).</p> <p>f. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.</p> <p>g. Verify gages are in calibration as indicated on calibration label.</p> <p>h. Verify upper watertight hatch cavity drain valve operation is satisfactory.</p> <p>i. Witness satisfactory rigging and operation of escape trunk portable skirt, verify ability to remove the bubble skirt with the upper hatch shut within 5 minutes without the use of tools. (N/A if A&I T0165 has been accomplished.)</p>	<p>MIP 5940/905 MRC 7DKE</p> <p>MIP 5641/9R3 or 5641/9R6 MRCs 9MAW, 9MAX</p> <p>Note 11</p> <p>Note 11</p> <p>NSTM S9086- RK-STM-010 Chapter 505</p> <p>Ship's Plans</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>3. <u>Emergency Communications Equipment:</u></p> <p>a. Inventory allowance of the following equipment and confirm proper stowage as indicated:</p> <p>(1) SEPIRB Model T-1630/SRT (2 FWD, 2 mid, 2 aft with Launch Hardware each compartment).</p> <p>b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.</p> <p>(1) SEPIRB.</p> <p>(2) AN/BQQ-6 Emergency Communications and Distress Beacon Groups.</p> <p>c. Inventory allowance of spare batteries for AN/BQQ-6. Ensure shelf life of batteries has not been exceeded.</p> <p>(1) Check that the AN/BQQ-6 Emergency Communications Group receptacle is marked "61/62/63 Receptacle/Emergency Communications for AN/BQQ-6."</p> <p>4. <u>Life Saving and Safety Equipment:</u></p> <p>a. Inventory allowance (randomly, type and quantity as applicable) and witness satisfactory performance of PMS procedures on the following: (PMS procedures are to be demonstrated on one representative candidate from each of the sub groups listed below).</p> <p>(1) Auto-Inflatable life preservers.</p> <p>(2) Inherently Buoyant life preservers.</p>	<p>Ship Configuration and Logistics Support Information System (SCLSIS) & Consolidated Shipboard Allowance List (COSAL)</p> <p>AEL 7-00000A434</p> <p>MIP 4413/015</p> <p>MIP SO-405/902 or MIP SO-404/901</p> <p>Ship's COSAL Note 12</p> <p>Ship's COSAL Note 13</p> <p>MIP 5832/SUB</p> <p>MIP 5832/030</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
(3) Man overboard bag.	Note 14 MIP 5832/021								
(4) Qualified swimmer designated for man overboard.	Note 15 MILPERS MAN Art. 1414-010 Series								
(5) Safety harness (belts).	MIP 6231/001 MRC 2EA0								
(6) Safety track.	Note 16 MIP 6111/R06								
(7) Distress marker lights.	MIP 5832/010								
(8) Life lines and stanchions.	MIP 6121/SUB								
(9) SEIE Suits.	MIP 5940/005 MRC 9LQX								
(10) Crash Bags.	MIP 5940/005, MRC 1SC3 and AEL 2-330023072								
(11) Guard Book. (Stored in same locker as Crash Bag.)	Latest Revision per AEL 2-330023072								
(12) OP 61-1									
(13) OI 638-3									
(14) OI 638-4									
5. <u>Escape Training:</u> a. Verify that all hands are trained in SEIE escape.									
6. <u>DISSUB 7-Day Survival:</u> a. Portable desalinators (2 FWD, 2 mid & 2 aft) (1) Verify Portable desalinator PMS has been completed within required periodicity.	Note 9 AEL 2-360033003 MIP 5940/003								
b. <u>Atmosphere Control:</u> (1) Inventory quantity onboard and inspect condition of the following:									

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>(a) CO₂ absorbent canisters.</p> <p>Amount onboard for DISSUB: FWD: _____ Mid: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required: _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____</p> <p>(b) DISSUB LiOH Deployment Kits.</p> <p>Amount onboard: FWD: _____ Mid: _____ Aft: _____</p> <p>Required: _____</p> <p>Comment on condition _____</p>	<p>AELs 2-3300230 or 2-3300232 series for LiOH product.</p> <p>NON- DISSUB; (e.g., for CO-H₂ After- filter & DQA</p> <p>Note 17</p> <p>AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.</p> <p>Note 18</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>(c) O₂ candles.</p> <p>Amount onboard for DISSUB: FWD: _____ Mid: _____ Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required: _____</p> <p>Comment on condition and ship's record for DISSUB/NON-DISSUB segregation. _____</p> <p>(d) O₂ candle furnace.</p> <p>Candle furnaces onboard: FWD: _____ Mid: _____ Aft: _____</p> <p>Required: _____</p> <p>Comment on condition (include location - FWD, mid and/or aft compartments). _____</p> <p>(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).</p> <p>(2) Verify CO₂ absorbent canister PMS has been completed within required periodicity. Additionally, randomly select 10% of canisters onboard and weigh them in accordance with the applicable MRC.</p> <p>(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.</p> <p>c. <u>Atmosphere Monitoring:</u></p> <p>(1) Inventory quantity onboard and inspect condition of the following:</p>	<p>AEL 1-230013100</p> <p>NON-DISSUB - (e.g., for O₂ generator or Low Pressure Electrolyzer (LPE)).</p> <p>Note 19</p> <p>Ship's COSAL</p> <p>Note 20</p> <p>Ship's COSAL MIP 5519/600 MRC G8CL</p> <p>MIP 5151/001 MRC B6CW</p>								

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INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
<p>(a) DISSUB O₂/CO₂ Gas Monitors (Analox).</p> <p>Amount onboard (including location)</p> <hr/> <p>Required: (minimum) 1 FWD, 1 mid, 1 aft compartment</p> <p>(2) Verify Analox PMS has been completed within required periodicity.</p> <p>(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.</p> <p>7. <u>Launchers</u>:</p> <p>a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.</p> <p>b. Verify a minimum of six Red Submarine Emergency Identification Signals and Submarine Floating Signal pyrotechnics stowed in compartment with launcher.</p> <p>c. Operational verification shall include a demonstrated launch (water slug) from both remote and local operating stations.</p>	<p>AEL 2-870003101 Stored in same locker as Crash Bag</p> <p>MIP 5940/002 MRC 9TFF</p> <p>NSN 6135-01-538-3507 (4 FWD, 4 mid, 4 aft)</p>								

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NOTES
(SSBN/SSGN 726 CLASS)

1. Reach rods, universal joints, and connecting links in the superstructure should be secured with non-corrosive pins. Inspect valve stems for misalignment and ensure that reach rod connection is one of square socket design with the non-corrosive pin used only to secure the reach rod to the universal.
2. All high/low salvage valves are to be tested for freedom of operation at the frequency specified, except during the salvage inspection conducted incident to an overhaul. Salvage Air valve testing completed up to one year prior to the start of an availability will satisfy the salvage inspection requirements provided that certified records verifying the tests are available. Written certification by the Commanding Officer that specified external salvage valves have been overhauled by the industrial activity or Ship's Force and have been successfully hydrostatically tested will constitute certification that the valve operates freely, providing all inspections (Part I, items 2.b., 2.c., and 2.d. of this Appendix) for each valve so certified are satisfactory. If the results of the inspection of operating gear are not satisfactory, or doubt exists concerning freedom of operation, the specific valves in question shall be checked. Provide appropriate container for collecting anti-freeze drained from salvage piping when hull valve is cycled. Ensure controlled re-assembly in accordance with Quality Assurance requirements is performed when installing salvage caps. Exercise caution to prevent liquid in salvage air piping from impinging on nearby equipment when hull valve is cycled. Ensure anti-freeze is added to piping after inspection to prevent freezing.
3. The inspected ship's, vice the inspecting command's, salvage wrench shall be used if the inspecting command is another submarine. Discrepancies in the actual, versus plan, number of turns which are greater than one full turn shall be noted in addition to the number of actual turns recorded.
4. Discrepancies between physical installation and salvage plans are to be reported to the TYCOM with an information copy to all plan holders.
5. Exercise extreme caution when testing operation of 4500 psi compartment pressurization valves.
6. When inspecting the gagging gear for the inboard ventilation exhaust valve and the inboard ventilation induction valve, the valve linkages shall be inspected and the valves shall be adjusted in accordance with the requirements in the Non-Primary Plant Valves Technical Manual or individual ship's valve drawing.
7. Prior to testing Outboard Diesel Exhaust Valve, ensure replacement locking pin is available onboard.
8. On some designs, operation of the gagging device overrides the regular operating gear of the valve indicator in such a manner that the entire mechanism must be reset/readjusted before the normal operating gear or the valve position indicator will function as intended. If the gagging mechanism is operated or used for any reason, the mechanism shall be reset and the valve subsequently opened and closed by the normal operating gear in every manner in which the gear is designed to function to ensure the valve is in proper operating condition.
9. Unsatisfactory conditions degrade the SRC and/or SRDRS capability and require a CASREP be submitted in accordance with reference (a).
10. One or more of the Logistics and Escape Trunks (LET) will be removed during refit. When removed, the LET is isolated from service air and electric power. Communications circuits, electrical power, and charging manifold tests should be conducted prior to LET removal to ensure piping and electrical system continuity, and tested again upon reinstallation.
11. Diver's knife, timer and ball peen hammer may be stored in secure stowage in escape compartment.
12. Shelf life is computed from date of manufacture which is printed in code on the battery. For example, a battery code "1187" means the battery was manufactured in the 11th month of 1987. For expiration dates, see Naval Supply Systems Command Publication 4105, List of Items Requiring Special Handling.
13. The allowance of escape appliances for submarines with three escape compartments consists of 55 percent of complement in the forward and aft compartments and 110 percent of complement in the midships escape compartment. Complement for distribution shall be based on most stressing operational scenario compartment manning which is typically general quarters for forward/aft and normal underway in the missile compartment. Additionally, 38 non-inflatable life preservers are to be carried for topside use.
14. Man overboard bags to be equipped as specified in Man Overboard Casualty Procedures.
15. Man overboard swimmer to be competent swimmer/qualified diver as designated by Commanding Officer.

16. Safety track inspection shall be performed as specified by MIP 6111/R06 (MRC 3JTK) and applicable ship's drawings.

17. Lithium Hydroxide (LiOH) canister quantity, location, type and use impacts inspection acceptance criteria. The minimum number of LiOH canisters shall be obtained from the ship's COSAL and the below additional requirements:

- a. Canisters reserved for Disabled Submarine (DISSUB) use only:
 - (1) Forward LiOH canisters shall not be less than 273 -SSBN (330 - SSGN) Granular (NSN 6810-00-559-3261).
 - (2) Mid LiOH canisters shall not be less than 325 (358 - SSGN) Granular.
 - (3) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable Ship Systems Manual (SSM) once updated. General guidance is to add four (4) additional Granular LiOH canisters for each additional crew or rider beyond normal crew manning. Additional canisters shall be stowed in the same compartment (FWD, mid or aft) rider would be stationed during normal underway crew at rest (mid) and general quarters (FWD & aft), as applicable.
 - (4) Forward and mid Compartment LiOH canister count reserved for DISSUB shall be either all Granular.
- b. A minimum of 40 Granular LiOH canisters are required onboard to support NON-DISSUB applications and may be stowed forward, mid or aft. There is no minimum number of LiOH canisters required aft.

EXCEPTION: REDUCE TO 30 LIOH CANISTERS FOR CO-H₂ BURNER MAINTENANCE IF DIVER QUALIFIED AIR IS NOT APPLICABLE.

- c. LiOH canisters reserved for DISSUB shall be segregated from NON-DISSUB canisters with quantities and location(s) logged by the crew. Note 17 requirements do not authorize total onboard LiOH canisters reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement.

18. The minimum number of LiOH DISSUB deployment kits shall be obtained from the ship's COSAL and the below additional requirements for granular LiOH canisters reserved for DISSUB use only (if applicable):

- a. A minimum six (6) LiOH curtain kits - SSBN (7 - SSGN) are required to be stowed in the forward compartment.
- b. A minimum seven (7) LiOH curtain kits (8 - SSGN) are required to be stowed in the mid compartment.
- c. Four (4) additional LiOH curtains are required in the forward compartment for crew or riders exceeding normal crew manning of 165 - SSBN (166 - SSGN).

NOTE: EACH KIT CONTAINS 50 CURTAINS WITH DEPLOYMENT HARDWARE. PARTIAL OR OPENED KITS ARE UNSAT.

19. Sodium chlorate oxygen candle quantity and location impacts inspection acceptance criteria. The minimum number of candles shall be obtained from the below requirements:

- a. Oxygen candles reserved for DISSUB use only:
 - (1) Forward candles shall not be less than 116 - SSBN (140 - SSGN) for normal crew manning of 165 - SSBN (166 - SSGN).
 - (2) Mid candles shall not be less than 140 - SSBN (152 - SSGN) for normal crew manning of 165 - SSBN (166 - SSGN).
 - (3) Aft candles shall not be less than six (6) for normal crew manning of 165 - SSBN (166 - SSGN).
 - (4) Any expected crew and/or riders above normal crew manning requires additional DISSUB survivability stores as determined by calculations provided in the applicable SSM once updated. General guidance is to add one and a half (1.5) additional candles for each additional crew or rider beyond normal crew manning. Additional candles shall be stowed in the same compartment (FWD, mid or aft) rider would be stationed during normal underway, crew at rest (mid) and general quarters (FWD & aft), as applicable.

NOTE: STOWAGE OF AN OPENED OR DAMAGED CANDLE OR IGNITER IS UNSAT.

- b. Mission appropriate oxygen candle quantities reserved for NON-DISSUB shall be in excess of quantities reserved for DISSUB. Normal OPs requires a minimum of 10 days of candles, while arctic OPs require a minimum of 20 days. Oxygen candles supporting NON-DISSUB applications may be stowed forward, mid or aft.
- c. Oxygen candles reserved for DISSUB shall be segregated from NON-DISSUB candles with quantities and location(s) logged by the crew. Note 19 requirements authorize total onboard candles reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement if mission and Note 19 requirements are otherwise met.
- d. Oxygen candle igniters shall be of a quantity and location (FWD, mid or aft) that supports onboard candle load-out at least one for one.

20. Oxygen candle furnace quantity and location impacts inspection acceptance criteria. The minimum number of furnaces shall be obtained from the ship's COSAL and the below additional requirements:

- a. Furnaces maintained in clean and fully operating condition are necessary for both DISSUB and NON-DISSUB applications as follows:
 - (1) Oxygen furnaces shall not be less than one (1) in each compartment (FWD, mid and aft) for normal crew manning of 165 - SSBN (166 - SSGN).
 - (2) A second furnace is required forward and/or mid respectively if more than 130 crew and riders are assigned forward or 137 crew and riders assigned mid. An assignment is defined as where crew member and rider would be stationed during normal underway, crew at rest (mid) and general quarters (FWD), as applicable.
- b. Note 20 requirements do not authorize total onboard furnaces to be less than the ship's COSAL requirement.

APPENDIX D
SSN 774 CLASS SUBMARINE SALVAGE INSPECTION
CHECK-OFF LIST

General Information

1. Items pertaining to rescue vehicle seating surfaces and buoy cable angle tests require substantial support equipment and are designated for industrial activity accomplishment.
2. Configuration differences are noted as comments in the reference column.
3. Portions of the Salvage Inspection (as specified by the maintenance activity) may be conducted prior to the start of CNO availabilities as "pre-availability inspections" to support planning of the availability. These items need not be re-inspected provided no work was performed during the availability which affects their status. When specified, these items will be performed by Ship's Force and written certification by the Commanding Officer provided to the maintenance activity, the ISIC, and the Senior Inspecting Officer.
4. **The user is directed to use the most current revision of the PMS maintenance requirement.**

PART I: SALVAGE

INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>1. <u>Salvage Drawings:</u></p> <p>a. Verify salvage drawings:</p> <p>(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or</p> <p>(2) Latest revision is identified in ship's plan index.</p> <p>(3) Have correct distribution.</p> <p>(4) Are identified as Selected Record Drawings</p> <p>2. <u>High/Low Salvage Connections</u></p> <p>a. Verify deck touch plate markings are installed and per plan.</p> <p>b. Check that each valve is free to operate with the inspecting command's salvage wrench.</p> <p>c. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.</p>	<p>Fleet Modernization Program Management and Operations Manual NAVSEA SL720-AA-MAN-010</p> <p>Ship Dwg. Consolidated Index Number 594 or 845</p> <p>Ship's Plans</p> <p>Notes 1 and 2</p> <p>Notes 1 and 16</p>				

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INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<p>d. External salvage system caps:</p> <p>(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.</p> <p>(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.</p> <p>(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.</p> <p>e. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.</p> <p>3. <u>Internal Air Salvage:</u></p> <p>a. Test satisfactory operation of all internal salvage air valves.</p> <p>b. Verify all compartment pressure gages are in calibration as indicated on calibration label.</p> <p>4. <u>Bulkhead Flappers:</u></p> <p>a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.</p> <p>5. <u>Hull Access Hatches, Watertight Doors and Torpedo Loading Hatches:</u> Inspection performed by local PMT.</p> <p>a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.</p> <p>6. <u>External Gagging Devices:</u></p> <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>Note 3</p> <p>Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)</p> <p>Note 4</p> <p>MIP 1671/974, MRCs 7CZF, 7CZG and 7CZH</p> <p>Notes 2, 5, and 6</p>				

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INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
<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>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>				

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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>						

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INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>2. <u>Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:</u></p> <p>a. Escape trunk hatch fairings must be maintained in a condition to be easily disassembled to support submarine rescue. Verify Planned Maintenance has been completed within the required periodicity on all escape trunk hatches. Visually inspect escape trunk hatch fairings for compliance with the specifications called out in MRC G7YM. Paint fouling or corrosion of fairing fasteners must be immediately corrected. Demonstrate the ability to remove one fastener in each fairing piece required to be removed in the fairing disassembly procedure.</p> <p>b. Demonstrate that each access hatch operates satisfactorily with all respects of locking/unlocking, opening/shutting from below/above (with salvage wrench/handwheel as applicable).</p> <p>c. Demonstrate that each access hatch can be opened with 5th percentile swing force operability criteria for surfaced emergency egress.</p> <p>d. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.</p> <p>(1) Demonstrate satisfactory installation of Improved Powered Hatch Operator with intensifier and compensator as one mode of hatch operation of Logistics Escape Trunks.</p> <p>(a) Verify inventory of all parts.</p> <p>(b) Verify periodic pressure testing of hoses.</p> <p>(c) Verify proper operation of sensing line and trunk gate.</p> <p>(d) Verify assembly of intensifier and gearbox to upper hatch operator.</p>	<p>Note 10</p> <p>MIP 1671/974, MRC G7YM</p> <p>MIP 1671/974 MRC E4PH</p> <p>Ship's Drawing</p> <p>MIP 1671/974 MRC E4PK</p>						

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INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(e) Verify installation of upper hatch operator compensator.</p> <p>(f) Demonstrate satisfactory operational check of intensifier pump and gears.</p> <p>e. Demonstrate satisfactory operation and examine the condition of the following equipment:</p> <p>(1) Vent valves (trunk and compartment).</p> <p>(2) Blow valves (trunk and compartment).</p> <p>(3) Flood and drain valves (including remote operation mechanisms and strainer installations).</p> <p>(4) Conduct Hood Inflation System/Stole Charging Valve operational check to confirm valves operate properly. Verify watertight caps installed.</p> <p>(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.</p> <p>(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.</p> <p>(7) 31MC installed above waterline.</p> <p>(8) Verify accomplishment of PMS to clear sea pressure sensing lines.</p> <p>f. Verify the following equipment installed:</p> <p>(1) Diver's knife.</p> <p>(2) Ballpeen hammer.</p> <p>(3) Persuader (crows foot).</p> <p>g. Check Flood Line Orifice Size (orifice size is 1.37" for initial trials only).</p>	<p>MIP 5940/905MRC 7DKE</p> <p>MIP 5641/974 MRCs E2PT and E2PU</p> <p>Note 1 I</p> <p>Note 1 I</p> <p>Installed</p>						

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INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(d) Reinstall the protective cap ensuring proper fit.</p> <p>3. <u>Emergency Communications Equipment:</u></p> <p>a. Inventory allowance of the following equipment and confirm proper stowage as indicated:</p> <p>(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).</p> <p>b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.</p> <p>(1) SEPIRB.</p> <p>4. <u>Life Saving and Safety Equipment:</u></p> <p>a. Inventory allowance (randomly, type and quantity as applicable) and witness satisfactory performance of PMS procedures on the following: (PMS procedures are to be demonstrated on one representative candidate from each of the sub groups listed below).</p> <p>(1) Auto-Inflatable life preservers.</p> <p>(2) Inherently Buoyant life preservers.</p> <p>(3) Man overboard bag.</p> <p>(4) Qualified swimmer designated for man overboard.</p> <p>(5) Safety harness (belts).</p> <p>(6) Safety track.</p> <p>(7) Distress marker lights.</p> <p>(8) Life lines and stanchions.</p> <p>(9) SEIE Suits.</p>	<p>Ship Configuration and Logistics Support Information System (SCLSIS) & COSAL</p> <p>AEL 7-00000A434</p> <p>MIP 4413/015</p> <p>Ship's COSAL Note 12</p> <p>MIP 5832/SUB</p> <p>MIP 5832/030</p> <p>Note 13 MIP 5832/021</p> <p>Note 14 MILPERS MAN Art. 1414-010 Series</p> <p>MIP 6231/001 MRC 2EA0</p> <p>Note 15 MIP 6111/R06</p> <p>MIP 5832/010</p> <p>MIP 6121/SUB</p> <p>MIP 5940/005 MRC 9LQX</p>						

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INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
<p>(10) Crash Bags.</p> <p>(11) Guard Book. (Stored in same locker as Crash Bag.)</p> <p>5. <u>Escape Training</u>:</p> <p>a. Verify that all hands are trained in SEIE escape.</p> <p>6. <u>DISSUB 7-Day Survival</u>:</p> <p>a. <u>Atmosphere Control</u>:</p> <p>(1) Inventory quantity onboard and inspect condition of the following:</p> <p>(a) CO₂ absorbent canisters.</p> <p>Amount onboard for DISSUB:</p> <p>FWD: _____</p> <p>Aft: _____</p> <p>Amount onboard for NON-DISSUB: _____</p> <p>Required: _____</p> <p>Comment on condition and ship's record _____</p> <p>(b) DISSUB LiOH Deployment Kits.</p> <p>Amount onboard:</p> <p>FWD: _____</p> <p>Aft: _____</p> <p>Required: _____</p> <p>Comment on condition _____</p>	<p>MIP 5940/005, MRC 1SC3 and AEL 2-330023072</p> <p>Latest Revision per AEL 2-330023072</p> <p>Note 8</p> <p>AELs 2-3300230 or 2-3300232 series for LiOH product.</p> <p>NON-DISSUB; (e.g., for CO-H₂ After- filter & DQA)</p> <p>Note 17</p> <p>AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.</p> <p>Note 18</p>						

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NOTES
(SSN 774 CLASS)

1. All high/low salvage valves are to be tested for freedom of operation at the frequency specified, except during the salvage inspection conducted incident to an overhaul. Salvage Air valve testing completed up to one year prior to the start of an availability will satisfy the salvage inspection requirements provided that certified records verifying the tests are available. Written certification by the Commanding Officer that specified external salvage valves have been overhauled by the industrial activity or Ship's Force and have been successfully hydrostatically tested will constitute certification that the valve operates freely, providing all inspections (Part I, items 2.b. and 2.c. of this Appendix) for each valve so certified are satisfactory. If the results of the inspection of operating gear are not satisfactory, or doubt exists concerning freedom of operation, the specific valves in question shall be checked. Provide appropriate container for collecting anti-freeze drained from salvage piping when hull valve is cycled. Ensure controlled re-assembly in accordance with Quality Assurance requirements is performed when installing salvage caps. Exercise caution to prevent liquid in salvage air piping from impinging on nearby equipment when hull valve is cycled. Ensure anti-freeze is added to piping after inspection to prevent freezing.
2. The inspected ship's, vice the inspecting command's, salvage wrench shall be used if the inspecting command is another submarine. Discrepancies in the actual, versus plan, number of turns which are greater than one full turn shall be noted in addition to the number of actual turns recorded.
3. Discrepancies between physical installation and salvage plans are to be reported to the TYCOM with an information copy to all plan holders.
4. Exercise extreme caution when testing operation of 4500 psi compartment pressurization valves.
5. When inspecting the gagging gear for the inboard ventilation exhaust valve and the inboard ventilation induction valve, the valve linkages shall be inspected and the valves shall be adjusted in accordance with the requirements in the Non-Primary Plant Valves Technical Manual or individual ship's valve drawing.
6. Prior to testing Outboard Diesel Exhaust Valve, ensure replacement locking pin is available onboard.
7. On some designs, operation of the gagging device overrides the regular operating gear of the valve indicator in such a manner that the entire mechanism must be reset/readjusted before the normal operating gear or the valve position indicator will function as intended. If the gagging mechanism is operated or used for any reason, the mechanism shall be reset and the valve subsequently opened and closed by the normal operating gear in every manner in which the gear is designed to function to ensure the valve is in proper operating condition.
8. Unsatisfactory conditions degrade the SRC and/or SRDRS capability and require a CASREP be submitted in accordance with reference (a).
9. Shelf life is computed from date of manufacture which is printed in code on the battery. For example, a battery code "1187" means the battery was manufactured in the 11th month of 1987. For expiration dates, see Naval Supply Systems Command Publication 4105, List of Items Requiring Special Handling.
10. One or more of the Logistics and Escape Trunks (LET) will be removed during refit. When removed, the LET is isolated from service air and electric power. Communications circuits, electrical power, and charging manifold tests should be conducted prior to LET removal to ensure piping and electrical system continuity, and tested again upon reinstallation.
11. Diver's knife and ballpeen hammer may be stored in secure stowage in escape compartment.
12. The allowance of escape appliances for submarines with two escape compartments consists of 110 percent of complement in each compartment. Complement for distribution shall be based on most stressing operational scenario compartment manning which is typically normal underway forward and general quarters in the aft compartment. Additionally, 20 non-inflatable life preservers are to be carried for topside use.
13. Man overboard bags to be equipped as specified in Man Overboard Casualty Procedures.
14. Man overboard swimmer to be competent swimmer/qualified diver as designated by Commanding Officer.
15. Safety track inspections shall be performed as specified by MIP 6111/R06 (MRC 3JTK) and applicable ship's drawings.
16. "J" pressure and/or seat tightness testing is not required for new construction ships.

17. Lithium Hydroxide (LiOH) canister quantity, location, type and use impacts inspection acceptance criteria. The minimum number of LiOH canisters shall be obtained from the ship's COSAL and the below additional requirements:

- a. Canisters reserved for Disabled Submarine (DISSUB) use only. Prior to Ship Alt SSN4558K completion on SSN 774 - 781, these boats will maintain at least 5-day onboard survivability provisions. After Ship Alt SSN4558K completion, these boats will maintain at least 7-day onboard survivability provisions. SSN 782 and later boats shall be constructed with 7-day onboard survivability provisions.
 - (1) For SSN 774 - 781 prior to Ship Alt SSN4558K, forward LiOH canisters shall not be less than 257 Granular (NSN 6810-00-559-3261) or not less than 166 ExtendAir® (NSN 6810-01-560-3015) for normal crew manning of 132 onboard under the following assigned stations: 120 FWD (Condition: Normal underway) and 15 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.
 - (2) For SSN 774 - 781 after Ship Alt SSN4558K completion and boats after SSN 781, forward LiOH canisters shall not be less than 293 ExtendAir®. This provisioning requirement supports crew and Direct Support Element (DSE) riders up to a maximum of 149 onboard personnel under the following assigned stations: 141 FWD (Condition: Normal underway) and 16 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.
 - (3) Any expected crew and/or riders exceeding above paragraphs (1) and (2) manning, requires additional DISSUB survivability stores as determined by calculations provided in the applicable Ship Systems Manual (SSM) once updated. General guidance is to add four (4) additional Granular LiOH canisters or three (3) ExtendAir® LiOH canisters for each additional crew or rider that exceeds above paragraphs (1) and (2) manning, as applicable. Additional canisters shall be stowed in the same compartment (FWD or aft) rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.
 - (4) Forward LiOH canister count reserved for DISSUB shall be either all Granular or all ExtendAir® canisters - no mix.
- b. A minimum of 40 Granular LiOH canisters are required onboard to support NON-DISSUB applications and may be stowed forward or aft. There is no minimum number of LiOH canisters required aft.

EXCEPTION(S): REDUCE TO 30 LIOH CANISTERS FOR CO-H₂ BURNER MAINTENANCE IF DIVER QUALIFIED AIR IS NOT APPLICABLE. FOR SALVAGE INSPECTIONS SUPPORTING SEA TRIALS ONLY: ANY AND ALL ONBOARD LIOH NORMALLY SUPPORTING NON-DISSUB AND NOT SCHEDULED FOR USE DURING SEA TRIALS, MAY BE RE-DESIGNATED/RESERVED FOR DISSUB USE.

- c. LiOH canisters reserved for DISSUB shall be segregated from NON-DISSUB canisters with quantities and location(s) logged by the crew. Note 17 requirements do not authorize total onboard LiOH canisters reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement.

18. The minimum number of LiOH DISSUB deployment kits shall be obtained from the ship's COSAL and the below additional requirements:

- a. For granular LiOH canisters reserved for DISSUB use only (if applicable):
 - (1) For SSN 774 - 781 prior to Ship Alt SSN4558K, forward LiOH curtain kits shall not be less than six (6) for normal crew manning of 132 onboard under the following assigned stations: 120 FWD (Condition: Normal underway) and 15 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.

NOTE: A SPARE LIOH CURTAIN KIT IS ALSO STOWED AFT ON THESE BOATS.

- (2) For SSN 774 - 781 prior to Ship Alt SSN4558K, any expected crew and/or riders exceeding above paragraph (1) manning, requires additional DISSUB survivability stores as determined by calculations provided in the applicable SSM once updated. General guidance is to add four (4) additional LiOH curtains for each additional crew or rider that exceeds paragraph (1) manning. LiOH curtain kits

containing these additional curtains shall be stowed in the same compartment (FWD or aft) rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable. Relocate DISSUB stores accordingly if assigned stations requires otherwise.

NOTE: EACH KIT CONTAINS 50 CURTAINS WITH DEPLOYMENT HARDWARE. PARTIAL OR OPENED KITS ARE UNSAT.

(3) For SSN 774 - 781 after Ship Alt SSN4558K completion and boats after SSN 781, LiOH curtain kits are not applicable. See Note 18b for appropriate DISSUB CO₂ scrubbing assets.

b. For ExtendAir® LiOH canisters reserved for DISSUB use only (if applicable):

(1) For SSN 774 - 781 prior to Ship Alt SSN4558K, forward ExtendAir® DISSUB Deployment kits (NSN 4460-01-560-1105) shall not be less than three (3) for normal crew manning of 132 onboard under the following assigned stations: 120 FWD (Condition: Normal underway) and 15 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.

(2) For SSN 774 - 781 after Ship Alt SSN4558K completion and boats after SSN 781, forward ExtendAir® DISSUB Deployment kits shall not be less than six (6). This provisioning requirement will support up to 360 onboard ExtendAir® LiOH canisters located forward.

(3) A minimum of one (1) ExtendAir® DISSUB Deployment kit is required to be stowed in the forward or aft compartment for each multiple of 60 ExtendAir® LiOH canisters onboard in those locations (FWD and aft).

19. Sodium chlorate oxygen candle quantity and location impacts inspection acceptance criteria. The minimum number of candles shall be obtained from the below requirements:

a. Oxygen candles reserved for DISSUB use only:

(1) For SSN 774 - 781 prior to Ship Alt SSN4558K, forward candles shall not be less than 108 for normal crew manning of 132 onboard under the following assigned stations: 120 FWD (Condition: Normal underway) and 15 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.

(2) For SSN 774 - 781 after Ship Alt SSN4558K completion and boats after SSN 781, forward candles shall not be less than 189. This provisioning requirement supports crew and DSE riders up to a maximum of 149 onboard personnel under the following assigned stations: 141 FWD (Condition: Normal underway) and 16 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.

(3) Aft candles shall not be less than 10 for manning including DSE riders up to a maximum of 149 onboard personnel under the following assigned stations: 141 FWD (Condition: Normal underway) and 16 aft (Condition: General quarters). Relocate DISSUB stores accordingly if assigned stations requires otherwise.

(4) Any expected crew and/or riders exceeding above paragraphs (1), (2) and (3) manning, requires additional DISSUB survivability stores as determined by calculations provided in the applicable SSM once updated. General guidance is to add one and a half (1.5) additional candles for each additional crew or rider that exceeds above paragraphs (1), (2) and (3) manning, as applicable. Additional candles shall be stowed in the same compartment (FWD or aft) the rider would be stationed during normal underway (FWD) and general quarters (aft), as applicable.

NOTE: STOWAGE OF AN OPENED OR DAMAGED CANDLE OR IGNITER IS UNSAT.

b. Mission appropriate oxygen candle quantities reserved for NON-DISSUB shall be in excess of quantities reserved for DISSUB. Normal OPs requires a minimum of 10 days of candles, while arctic OPs require a minimum of 20 days. Oxygen candles supporting NON-DISSUB applications may be stowed forward or aft.

EXCEPTION: FOR SALVAGE INSPECTIONS SUPPORTING SEA TRIALS ONLY: ANY AND ALL ONBOARD OXYGEN CANDLES NORMALLY SUPPORTING NON-DISSUB AND NOT SCHEDULED FOR USE DURING SEA TRIALS, MAY BE RE-DESIGNATED/ RESERVED FOR DISSUB USE.

- c. Oxygen candles reserved for DISSUB shall be segregated from NON-DISSUB candles with quantities and location(s) logged by the crew. Note 19 requirements authorize total onboard candles reserved for DISSUB and NON-DISSUB to be less than the ship's COSAL requirement if mission and Note 19 requirements are otherwise met.
 - d. Oxygen candle igniters shall be of a quantity and location (FWD or aft) that supports onboard candle load-out at least one for one.
20. Oxygen candle furnace quantity and location impacts inspection acceptance criteria. The minimum number of furnaces shall be obtained from the ship's COSAL and the below additional requirements:
- a. Furnaces maintained in clean and fully operating condition are necessary for both DISSUB and NON-DISSUB applications as follows:
 - (1) For SSN 774 - 781 prior to Ship Alt SSN4558K, forward furnaces shall not be less than one (1) for normal crew manning of 132 onboard under the following assigned stations: 120 FWD (Condition: Normal underway) and 15 aft (Condition: General quarters). A second furnace is required forward if more than 127 crew and/or riders shall be forward during normal underway.
 - (2) For SSN 774 -781 after Ship Alt SSN4558K completion and boats after SSN 781, forward furnaces shall not be less than two (2). This provisioning requirement supports crew and DSE riders up to a maximum of 149 onboard personnel under the following assigned stations: 141 FWD (Condition: Normal underway) and 16 aft (Condition: General quarters).
 - (3) Aft furnaces shall not be less than one (1) for manning including DSE riders up to a maximum of 149 onboard personnel under the following assigned stations: 141 FWD (Condition: Normal underway) and 16 aft (Condition: General quarters).
 - b. Note 20 requirements do not authorize total onboard furnaces to be less than the ship's COSAL requirement.

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APPENDIX E

SAMPLE PRE-INSPECTION INFORMATION/CERTIFICATION

From: Commanding Officer, USS (Ship's Name and Hull No.)
 To: Senior Inspecting Officer
 Subj: SUBMARINE SALVAGE INSPECTION OF USS (Ship's Name and Hull No.)
 Ref: (a) COMUSFLTFORCOMINST 4790.3; Joint Fleet Maintenance Manual, Volume IV, Chapter 18
 Encl: (1) SSN 688 Class Submarine Salvage Inspection Check-Off List

1. The overall responsibility for the coordination and assembly of reference plans and publications in support of our submarine salvage inspections is assigned to (preferably the XO, 1st Lt, or Weapons Officer). Our Topside Coordinator is (Name), and our Below Decks Coordinator is (Name).
2. The following information/certification is presented in accordance with reference (a): _____.

Reference:	Inspected Item:	Certification of Ship's Representative:
(a) Encl (1), Part I, para. 2	<u>High and Low Salvage Connections.</u> External Salvage Valves have been overhauled & seat tightness tested.	Date: _____ Tested by: _____ (Overhauling Activity)
(b) Encl (1), Part I, para. 3.b., Part II, para. 2.i.	<u>Gages</u> have been tested or calibrated within the past 12 months. (list any discrepancies in para. 3)	_____ Ship's Force Representative
(c) Encl (1), Part I, para. 6.	<u>External Gagging Devices.</u> Valves will be lined up & reset by:	_____ Qualified Eng. Petty Officer
(d) Encl (1), Part II, para. 1.	<u>SRC/SRDRS.</u> Flatness Test applicability for this scheduled inspection. Submitted for review and verification.	_____ Yes, if applicable
(e) Encl (1), Part II, para. 2.	Escape Trunks. Ship's representative for escape trunk will be:	_____ Ship's Representative
(f) Encl (1), Part II, para. 3.	<u>Emergency Communications Equipment</u> Operational and stowed with the following exceptions:	_____ Yes, or list exceptions in paragraph 2.

Reference:	Inspected Item:	Certification of Ship's Representative:	
(g) Encl (1), Part II, para. 4.	<u>Life Saving & Safety Equipment PMS</u> procedures last conducted on: (List discrepancies in paragraph 3.)	_____	
		Date	
	Inventories are as follows:	Amount on Board	Required (COSAL)
	Number of escape or SEIE valises.	_____	_____
	Location	_____	_____
		(Forward/Aft)	
		Amount on Board	Required (COSAL)
	Inflatable life preservers	_____	_____
	Number of non-inflatable life preservers	_____	_____
		Amount on Board	Required (COSAL)
	Life Rafts (if applicable)	_____	_____
	Number of safety harnesses	_____	_____
	Distress Marker Lights	_____	_____

NOTE: MUST CONFORM TO CURRENT PMS SCHEDULE.

(h) Encl (1), Part II, para. 5.	<u>Escape Training.</u> All hands are qualified in SEIE escape.	_____	
		Yes, or list discrepancies in paragraph 3.	

Reference:	Inspected Item:	Certification of Ship's Representative:
(i) Encl (1), Part II, para. 6.	<u>DISSUB 7-Day Survival</u>	_____
	a. Portable desalinators (Required: 2 FWD and 2 aft):	Amount
	b. Atmosphere Control. The following amount of absorbent is aboard:	_____
		Type and Amount
	The allowance is:	_____
		Amount
	O ₂ candles applicable	_____
		Yes or No
	The following number of O ₂ candles are onboard:	_____
		Number or N/A
(j) Encl (1), Part II, para. 7.		_____
	c. Atmosphere Monitoring DISSUB O ₂ /CO ₂ Gas Monitors (Analox - Required: 1 FWD and 1 aft):	Amount
	<u>Signal Ejector/Launcher</u> operation and Red Submarine Emergency Identification Signal inventory will be accomplished by:	_____
		Ship's Representative
	Signal Ejector/launcher operation cannot be demonstrated as muzzle is above waterline or ship is in dry-dock. The signal ejector was last operated on:	_____
	(Date)	

NOTE: IF EJECTOR WAS NOT OPERATED IN PAST THIRTY DAYS, OPERATION MUST BE DEMONSTRATED BY FLOODING THROUGH MUZZLE WITH FIRE HOSE.

3. Discrepancies.

- a. Discrepancies are as follows:
- b. The following items were not inspected for the reasons given and a waiver is requested:

<u>Nomenclature</u>	<u>Paragraph</u>	<u>Reason</u>
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Commanding Officer
(or By Direction Authority)

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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 799, 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.

- (6) Shutdown.
- (7) Placement in a static condition and restarted.
- (8) Shutdown and purge complete.

21.2.3 Commanding Officer.

- a. Report reduced status in accordance with established procedures any time the personnel requirements stated in paragraphs 21.1.1.c and 21.1.1.e of this chapter cannot be met.
- b. Implement and execute a shipboard training program to qualify and maintain oxygen generator personnel qualifications.
- c. Prohibit operation of the oxygen generators if shipboard procedures are not in compliance with this chapter and reference (a), (b), (c) or (d), as required.
- d. Ensure the Oxygen Generator Material Maintenance Log is maintained and correctly reflects **all** corrective and planned maintenance performed.
- e. Ensure periodic reviews of the Oxygen Generator Material Maintenance Logs are conducted by the Division Leading Petty Officer, Division Officer and Engineer Officer.
- f. Ensure all safety related deficiencies are promptly entered into the Equipment Status Log.
- g. Prior to a CNO Maintenance Availability, ensure the PMT conducts a material inspection of the oxygen generators. Ensure oxygen generators are placed into Lay Up and adequately protected in accordance with Inactive Equipment Maintenance requirements.
- h. Ensure PMT conducts a Post-CNO Maintenance Availability material inspection prior to placing the oxygen generators in electrolysis.
- i. Ensure the PMT conducts an operational inspection in accordance with paragraph 21.2.2.e of this chapter prior to commencing Fast Cruise during a CNO Maintenance Availability. Oxygen generators will be operated by Ship's Force qualified operators as described in paragraph 21.1.1 of this chapter. The oxygen generators will be in a static shutdown condition, pressurized with nitrogen and meet the 3000 PSIG testing requirements of reference (a), (b), (c) or (d), as required.
- j. Ensure electrolysis is secured and units are placed in a safe condition prior to commencing any training drill which may cause a "loss of power" casualty (either normal or alternate power). If the oxygen generators are to be placed in a static condition for the duration of the training drill, ensure normal power will be restored to restart electrolysis, or alternate power will be available to conduct a complete purge, prior to the expiration of the 45 minute hold limitations of reference (a), (b), (c) or (d), as required.

21.3 REQUIREMENTS FOR SHIPBOARD PERSONNEL QUALIFICATION.

21.3.1 Training. Oxygen generator operators and maintenance technicians must be graduates of the training courses required for the appropriate NEC in accordance with the requirements of reference (e).

NOTE: PERSONNEL QUALIFIED TO PERFORM MAINTENANCE ON THE OXYGEN GENERATOR MUST ALSO BE GRADUATES OF OXYGEN CLEAN WORKER SCHOOL (EXCEPT SUBMARINES WITH LPEs AND ILPEs).

- a. The NECs required for EOG installations:
 - (1) NEC 4252: An individual certified to this NEC will have successfully completed EOG Operator/Maintenance Course A-852-0050.
 - (2) NEC 4752: An individual certified to this NEC will have successfully completed EOG Operator/Technician Course A-623-0039.
- b. The NECs required for AEOG installations:
 - (1) NEC 4208: An individual certified to this NEC will have successfully completed AEOG Operation and Mechanical Maintenance Course A-652-0087.

- (2) NEC 4708: An individual certified to this NEC will have successfully completed AEOG Electrical/Electronic Maintenance Course A-623-0008.
- c. The NECs required for LPE installations:
 - (1) NEC 4253: An individual certified to this NEC will have successfully completed LPE Operation and Mechanical Maintenance Course A-652-0190.
 - (2) NEC 4653: An individual certified to this NEC will have successfully completed LPE Electrical/Electronic Maintenance Course A-623-0050.
- d. The NECs and/or course completion required for ILPE installations:
 - (1) An individual certified by either holding NEC 4234 and/or successful completion of ILPE Operation and Mechanical Maintenance Course A-652-0093.
 - (2) NEC 4641: An individual certified to this NEC will have successfully completed ILPE Electrical/Electronic Maintenance Course A-623-0132.

21.3.2 Watchstanding Prerequisites. Prior to being certified as qualified for oxygen generator watches the following watchstander prerequisites must be met:

- a. For 6L16 NEC 4252: Stand watches, under instruction, for a minimum of three (3) six (6) hour watches underway, with the oxygen generator(s) in operation.
- b. For 6L16 NEC 4752: Stand watches, under instruction, for a minimum of one (1) start-up, one (1) shutdown and purge, and one (1) three (3) hour watch underway with the oxygen generator(s) in operation. For technicians, this is a familiarization watch only; technicians qualifying as operators, are governed by paragraph 21.3.2.a of this chapter.
- c. For AEOG NEC 4208: Stand watches, under instruction, for a minimum of three (3) six (6) hour watches underway with the oxygen generator(s) in operation.
- d. For AEOG NEC 4708: Stand watches, under instruction, for a minimum of one (1) start-up, one (1) shutdown and purge, and one (1) three (3) hour watch underway with the oxygen generator(s) in operation. For technicians, this is a familiarization watch only; technicians qualifying as operators are governed by paragraph 21.3.2c of this chapter.
- e. For LPE NEC 4253: Stand watches, under instruction, for a minimum of three (3) six (6) hour watches underway with the oxygen generator(s) in operation.
- f. For LPE NEC 4653: Stand watches, under instruction, for a minimum of one (1) start-up, one (1) shutdown and purge, and one (1) three (3) hour watch underway with the oxygen generator(s) in operation. For technicians, this is a familiarization watch only; technicians qualifying as operators are governed by paragraph 21.3.2e of this chapter.
- g. For ILPE NEC 4234 and/or successful completion of course A-652-0093: Stand watches, under instruction, for a minimum of three (3) six (6) hour watches underway with the oxygen generator(s) in operation.
- h. For ILPE NEC 4641: Stand watches, under instruction, for a minimum of one (1) start-up, one (1) shutdown and purge, and one (1) three (3) hour watch underway with the oxygen generator(s) in operation. For technicians, this is a familiarization watch only; technicians qualifying as operators are governed by paragraph 21.3.2g of this chapter.
- i. Demonstrate an understanding of the approved NAVSEA Oxygen Generator Log Sheets, including the significance of data recorded and operational limits.
- j. Demonstrate a knowledge of corrective action(s) to be taken in the event of sudden changes in equipment operating parameters.
- k. Successfully complete qualifications for the oxygen generator and support systems in accordance with references (f) through (j).

VOLUME IV
CHAPTER 22
SUBMARINE ANTENNA TESTING

REFERENCES.

- (a) NAVSEA S9425-CG-STD-010 - Installation Standards for Submarines

22.1 **PURPOSE.** To provide Type Commander policy with respect to pressure testing submarine communication antennas and Photonics systems. This policy is not applicable to periscopes, radar antennas and other non-communication masts and cabling. Amplifying information is contained in reference (a).

22.2 **BACKGROUND.** Submarine antenna and Photonics systems associated cable connections between the antenna and electrical hull fitting are sensitive to seawater intrusion. In the event that seawater enters an electrical hull fitting, radome or other powered component and the system is subsequently powered-on or used for transmission, significant component damage may occur.

22.3 **POLICY.**22.3.1 **Hydrostatic Pressure Testing.**

- a. Hydrostatic pressure testing of submarine antennas with cables attached prior to initial installation is mandatory except for buoys and floating wires. This pre-installation test is intended solely to verify the correctness of the final assembly and does not equal or replace the more elaborate acceptance testing required for various individual manufactured components. **Submarine communications antennas that are required to be hydrostatic pressure tested are:**
- (1) Multifunction Masts, OE-538 (SSNs) and OE-592 (SSBNs/SSGNs).
 - (2) Submarine High Data Rate Mast, OE-562 (SubHDR).
- b. **Buoys that are excluded are:**
- (1) Submarine Launched One-Way Tactical (SLOT) Buoys (AN/BRT-1 and AN/BRT-1A).
 - (2) Submarine Emergency Position Indicating Radio Beacon (SEPIRB) Buoy (T-1630/SRT).
- c. **Floating wires that are excluded are the Buoyant Cable Antenna (AS-3434B(V)3/BRC).**

NOTE: THE TOWED BUOY ANTENNA, AN/BRR-6 (SSBN 730 - 738) AND THE AN/BRR-6B (SSBN 739 - 743) WILL BE HYDROSTATIC TESTED BEFORE INSTALLATION ACCORDING TO THE MAINTENANCE MANUAL.

22.3.2 **Fleet Maintenance.** Maintenance actions conducted by Fleet Maintenance Activities or Ship's Force regarding the watertight integrity test requirements between submarine antennas and their respective hull connectors, shall be as follows:

- a. When the antenna or cable is disconnected or replaced shipboard, the Technical Work Document will include the checks below in the assembly procedure to reconnect the cable to the base of the antenna and/or electrical hull fitting:
- (1) Craftsman verification that surface finishes of O-ring seating surfaces are in accordance with applicable specifications.
 - (2) Craftsman verification that the O-ring is properly installed and in accordance with applicable specifications.
 - (3) For submarine SubHDR and Photonics systems outboard cable removal and replacement, accomplish in accordance with Volume V, Part I, Chapter 7, Appendix B, NOTE 31 of this manual.

- b. **Prior to performing a deep dive certification after a maintenance action, passive and/or pre-energize testing shall be performed in accordance with the system specific Technical Manual, SUBMEPP approved Maintenance Standard, SUBMEPP approved Standard Test Procedure or Maintenance Requirement Card (MRC) to ensure the system is not grounded prior to use.**
- c. **Upon completion of a deep dive certification for a maintenance action, passive and/or pre-energize testing shall be performed in accordance with the system specific Technical Manual, SUBMEPP approved Maintenance Standard, SUBMEPP approved Standard Test Procedure or MRC to ensure the system is not grounded prior to use.**

22.4 PROCEDURE.

- a. **Upon completion of maintenance and before underway for submerged operations, the ship shall place CAUTION tags on the Main Power Switch or transmit keys for the affected antennas. The Amplifying Instructions for the CAUTION tags will state - “DO NOT OPERATE/TRANSMIT ON THIS ANTENNA UNTIL COMPLETION OF PASSIVE CHECKS FOLLOWING A DIVE TO TEST DEPTH. PASSIVE CHECKS MUST BE PERFORMED PRIOR TO EACH USE UNTIL THE DEEP DIVE IS COMPLETE.”**
- b. **It is understood that in some cases, due to water depth restrictions, the deep dive may not be performed for quite some time. In these cases, the ship should dive to the maximum depth possible and conduct passive checks. Provided the checks are satisfactory, the CAUTION tag may be replaced with one stating - “DO NOT OPERATE/TRANSMIT ON THIS ANTENNA FOLLOWING OPERATIONS GREATER THAN (enter max depth obtained). PASSIVE CHECKS MUST BE PERFORMED PRIOR TO EACH USE UNTIL THE DEEP DIVE IS COMPLETED.”**
- c. **The tag(s) may be removed following completion of a deep dive to test depth and completion of satisfactory passive testing performed in accordance with the system specific technical manuals or Maintenance Index Pages/MRCs to ensure the system is not grounded.**

23.4 REQUESTING PROCEDURES.

- a. Gas turbine inspections are to be scheduled by the ship in accordance with PMS, GTBs or ISIC/TYCOM directives.
- b. Requests for scheduling of routine inspections shall be submitted utilizing Automated Work Requests with primary and alternate dates provided. Inspections normally take three to seven working days to complete. Requests for non-routine inspections may be submitted by naval message, Automated Work Request, or telephone, as the situation requires, to the ISIC or TYCOM.
- c. Scheduling requests should be submitted a minimum of 60 days prior to the desired dates of routine inspections.
- d. Gas turbine inspections may be conducted in conjunction with assessment programs scheduled by the ISIC or TYCOM.

23.5 PREPARATION FOR INSPECTION. The MGTI shall send out a preparation package 30 days prior to the inspection.

23.6 INSPECTION PROCEDURES.

23.6.1 Post Casualty Inspections. For post casualty inspections, the Commanding Officer, Engineer Officer, Main Propulsion Assistant (MPA) and leading Gas Turbine Technician (GS) should meet with the inspector on his arrival and, where possible, the Engineer Officer, MPA and leading GS should accompany the MGTI during the inspection.

23.6.2 Pre-Availability Inspections. For pre-availability inspections, pre-deployment inspections, GTRR and Assessments, the MPA and the leading GS should meet and where possible, accompany the MGTI during the inspection.

23.7 INSPECTION CRITERIA. Deficiencies and out-of-specification readings or observances noted should be immediately corrected or recorded as specified in the applicable bulletin(s) and reinspections scheduled. Three categories of deficiencies shall be recorded as follows:

23.7.1 Repair Before Operating. A Repair Before Operating (RBO) is any condition existing that if left unattended, would definitely pose a hazard to personnel safety. Only a MGTI that is currently certified may issue a RBO. RBO deficiencies require reinspection by a MGTI that is currently certified after repairs and before the gas turbine engine is operated. DFS will not be approved for RBOs. If there is not an immediate or near future danger to personnel, the discrepancy shall be assigned as SEVERELY DEGRADED with major operational restrictions. Any condition which is designated as SEVERELY DEGRADED and is considered for a DFS submission, is a Major DFS and must be brought to the attention of the NAVSEA Gas Turbine Technical Warrant. A Major DFS must be forwarded for NAVSEA review and approval with accompanying engineering analysis recommendations from the originator. A gas turbine with a SEVERELY DEGRADED condition cannot be operated until it is corrected/repared and reinspected unless it has been properly approved as a Major DFS. The following items are examples of RBO items and **are not to be construed as a complete list.**

- a. Conditions existing that if left uncorrected would definitely result in an uncontained failure of the engine.
- b. Lube oil leaks that exceed maximum limits in GGTB 17.
- c. Exhaust duct crack(s) that may allow exhaust leaks into ship compartments.
- d. Fuel Oil leaks that pose risk of ignition.
- e. Loss of structural integrity in intake or exhaust ducts which may result in personnel injury.

23.7.2 Major Deficiencies. Conditions exist that if left unattended would result in significant damage to equipment. **A Major DFS must be submitted for continued operation and discrepancies must be entered in CSMP and scheduled for correction at earliest opportunity.** The following items are examples of major items and are not to be construed as a complete list.

- a. Bent/broken/binding VSV vane actuation arms.
- b. Improperly rigged or worn VSVs and bushings.

- c. Chafed fuel oil or lube oil lines. (Beyond serviceable limits of GGTB 6)
- d. Stall (tip clang)
- e. Bent or damaged blades.
- f. Loose/missing casing split line bolts.
- g. GTB inspection periodicity/time limits exceeded.
- h. Combustor liner out of specifications.
- i. Eroded turbine section beyond serviceable limits.
- j. Vertical and/or side mount out of specifications.
- k. Fuel nozzles not maintained in accordance with PMS.
- l. Broken cannon plugs.
- m. Foreign Object Damage screen with cracks or missing wires that are beyond serviceable limits.

23.7.3 Minor Deficiencies.

- a. Deficiencies exist which do not adversely effect reliability, performance or safety of the engine or operating personnel. These deficiencies, if not corrected, could result in gradual deterioration of the engine, reduced efficiency and eventually major repairs.
- b. Gas turbine engine can be operated with no restrictions. Discrepancies shall be entered in the CSMP and scheduled for correction at earliest opportunity.

23.8 INSPECTION RESULTS. Upon completion of inspections, the MGTI will brief the Commanding Officer, Engineer Officer, MPA and senior GS of the results. Provide information for inclusion into the ships CSMP.

- a. Any RBO will be noted in Block 35 of the OPNAV 4790/2K.
- b. The engine cannot be started until RBO repairs are complete and re-inspected by an MGTI.
- c. A formal GTRR report shall be submitted to the TYCOM Code N434 via the Navy Propulsion website (<https://propulsion.navsses.navy.mil>). All Gas Turbine GTRR reporting to be in compliance with the latest revision of reference (b).

- c. Assist Commanding Officers in arranging for the corrective action of deficient items which are beyond the capability of Ship's Force to perform. Monitor the follow-up action to correct these deficiencies.
- d. Review the RIRMIS to ensure deferred inspection deficiencies are entered into the Current Ships Maintenance Project (CSMP), and are planned/programmed for repair.

27.3.4 Regional Maintenance Center Commanding Officer. Provide certified SGPIs to perform inspections per paragraph 27.6.1 of this chapter.

27.3.5 Ship's Commanding Officer.

- a. Request inspections via Naval Message with desired primary and alternate dates to the Type Commander (TYCOM) with info copies to cognizant Regional Maintenance Center (RMC) and NSWCCD for accomplishment of inspections using the format in Appendix A.
- b. Prepare for the scheduled inspections.
- c. Conduct Ship's Force responsible (Annual) inspections as required by references (a) and (b).
- d. Review inspection results and initiate corrective action for those deficiencies within Ship's Force capability. Initiate requests for those actions beyond Ship's Force capability and those items that are identified as being deferred. Submit a Casualty Report in accordance with reference (d) for any discrepancies that will impact operational schedule.
- e. Assess the impact of corrective actions on the ship's operating schedules and advise the TYCOM and operational commanders of any adverse effects.
- f. Submit reports per paragraph 27.7.2 of this chapter.

27.3.6 Regional Maintenance Center Senior Inspector. RMC Senior inspectors shall:

- a. Ensure all assigned SGPIs maintain current SGPI certificates per reference (b).
- b. Perform Steam Reboiler inspections per references (a) and (b).
- c. Review and submit reports per paragraph 27.7.2 of this chapter.
- d. Coordinate inspections in cognizant maintenance areas.
- e. Send inspection confirmation message using Appendix B of this chapter.
- f. Maintain an up to date list of required Steam Reboiler inspections which shall include the latest inspections for all ships assigned to their geographic area of responsibility.

27.3.7 Steam Generating Plant Inspector.

- a. Maintain certification per the requirements of reference (b).
- b. Perform inspections in accordance with the requirements of references (a) and (b) assigned.

27.4 INSPECTION SCHEDULING. Commands will initiate inspection requests to assist with inspection coordination. Commands shall ensure that the inspection scheduling complies with reference (b) and Commanding Officers shall request Steam Reboiler inspections by message using the format in Appendix A. In addition, an OPNAV 4790/2K shall be submitted to the RMC requesting a certified SGPI/NSWCCD-LCEM inspector as required to conduct inspections.

27.5 SAFETY PROCEDURES.

- a. Ensure idle Steam Reboiler condition is accomplished in accordance with the provisions of the Steam Plant Manual and reference (a) in preparation for the inspection.
- b. Ensure all safety precautions associated with entry into sealed tanks, voids and/or pressure vessels including gas-free certification are performed in accordance with the requirements of references (e), (f), and Chapter 23 of this volume.
- c. Ensure proper maintenance barriers are established per the requirements of Chapter 10 of this volume.

- d. Station an attendant outside the Steam Reboiler to provide assistance when maintenance and inspections are performed on the Steam Reboiler internals.
- e. Ensure all precautions and warnings cited in Chapter 5 of reference (a) are followed when conducting maintenance and inspections.
- f. Maintain accountability of all items taken into the Steam Reboiler. Foreign material exclusion enclosures will be used to the maximum extent practical to prevent tools or other foreign materials from being inadvertently left in the Steam Reboiler or associated ship's systems.
 - (1) Personnel entering Steam Reboilers will empty their pockets of all unnecessary items.
 - (2) Removal of all items and foreign material exclusion enclosures from the Steam Reboiler will be verified and accounted for prior to conducting a final close-out inspection.
 - (3) Final close-out inspection of the Steam Reboiler shall be accomplished by the Reactor Officer or his designated assistant.

27.6 STEAM REBOILER INSPECTIONS AND REQUIREMENTS. Steam Reboiler inspections conducted in accordance with references (a) and (b) shall fulfill all other Steam Reboiler inspection requirements. All boiler inspections, including pre- and post-operational assessments, should be scheduled for coincidental performance.

27.6.1 Eddy Current Inspection. Eddy Current Inspection (ECI) shall be accomplished at Post Shakedown Availability and every 32 months, in accordance with reference (g).

- a. The ECI will be scheduled by Planned Maintenance System (PMS) 312.
- b. The ECI will be performed by personnel trained and qualified in the use of ECI equipment and ECI data interpretation.

27.6.2 Routine Inspection. Routine visual inspections are required after the first 30 months of operation, and every 30 months after a Strength and Integrity Inspection, not to exceed 36 months. Any extension beyond 36 months requires an approved major DFS which must be brought to the attention of NSWCCD and the NAVSEA Boiler and Condenser Technical Warrant Holder.

- a. The Routine inspection will be scheduled by the TYCOM.
- b. The Routine inspection will be performed by a certified SGPI.
- c. The Routine inspection will be conducted concurrent with ECI or tube renewals.

27.6.3 Start of Availability Inspection. The SAI will be accomplished at the beginning of an availability to better define or re-evaluate the Steam Reboiler bid specification and identify those major items which may impact ship's operational schedule.

- a. The SAI will be scheduled by the TYCOM and/or PMS 312.
- b. The SAI will be performed by the NSWCCD Inspector accompanied by a certified SGPI.

27.6.4 Strength and Integrity Inspection. The interval between strength and integrity inspections will be 64 months, not to exceed 72 months. The 64 month period commences with the first lite-off of the Steam Reboiler following the previous strength and integrity inspection. Any extension beyond 72 months requires an approved major DFS and must be brought to the attention of NSWCCD and the NAVSEA Boiler and Condenser Technical Warrant Holder.

- a. The Strength and Integrity inspection will be scheduled by PMS 312.
- b. The Strength and Integrity inspection will be performed by an NSWCCD inspector accompanied by a certified SGPI.
- c. The Strength and Integrity inspection will be conducted concurrent with ECI or tube renewals.

27.6.5 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.