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VOLUME IV

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RECORD OF CHANGES

CHANGE NO.	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY (INITIALS)

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JOINT FLEET MAINTENANCE MANUAL CHANGE REQUEST FORM
FROM: ACTIVITY/SHIP _____ E-MAIL ADDRESS _____ CODE/DEPT/SHOP _____ DATE _____ ORIGINATOR _____ TEL EXT (___)_____
VOL-PART-PARA NO. _____ FIGURE _____ TABLE _____ PROCESSING NORMAL _____ URGENT*_____ * (Justify in rationale below if urgent is marked and transmit via e-mail as "High Importance") PROBLEM DESCRIPTION:
RECOMMENDED CHANGE: (Include any proposed text addition/deletion)
RATIONALE:

E-mail to PTNH.SUBMEPP.JFMMMGR@Navy.Mil
(If mailing, fold on dotted line on reverse sideand mail to Submarine Maintenance Engineering, Planning and Procurement (SUBMEPP) Activity or send facsimile to (207) 438-6210.)

FOLD

Commanding Officer

_____

OFFICIAL BUSINESS

Commanding Officer
Submarine Maintenance Engineering,
Planning and Procurement (SUBMEPP) Activity
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Portsmouth, NH 03804-2500

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VOLUME IV

CHAPTER 1

INTRODUCTION

REFERENCES.

(a) OPNAVINST 3120.32 - Standard Organization and Regulations of the U.S. Navy
(b) OPNAVINST 4700.7 - Maintenance Policy for U.S. Naval Ships
(c) COMLANTFLTINST 5400.2 - U.S. Atlantic Fleet Regulations
(d) COMPACFLTINST 5400.3 - U.S. Pacific Fleet Regulations
(e) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual

LISTING OF APPENDICES.

A List of Acronyms

1.1 PURPOSE. To provide guidance in the execution and management for tests, inspections and assessments applicable to units of the Navy.

a. The Foreword of this manual contains a master listing of all references used throughout the Joint Fleet Maintenance Manual. These references are arranged in alphanumeric order to facilitate their procurement for use with this manual. References used in specific chapters of this volume are listed at the beginning of each chapter in the order in which they appear in the chapter text.

b. Acronyms are identified when they are initially used in this volume. Appendix A of this chapter contains a master listing of acronyms used throughout this volume.

c. References (a) through (e) shall be used in conjunction with this manual, however, the requirements of this manual shall **not** take precedence over these higher authority directives, or technical directives from applicable Systems Commands. Where conflicts exist with previously issued Fleet Commander, Commander, Naval Reserve Forces (COMNAVRESFOR), Type Commander (TYCOM) letters, transmittals and instructions, other than references (c) and (d), this manual shall take precedence. Conflicts shall be reported to the cognizant TYCOM for resolution.

1.2 SCOPE. This volume applies to all ships and shore activities under the cognizance of Commander, United States Fleet Forces Command (COMUSFLTFORCOM), Commander, Pacific Fleet (COMPACFLT) and COMNAVRESFOR. This volume is not intended to be all encompassing, since the guidance for many elements of the maintenance programs and their execution are promulgated by higher/technical authority (e.g., Naval Ships' Technical Manuals (NSTM), Office of the Chief of Naval Operations Instruction (OPNAVINST)).

a. This volume contains general topics, applicable to all ships and units under the cognizance of COMUSFLTFORCOM or COMPACFLT. In those cases where chapters, sections and/or paragraphs of chapters are not applicable to certain Forces, an applicability statement has been used for clarification.

b. Equipment under the cognizance of the Strategic Systems Programs and Naval Sea Systems Command Nuclear Propulsion Directorate (NAVSEA 08) is maintained in accordance with Strategic Systems Programs and NAVSEA 08 directives, respectively.

1.3 CHANGES AND CORRECTIONS. Changes and corrections will be issued as required. Comments and suggestions for improving or changing this volume are invited. Address comments, recommendations, and requested changes to Submarine Maintenance Engineering, Planning and Procurement Activity utilizing the change request form located in the front of this manual. If changes are submitted in electronic format, facsimile or E-mail, each change request shall contain the information required on the change request form.

1.4 REQUEST FOR COPIES OF THE MANUAL. Activities on distribution for the Joint Fleet Maintenance Manual (JFMM) that require additional copies or activities wanting to be added to distribution should submit a letter to their applicable TYCOM, identifying CD-ROM/paper requirements along with justification for the request. To the maximum extent possible, technical publications libraries at each activity will receive all copies of the manual for that activity and coordinate local distribution and updates.

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

VOLUME IV

CHAPTER 2

FLEET MAINTENANCE ACTIVITY ASSESSMENT

REFERENCES.

(a) NAVSEA S9810-AA-GTP-010 - Intermediate Maintenance Activity Work Center Requirements Manual
(b) COMPACFLTINST 4700.5/COMLANTFLTINST 4700.1 - Navy Afloat Maintenance Training Strategy (NAMTS) Job Qualification Requirements (JQR) Management
(c) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual
(d) OPNAVINST 5100.23 - Navy Occupational Safety and Health (NAVOSH) Program Manual
(e) OPNAVINST 5100.19 - Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat
(f) OPNAVINST 3120.32 - Standard Organization and Regulations of the U.S. Navy
(g) NAVSEA SS521-AG-PRO-010 - U.S. Navy Diving Manual

LISTING OF APPENDICES.

A Typical Core Capability Assessment Areas
B Typical Core Capability Assessment Projects
C Sample FMA Assessment Report
D FMA Assessment Deficiency Format

2.1 PURPOSE. To provide guidance for conducting a Fleet Maintenance Activity (FMA) Assessment, including areas to be assessed, responsibilities for conducting the assessment and deficiency correction and reporting requirements.

2.1.1 Scope. Fleet Maintenance Activity assessments will be conducted by the Type Commander (TYCOM) or Fleet Commander with cognizance over the FMA. For assessments conducted by the cognizant TYCOM, the assessment team will be comprised of members from each TYCOM that the FMA performs repairs for, with the senior member from the cognizant TYCOM. For assessments conducted by the cognizant Fleet Commander, the assessment team will be comprised of members from each TYCOM that the FMA performs repairs for, with the Fleet Commander, or Fleet Commander assigned TYCOM representative as the senior member of the assessment team. Assessments will be conducted in accordance with references (a) through (g) using the Quality Assurance assessment areas prescribed by Volume V, Part I, Chapter 9 of this manual.

a. Assessments of Afloat FMAs will be performed annually, not to exceed 18 months.

b. Assessments of shore based FMAs will be performed every 18 months, not to exceed 24 months. (TYCOM Quality Assurance assessments, explained in Volume V, Part I, Chapter 9 of this manual, will be accomplished concurrently with FMA assessments when scheduled in the same calendar year.)

c. (Regional Maintenance Centers only) The following Regional Maintenance Centers (RMC) will be assessed every 18 months not to exceed 24 months. Areas may be assessed more frequently based upon results of previous assessments. These assessments encompass all functions of the RMC standard departments as listed in Commander, Naval Regional Maintenance Center Ship Organization and Regulation Manual:

Mid-Atlantic Regional Maintenance Center (MARMC)
Southeast Regional Maintenance Center (SERMC)
Southwest Regional Maintenance Center (SWRMC)
Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility
Puget Sound Naval Shipyard and Intermediate Maintenance Facility
U.S. Naval Ship Repair Facility and Japan Regional Maintenance Center (SRF-JRMC)

Forward Deployed Regional Maintenance Center (FDRMC)

d. Assessments are to evaluate the ability of the FMA to execute maintenance in accordance with applicable technical directives and specifications. The assessment of FMAs encompasses Repair Department Work Centers (WC) and the direct repair WC support functions performed by other departments.

2.1.2 Applicability. The assessments described in this chapter are applicable for non-nuclear work only. This chapter does not apply to nuclear work and systems; they are addressed separately in Volume V, Part I, Chapter 9 of this manual.

2.2 ASSESSMENT AREAS.

a. FMAs are expected to maintain a broad spectrum of capabilities at full readiness. The FMA can expect that many of these capabilities will be observed and evaluated during the course of the assessment. The Assessment Team will place primary emphasis on the essential core capabilities, utilizing the guidelines of references (a) and (b).

b. Core capability craftsman demonstration areas are shown in Appendices A and B of this chapter. These represent the typical areas to be assessed and, as time permits, the team leader may observe other areas/projects. Observation of "in process work" is preferred to the assignment of projects or mockups in core capability areas. The team leader will make all decisions regarding the assignment of projects.

2.3 ASSESSMENT RESULTS. An overall grade of satisfactory or unsatisfactory will be assigned based on the FMA's compliance with higher-level requirements and governing technical documents.

2.4 RESPONSIBILITIES.

2.4.1 Type Commander.

a. Promulgate an assessment schedule by 30 November for the following calendar year.

b. Forward a precepts letter, or a message, to the FMA's Commanding Officer at least two weeks prior to the assessment. This letter should include:

(1) The date of the assessment.

(2) Assessment Team member's security clearance information.

(3) Core capability areas for the observation of in process work.

(4) Logistic support requirements.

(5) Additional information as appropriate.

c. Conduct an inbrief and outbrief with the Immediate Superior in Command (ISIC) (if assigned), FMA's Commanding Officer and designated personnel. A preliminary copy of the Assessment Report will be provided to the FMA at the outbrief.

d. Issue the Assessment Report (Appendix C of this chapter) to the FMA via the ISIC within 15 calendar days following completion of the assessment.

2.4.2 Fleet Maintenance Activity.

a. Forward team security clearance information to the local base security office and to all units who are or will be in availability during the period of the assessment.

b. Designate an Assessment Coordinator to act as the point of contact between the Assessment Team and the command. Notify the appropriate TYCOM of the name and phone number of the Assessment Coordinator upon receipt of the assessment precepts letter.

c. Ensure the following assessment support is provided:

(1) Access to all industrial areas within the FMA.

(2) An adequate and dedicated administrative work area to allow the Assessment Team to assemble.

(3) Parking for the Assessment Team.

(4) A telephone with off-ship and long distance capability.

(5) Access to Maintenance Resource Management System.

(6) Clerical personnel to assist. These personnel will report to the Assessment Team Leader for assignment of working hours and duties.

(7) Copying services.

(8) Access to all Controlled Work Packages (CWP) and standard Formal Work Packages (FWP), including the index of FWPs.

(9) Access to selected Repair Department training records and the departmental weekly training schedule for the week of the assessment.

(10) A list of all non-nuclear Technical Work Documents performed since the last assessment.

(11) A list of key personnel and telephone numbers.

(12) A list of capabilities required per references (a) and (b), but not held.

(13) A list of all critical path jobs scheduled during the assessment.

(14) A list of all production/management meetings scheduled during the assessment.

(15) In the Assessment Team work area, provide:

(a) One desk top computer and a laser printer.

(b) A copy of the following reference documents:

1 The previous TYCOM/Fleet Assessment report with corrective actions.

2 Equipment out of commission lists.

3 All FMA instructions and notices, including those pertaining to safety, production and repair functions, and the Command Availability Guide (if applicable).

4 Activity manpower documents.

5 Navy Afloat Maintenance Training Strategy-Training Reports.

6 FMA Capabilities (currently titled IMA Capabilities) and WC Validation Reports for all applicable WCs.

7 Joint Fleet Maintenance Manual.

8 TYCOM Training Manual.

9 Repair Department Equipment Status Log.

10 FMA Audit and Surveillance Program records.

11 FMA self-assessments.

12 Departure from Specification files.

d. Initiate action to systematically correct each assessment deficiency finding (Appendix D of this chapter) in accordance with paragraph 2.5.1 and 2.5.2 of this chapter.

2.5 ASSESSMENT FINDINGS/CORRECTIVE ACTION.

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

b. Audit cards must clearly "stand on their own" and indicate if certification is or is not impacted by the finding when the audit card deals with SUBSAFE or Deep Submergence Systems deficiencies. All audit cards annotating a certification issue will be classified as "Immediate Corrective Action Required".

c. The FMA will annotate in the corresponding assessment report enclosure, the corrective actions taken for each finding.

d. The Commanding Officer will also submit a findings status report to the TYCOM via the administrative chain of command within 60 days following receipt of the official assessment report.

e. Unless a delay is specifically authorized by the TYCOM, all findings will be corrected within the time limits specified in paragraphs 2.5.1 and 2.5.2 of this chapter.

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

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

APPENDIX A

TYPICAL CORE CAPABILITY ASSESSMENT AREAS

1. Safety/Navy Occupational Safety and Health.
2. Repair Training Effectiveness.
3. Maintenance Management.
4. Maintenance Data System Management.
5. Calibration - Production/WC Management.
6. FWPs (Volume V, Part I, Chapter 2 of this manual).
7. Tool/Equipment Control Programs.
8. Corrosion Control Program (as applicable).
9. Welding and Brazing Programs.
10. Quality Assurance Organization (Volume V of this manual).
11. Nondestructive Testing/Nondestructive Inspection (Volume V, Part I, Chapter 3 of this manual).
12. Technical Work Documents (Volume V, Part I, Chapter 2 of this manual).
13. Planning & Estimating.
14. Technical Library.
15. Hull Repair.
16. Machinery Repair.
17. Electrical Repair.
18. Electronics Repair.
19. Ordnance Repair (as applicable).
20. Weapon System Repair.
21. Weight Handling/Rigging.
22. Diving/Diver Life Support Systems (as applicable).
23. Regional Repair Center Capabilities (as applicable).

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APPENDIX B

TYPICAL CORE CAPABILITY ASSESSMENT PROJECTS

1. Butt Weld (pipe).
2. HY-80 Weld Process.
3. Weld Hardface.
4. Silver Braze.
5. Tube Bend.
6. Flex Hose Manufacture & Testing.
7. Electroplating.
8. Hydraulic Control Valve Repair.
9. Weight Handling Sling Manufacture and Weight Test.
10. Valve Lap and Hydrostatic Test.
11. Other projects as necessary.

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APPENDIX C

SAMPLE FMA ASSESSMENT REPORT

From: TYCOM (as appropriate)
To: Commanding Officer, FMA
Via: ISIC (as appropriate)

Subj: FMA ASSESSMENT

Ref: (a) COMUSFLTFORCOMINST 4790.3; Joint Fleet Maintenance Manual
(b) Precepts letter

Encl: (1) FMA Assessment Findings
(2) FMA Assessment Project Summary

1. Per Volume IV, Chapter 2 of reference (a) and reference (b), an FMA Assessment was conducted onboard FMA (Name of assessed command), during the period (Dates of Assessment).

2. The Assessment Team reviewed selected areas as prescribed in reference (a) and their findings and comments are contained in enclosures (1) and (2). Any required corrective actions should be initiated in accordance with Volume IV, Chapter 2, paragraph 2.5.1 and 2.5.2 of reference (a).

3. Overall Observation: (A brief summary of the results of the assessment including an overall evaluation of satisfactory/unsatisfactory).

4. (Subsequent paragraphs should briefly comment on major areas of concern found during the assessment).

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APPENDIX D

FMA ASSESSMENT DEFICIENCY FORMAT

( ) IMMEDIATE CORRECTIVE ACTION REQUIRED

ITEM:

AREA:

ASSESSOR:

DISCUSSED WITH:

FINDING:

REFERENCE:

DISCUSSION:

CORRECTIVE ACTION:

A. ROOT CAUSES:

B. TEMPORARY CORRECTIVE ACTION:

C. PERMANENT CORRECTIVE ACTION:

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VOLUME IV

CHAPTER 3

BOILER INSPECTION

REFERENCES.

(a) OPNAVINST 9220.3 - Propulsion and Auxiliary Plant Inspection and Inspector Certification Program
(b) NAVSEA S9086-GY-STM-010 - NSTM Chapter 221 (Boilers)
(c) NAVSEA S9221-D2-MMA-010 - Steam Generating Plant Inspection (Non-Nuclear)
(d) NWP 1-03.1 - Naval Warfare Publication Operational Report
(e) NAVSEA S6470-AA-SAF-010 - Gas Free Engineering Manual
(f) NAVSEA S9086-CH-STM-030 - NSTM Chapter 074 Volume 3 (Gas Free Engineering)
(g) NAVSEA S0400-AD-URM-010/TUM - Tag-Out Users Manual
(h) NAVSEA S9086-GX-STM-020 - NSTM Chapter 220 Volume 2, (Boiler Water/Feedwater Test and Treatment)
(i) NAVSEA S9086-RK-STM-010 - NSTM Chapter 505 (Piping Systems)
(j) NAVSEA S9086-G3-STM-010 - NSTM Chapter 225 (Steam Machinery Controls Systems)
(k) OPNAVINST 9220.2 - U.S. Navy Boiler Water and Feedwater Test and Treatment Program (Nuclear Excluded)
(l) OPNAVINST 4100.11 - Navy Energy Usage Reporting System (NEURS)
(m) COMLANTFLTINST/COMPACFLTINST 4100.3 - Navy Energy Usage Reporting System (NEURS)

LISTING OF APPENDICES.

A Sample Boiler Inspection Request Message
B Sample Inspection Confirmation Message
C Summary of Boiler Inspection Scheduling and Responsibilities
D Sample Boiler Inspection Report Cover Letter
E Sample Boiler Inspection - RBO/Severely Degraded Deficiencies Message
F Sample RBO Rescission Message
G Sample 30 Day Update Message

3.1 PURPOSE. To establish policy and provide procedures and inspection requirements for the inspection of all conventional steam generating plants in surface force ships and training sites including schedules, preparations for inspection, inspection guidelines and reporting.

3.1.1 Policy. Periodic standardized inspections are required of all non-nuclear propulsion, auxiliary, waste heat and training site boilers by a certified Steam Generating Plant Inspector (SGPI) and/or Naval Surface Warfare Center, Carderock Division (NSWCCD) Life Cycle Engineering Manager (LCEM), as applicable. The maximum interval between boiler inspections and other occasions requiring boiler inspections, including responsibilities for continuation and standardization of the boiler inspection program, are formally assigned in reference (a).

3.2 TYPES OF BOILER INSPECTIONS.

a. Routine Inspection.

b. Pre-start of Availability Inspection (PSAI).

c. Start of Availability Inspection (SAI).

d. Strength and Integrity Inspection.

e. Industrial Support Visit (ISV).

f. Completion of Availability Inspection (CAI).

g. Inactivation or Reactivation Inspection.

h. Engineer Officer Inspection.

i. Major Repair Inspection.

j. Special Inspection.

k. Operational Assessments.

3.3 RESPONSIBILITIES.

3.3.1 Naval Sea Systems Command. NAVSEA shall provide technical authority oversight over all main, auxiliary, waste heat and training site boiler systems and associated equipment. The designated NAVSEA Technical Warrant Holder shall:

a. Assure safe and reliable system operation.

b. Set and enforce all technical requirements.

c. Approve all major Departure from Specifications (DFS).

d. Provide technical oversight and management of the SGPI and NSWCCD LCEM programs:

(1) Establish and enforce requirements for SGPI certification and recertification.

(2) Ensure periodic SGPI seminars are conducted.

(3) Ensure periodic technical audits of all Integrated Logistics Support documentation and Training.

(4) Maintain the Boiler Inspection and Repair Management Information System (BIRMIS).

(5) Routinely evaluate and ensure state of the art inspection, maintenance and repair tools and techniques are used.

3.3.2 Naval Surface Warfare Center, Carderock Division. NSWCCD shall:

a. Provide support to NAVSEA for the SGPI and NSWCCD LCEM programs. Ensure that the required technical documentation to support the SGPI/NSWCCD LCEM Inspector programs is maintained current.

b. Establish and monitor the requirements and standards for routine and industrial inspections of steam generating plants.

c. Develop, implement and maintain a program to train and certify NSWCCD LCEM Inspectors in accordance with reference (a).

d. Ensure that inspections of newly constructed ships and ships undergoing major overhaul and/or conversion are conducted in accordance with this instruction.

e. Conduct periodic technical audits of the SGPI Training Course per reference (a).

f. Provide management of technical data, boiler history and the associated repair management information database system.

g. Provide technical support to the semi annual seminars.

h. Maintain a roster of all certified SGPIs by name, rating, duty station, date of certification and expiration date of certification. Revoke inspector certification and initiate action to decertify inspectors who fail to comply with requirements of reference (a).

i. Ensure that the requirements for SGPI certification, recertification and certification extensions are met prior to final approval.

3.3.3 Fleet Commander. The Fleet Commander shall:

a. Identify and designate those fleet activities which have inspection responsibilities and maintain a base of certified SGPIs within those activities.

b. Ensure the availability of “school ships” to support SGPI/NSWCCD LCEM Inspector training. Student certification must be conducted on “D” type boilers.

c. Host the semi-annual SGPI seminars on an alternating coast basis.

3.3.4 Regional Maintenance Center. The Regional Maintenance Center (RMC) shall:

a. Provide certified SGPIs to perform inspections per section 3.6 of this chapter.

b. Review the guidelines and inspection requirements for all boiler inspections required by this instruction and ensure that each inspection report is recorded and updated into BIRMIS.

c. Schedule and coordinate inspections of all steam generating plants required by this instruction with the appropriate technical activities to avoid the unnecessary opening of boilers.

d. Provide a qualified SGPI when requested by the ship, Immediate Superior in Command (ISIC) or Type Commander (TYCOM).

3.3.5 Regional Maintenance Center Commanding Officers. RMC Commanding Officers shall:

a. Coordinate inspections in cognizant maintenance areas.

b. Maintain an up-to-date status of required steam generating plant inspections which shall include the latest inspection for all ships assigned to RMCs in their respective area of responsibility.

3.3.6 Immediate Superior In Command. The ISIC shall:

a. Maintain overall cognizance of the Steam Generating Plant Inspection Program within their area of responsibility to ensure requirements and standards are met.

b. Schedule routine steam generating plant inspections in coordination with the cognizant RMC.

c. Arrange for the availability of an SGPI during the SAI and CAI in coordination with NSWCCD and the cognizant RMC.

d. Monitor the follow-up action required to correct noted discrepancies by randomly sampling the ship's deferred maintenance action file and most recent boiler inspection report.

e. Assist Commanding Officers in arranging for the corrective action of items beyond the capability of Ship's Force, when requested.

3.3.7 Ship Commanding Officer/Officer In Charge/Maintenance Team. Ship Commanding Officers/Officers In Charge/Maintenance Team shall:

a. Request boiler inspections via Naval Message using the format in Appendix A of this chapter.

b. Prepare for scheduled inspections to include required operational testing in accordance with references (b) and (c).

c. Review inspection results and initiate corrective action for those items within Ship's Force capability. Initiate requests for the correction of items beyond Ship's Force capability. If any of the discrepancies of paragraph 3.9.2 of this chapter cannot be corrected within 72 hours following completion of the inspection, or if said discrepancies will impact the ship's operational schedule, initiate a Casualty Report (CASREP) for the affected boiler(s) in accordance with reference (d).

d. Assess the impact (if any) of corrective action on operating schedules and advise the operational commanders. Decide (with repair activities) the optimum timing of repair actions to minimize impact on operating schedules.

e. Submit reports per paragraph 3.7.2 of this chapter.

f. Schedule boiler inspections as required by appropriate Planned Maintenance System (PMS)/Class Maintenance Plan item.

3.3.8 Regional Maintenance Center Senior Inspector. RMC Senior Inspectors shall:

a. Ensure all assigned SGPIs maintain current certifications per reference (a).

b. Perform steam generating plant inspections per section 3.9 of this chapter, when directed.

c. Review and submit reports per paragraph 3.7.2 of this chapter.

d. Send inspection confirmation messages using Appendix B of this chapter.

e. Administer an SGPI pre-test for SGPI training school candidates per reference (a).

3.3.9 Steam Generating Plant Inspector. The SGPI shall:

a. Maintain SGPI certifications per reference (a).

b. Perform steam generating plant inspections per section 3.9 of this chapter, when directed.

c. SGPIs are part of the technical authority chain-of-command and are accountable to the NAVSEA Technical Warrant Holder for the performance of their inspection duties.

d. The shipboard SGPI shall:

(1) Monitor all repairs conducted on the boilers, such as tube replacements, casing/refractory work, burner settings, hydrostatic test, etc., and annotate findings in Boiler Water/Feedwater log.

(2) Observe PMS performed on the boilers to include MLOCs (burner front checks), greasing of sliding feet, setting safety valves, high and low static checks, flex tests and auxiliary support equipment safety/governor settings.

(3) Accomplish special inspections and repairs on boilers after boiler casualties while underway and report in BIRMIS. Also, accomplish operational assessments on ship's boiler auxiliary support equipment prior to upcoming availabilities and report in BIRMIS and in ships Current Ship's Maintenance Project (CSMP), if repairs are required.

e. It is recommended that the shipboard SGPI be assigned as the LCPO of the Oil Lab in order to monitor the boiler water chemistry, boiler lay-ups and the Boiler Water/Feedwater Program (not to be assigned as Ships Oil King).

NOTE: THE SHIP'S FORCE SGPI CAN ONLY ACCOMPLISH SPECIAL INSPECTIONS AND OPERATIONAL ASSESSMENTS ON THEIR OWN SHIP, AS DESCRIBED IN PARAGRAPHS 3.6.9 AND 3.6.10 OF THIS CHAPTER. THE SHIP'S FORCE SGPI WILL ASSIST THE RMC SGPI/NSWCCD LCEM INSPECTOR DURING ROUTINE AND AVAILABILITY RELATED INSPECTIONS. THE SHIP'S FORCE SGPI MAY NOT INDEPENDENTLY CONDUCT ROUTINE, STRENGTH AND INTEGRITY, PSAI, SAI, ISV, CAI INSPECTIONS ON THEIR OWN SHIP.

3.4 INSPECTION SCHEDULING. Commands will initiate boiler inspection requests in a timely manner to assist with inspection scheduling coordination to include operational testing. Commands shall ensure the inspection scheduling complies with the following:

a. Commanding Officers/Officers In Charge of ships shall request boiler inspections by message. In addition, OPNAV 4790/2-Kilo shall be submitted to the RMC requesting a certified SGPI/NSWCCD LCEM inspector as required to conduct inspections.

b. Inspections should coincide with the required routine waterside and fireside maintenance.

c. Boiler inspection services shall be coordinated by geographic areas for maximum utilization of SGPIs/NSWCCD LCEM Inspectors. ISICs will combine inspection requests and schedule inspections.

3.5 BOILER SAFETY PROCEDURES. The safety of personnel must be given the highest priority. Observance of good engineering practices and careful control of boiler water chemistry will reduce the frequency of pressure vessel entry.

a. Ensure "idle boiler condition" is accomplished per the provisions of the Engineering Operational Sequencing System (EOSS) and reference (b). Where conflicts occur, an EOSS feedback form should be submitted for resolution.

b. Do not enter any part of a boiler or De-Aerating Feed Tank (DFT) until it has been fully ventilated and certified by a Naval Maintenance Facility Gas Free Engineer/National Fire Protection Agency marine chemist as safe for entry in accordance with references (e) and (f), as applicable, and Chapter 25 of this volume.

c. Ensure the idle boiler is tagged out (valves wired shut and danger tagged). Observe two-valve protection per reference (g) where applicable. Open to the atmosphere the drain connections on all dead interconnecting piping to observe drainage.

d. The use of unshielded or non-approved portable lighting in an open boiler is prohibited. Portable lighting shall be watertight. (National Stock Number (NSN) 9S-6230-00-701-2947 applies.)

e. Ensure all precautions cited in Section 2.24 of reference (b) are followed before entering an idle boiler.

f. There shall be a safety observer outside the boiler entrance to provide assistance whenever personnel are inside a boiler (steam drum, water drum, firebox or smokepipe).

g. Maintain an inventory log for accountability of all items taken into a boiler. The pockets of all personnel working in a boiler shall be emptied and all jewelry removed. The removal of all items from the boiler shall be verified from the inventory log prior to the close-up inspection. The Chief Engineer or his designated representative shall inspect the boiler prior to final close-out.

h. Cleaning of firesides or repairs conducted to the pressure vessel exterior of a boiler is acceptable with a steaming boiler in the same space provided the precautions cited in Section 2.7 of reference (b) are observed. Water washing of the firesides is not authorized without NAVSEA approval.

i. Requiring personnel to enter the steam/water side of a boiler with an adjacent steaming boiler is considered an unnecessary risk and will be avoided unless operations dictate otherwise. The decision to override normal safety precautions will be made by the Commanding Officer/Officer In Charge and will be reported to the TYCOM by message.

j. Keep the area under the boiler clean and dry.

k. Place signs warning that personnel are working in the boiler at the Boiler Console Operating station in the boiler operating space. The sign shall remain there until the work has been completed and personnel are clear of the secured boiler.

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

3.6.1 Routine Inspection. Routine Inspections will be conducted at least once every Fleet Readiness Training Plan and shall not exceed 24 months from its last inspection. For newly constructed ships, the 24 month period shall begin at the completion of the Board of Inspection and Survey (INSURV) Acceptance Trials. The normal interval between routine boiler inspections shall be 18 months. To provide scheduling flexibility, boiler inspections may be performed as early as 12 months or as late as 24 months after the previous inspection. Inspections that exceed the 18 month interval will require a minor DFS to the TYCOM with recommendation from NSWCCD-SSES. Extensions shall not result in the inspection interval exceeding 24 months. Any boiler which exceeds the inspection interval shall be placed out of commission until inspected by a certified SGPI. A major DFS with NAVSEA Technical Warrant Holder approval is required to operate a boiler beyond 24 months without a Routine Boiler inspection. The CAI or Strength and Integrity required inspections fulfill the requirements of a routine inspection.

a. The boiler inspection will be scheduled by the cognizant ISIC.

b. The boiler inspection will be performed by the cognizant SGPI.

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

certified all items required in NSTM 221-2.1.2.3 Ship's Pre-inspection Checklist For Up-coming Routine Boiler Inspection by U.S. Navy Steam Generating Plant Inspector and reference (c), Appendix E, F and Figure E-6 addressing Operational Assessments has been accomplished. Once completed, this resets the periodicity required for the next inspection to 18 months not to exceed 24 months.

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

a. The PSAI will be scheduled by the ISIC, as approved by the cognizant TYCOM.

b. The PSAI will be performed by the NSWCCD LCEM Inspector and the RMC SGPI.

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

a. The SAI will be scheduled by the ISIC, as approved by the cognizant TYCOM.

b. The SAI will be performed by the NSWCCD LCEM Inspector and the RMC SGPI.

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

a. The Strength and Integrity Inspection will be scheduled by the cognizant ISIC.

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

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

a. The ISV inspection will be scheduled by the industrial activity or Supervising Authority as applicable.

b. The ISV inspection will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

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

a. The CAI will be scheduled by the industrial activity or Supervising Authority, as applicable, and may be conducted in conjunction with a Routine Inspection.

b. The CAI will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

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

a. The Inactivation/Reactivation Inspection will be scheduled by the industrial activity, Supervising Authority or Inactive Ship Facility as applicable.

b. The Inactivation/Reactivation Inspection will be performed by an NSWCCD LCEM Inspector and the cognizant SGPI.

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

3.6.9 Special Inspection.

a. A special inspection shall be conducted whenever major repair work as defined by references (b) and (g) is accomplished. This inspection is arranged by the ISIC in coordination with the TYCOM and the RMC and performed by an SGPI.

b. Additionally, SGPIs are authorized to conduct special no-notice inspections at their discretion to assess operational, chemistry and maintenance related problems.

3.6.10 Operational Assessments. An operational assessment shall be accomplished prior to and at the completion of all Chief of Naval Operations (CNO) scheduled maintenance availabilities. These assessments are part of the Routine and Strength and Integrity Inspection requirements. These assessments will include both cold and hot plant inport safety checks and an operational evaluation. Detailed assessment requirements and check lists are available in reference (c), Figure E-6.

3.7 BOILER INSPECTION GUIDELINES AND REPORTS.

3.7.1 Guidelines.

a. Routine Inspections of boilers will be conducted by certified SGPIs.

b. Only an SGPI with a current certification may issue a Repair Before Operating (RBO) deficiency. All RBO items shall be corrected prior to boiler operation and reinspected by a certified SGPI or NSWCCD LCEM Inspector, as applicable, and preferably the same SGPI/NSWCCD LCEM Inspector who originally inspected the boiler. RBO discrepancies include those for which continued unrestricted operation could endanger personnel. RBOs may not be departed via DFS. If there is not an immediate or near future danger to personnel, the discrepancy shall be assigned as SEVERELY DEGRADED with major operational restrictions.

c. An SGPI-designated discrepancy discovered in accordance with reference (c) and paragraph 3.9.2 of this chapter which is assigned as severely degraded with major operational restrictions, and is considered for a DFS submission, is a major DFS and must be brought forward to the attention of the NAVSEA Boiler and Condenser Technical Warrant. A Major DFS must be forwarded for NAVSEA review and approval with accompanying engineering analysis recommendations from the originator. A severely degraded discrepancy in accordance with this chapter must be corrected/repaired prior to boiler operation unless it has been properly approved as a Major DFS.

d. The status of a boiler related DFS will be verified by the SGPI during the inspection for conformance with the requirements of this manual prior to placing the boiler into operation.

3.7.2 Reports.

a. The SGPI shall provide an oral critique and preliminary report to the ship's Commanding Officer or his designated representative. The report will contain the findings of the inspection, with special note of recurring discrepancies from previous inspections. The SGPI shall ensure a maintenance ready 2-Kilo for every discrepancy found during the inspection is entered into the Current Ship's Maintenance Project.

b. The Senior Inspector will forward a copy of the BIRMIS report with cover letter per the sample shown in Appendix D of this chapter to the ship's Commanding Officer no later than ten days after satisfactory clearance of all discrepancies.

c. The SGPI shall report deficiencies discovered during the inspection by message within 24 hours, using the message format of Appendix E of this chapter. This message shall contain both RBO and severely degraded deficiencies as described in paragraph 3.7.1 of this chapter.

d. The cognizant SGPI shall report by message, using the format in Appendix F of this chapter, the correction and re-inspection of all RBO deficiencies prior to lighting off an inspected boiler.

e. The ship's Commanding Officer shall submit a copy of the Current Ship's Maintenance Project to the SGPI for verification of downloaded 2 Kilos.

f. The ship's Commanding Officer shall report corrected deficiencies, by message, to the ISIC and TYCOM using the format in Appendix G of this chapter, within 30 days of the completed inspection and at 30 day intervals thereafter until all deficiencies are corrected or deferred to a CNO Maintenance Availability. The TYCOM is the sole authority for deferral of deficiencies. Update messages shall list the BIRMIS item number/2K Job Sequence Number of those items which have been completed since the last update message. A corrected BIRMIS report will be provided to the ship after BIRMIS status codes are updated.

g. The ship's Commanding Officer shall notify the ISIC (as applicable)/TYCOM when a scheduled steam generating plant inspection cannot be conducted by submitting a DFS request. State the reason why the inspection cannot be conducted and recommend a revised date.

3.8 BOILER INSPECTION PREPARATION.

a. Conduct the operational assessment before disassembling the boiler for inspection. Detailed assessment requirements are reported in reference (c).

b. Prepare the boiler using the guidance provided in reference (b).

c. Keep air passages, including the air box beneath the boiler and uptake spaces, clean and dry.

d. Wire shut and danger tag all steam and water valves to the boiler per the ship's Tag Out Users Manual. Open to the atmosphere the drain connections on all dead interconnecting piping to observe drainage.

e. The ship's Engineer Officer shall ensure all Ship's Force responsibilities are complete using the guidance provided in reference (c).

f. Open DFT for inspection.

3.9 BOILER INSPECTION.

3.9.1 Boiler Inspection Forms. Boiler inspections will be conducted using the appropriate BIRMIS forms. Include specific comments on the state of preservation and material condition of the boiler, hull structural members beneath the boiler and the effectiveness or ineffectiveness of the boiler water chemistry program.

3.9.2 Boiler Inspection Areas. A discrepancy is classified as an RBO, if left uncorrected, it could endanger personnel safety. All RBO items shall be corrected prior to boiler operation and re-inspected by a certified SGPI or NSWCCD LCEM Inspector as applicable, and preferably the same SGPI/NSWCCD LCEM Inspector who originally inspected the boiler. As inspected by an SGPI/LCEM inspector, RBO discrepancies may include but are not limited to the following:

a. Active oxygen attacking the boiler watersides.

b. Hard scale or baked sludge.

c. Significant lube oil/fuel oil contamination of watersides.

d. Inoperative/misadjusted/missing safety devices.

e. Refractory deterioration which allows heat penetration to casings or causes incomplete combustion.

f. Ship's Force Boilerwater/Feedwater certifications, chemical inventory and shelf life not within requirements in reference (h).

g. Inability to maintain water chemistry within limits. Ineffective Boilerwater/Feedwater program based on log review which left uncorrected may result in severe degradation of the boiler watersides. Inoperative or degraded treatment, sampling and blow-down systems.

h. Excessively fouled or tacky firesides, fireside deposits built up on the crown of the water drum.

i. Sliding feet that do not accept grease and/or do not show indication of movement.

j. Lack of maintenance and preservation of the boiler, resulting in deterioration and weakening of boiler and hull structural members. This includes deterioration in the air casing which allows water and combustion air/gasses into the space.

k. Lube oil contamination of Automatic Boiler Control (ABC) Systems.

l. Fire/safety hazards (fuel/lube oil in the machinery room), deteriorated or missing flange shields. Oil soaked lagging and insulation.

m. Inoperative or missing fire fighting equipment.

n. ABC equipment inoperable or failed cold/hot checks.

o. Steam smothering system inoperative (plugged nozzles, deteriorated or improperly installed piping).

p. Deteriorated boiler smoke pipes which allow stack gas to escape. Clogged or deteriorated stack drains.

q. Incorrectly adjusted burners or inoperative air registers. Safety Shut-off Devices which do not meet the leakage criteria of reference (b). Insufficient amount of sprayer plates, burner barrels and go-no-go gages to meet main space requirements as specified in reference (b).

r. Boiler that does not pass design hydrostatic test.

s. Non-deferrable defects/indications in the pressure vessel and piping boundary.

t. Damaged or deteriorated internals.

u. Defective tubes such as blistered, excessively warped or married tubes which prevent proper gas passage. Cracked tube bells.

v. Ultrasonic test results on soot blower heads or pressure vessel piping that are currently or projected to be at or below minimum requirements, out of periodicity, or when visual inspection dictates replacement before the next scheduled ultrasonic inspection.

w. Out of periodicity, in-operative temperature or pressure measuring instruments.

x. In-operative, out of adjustment Forced Draft Blower counterweight shutters.

y. Non-functioning DFT components or defects in the pressure vessel.

z. In-operative fuel and steam systems remote isolation devices.

aa. Valve tightness integrity and operation which limits its ability to perform its intended function and exceeds the criteria of reference (i).

ab. Non-conformance of electrical safety and deteriorated or damaged wiring or components.

ac. Any other discrepancy deemed by the SGPI which would cause injury to personnel.

NOTE: A SEVERELY DEGRADED DESIGNATION IS ASSIGNED TO A DEFICIENCY THAT IS NOT AN IMMEDIATE OR NEAR FUTURE DANGER TO PERSONNEL, BUT WILL HAVE MAJOR OPERATIONAL RESTRICTIONS. A SEVERELY DEGRADED DISCREPANCY IN ACCORDANCE WITH THIS CHAPTER MUST BE CORRECTED/REPAIRED PRIOR TO BOILER OPERATION UNLESS IT HAS BEEN PROPERLY APPROVED AS A MAJOR DFS.

3.9.3 Completion of Inspection. An oral critique and a preliminary inspection report, including a summary of restrictive deficiencies, will follow the inspection. Paragraph 3.7.2 of this chapter identifies official reporting requirements.

3.10 AUTOMATIC BOILER CONTROL SYSTEMS/ONLINE VERIFICATION GUIDELINES.

a. ABC Systems, which include Automatic Combustion Controls, Boiler Feedwater Level Controls, and Automatic Feed Pump Controls and DFT Level Controls have been designed and installed for the purpose of permitting steady and transient operation with the least variation possible. Proper utilization and maintenance of these systems will also allow a reduction of watch standers on station thereby enabling engineering personnel to devote more time to routine maintenance of machinery and upkeep of spaces, as well as providing the ship with instant response to signaled engine orders.

b. The following guidelines shall be adhered to regarding any or all ABC Systems installed:

(1) Ships shall use the controls at all times while steaming. Manual operation at the control panel/console (remote manual) shall be used when lighting off or securing the boiler. ABCs should be cut out and the boiler controlled in local manual only when required for casualty control, maintenance of equipment, or training of personnel. When ABCs cannot be operated in automatic, this fact shall be reported by a CASREP message.

(2) Installed multi-element feedwater regulators shall be cut in and used at all times except for periods devoted to training operators in the manual operation of feed check valves. Prime reliance for the control of water level in the boiler steam drum shall be placed on the automatic regulator. When any indicator, alarm or feedwater regulating valve is not functioning properly, or is out of commission, a qualified checkman shall be assigned. He/She shall have no other duties as directed by temporary standing orders.

(3) Prior to boiler light off, all ABCs shall be tested in accordance with EOSS.

(4) Maintenance and calibration of the ABC Systems shall be accomplished by qualified technicians in accordance with the direction provided in applicable PMS, reference (j) and the manufacturer's technical manuals.

c. Online Alignment Verification procedures provide a set of checks to verify proper performance of each of the sub-systems or control loops within the automatic combustion, feedwater and feed pump control systems. Online Alignment Verification shall be accomplished using the periodicity and procedures in PMS and applicable ABC ship specific technical manuals.

3.11 BOILER FLEXIBILITY TESTS. PMS and Online Alignment Verification procedures contain the necessary procedures for a boiler flexibility test. The periodicity is provided by and included in the PMS scheduling. The applicable Maintenance Requirement Card contains the NAVSEA guidelines governing the performance level of the boiler flexibility tests. Level I is the desired boiler flexibility performance level. Boilers with performance levels of II and III are considered safe to steam and safe for the conduct of Engineering Casualty Control Exercises. Boilers which cannot achieve a minimum level III flexibility are unsafe to steam and the ABC System should be reported by CASREP in accordance with the requirements of reference (d).

3.12 CERTIFIED BOILER WATER AND FEEDWATER TESTER REQUIREMENTS. All personnel who are required in the course of their duties to test, treat and/or manage boiler water/feedwater programs shall be certified as specified in reference (k).

3.13 OPERATING AND CASUALTY PROCEDURES. Each ship with steam generating plants will have approved Steam Generating Plant Operations Procedures in the format prescribed by their respective TYCOM. They shall contain detailed procedures and precautions for:

a. Normal operations including startup and shutdown.

b. Infrequent operations such as initial steam generating plant light-off following an availability.

c. Operating parameters, limitations, alarms and set points.

d. Casualty conditions including indications, immediate and supplementary actions.

e. Propulsion fuel economy per references (l) and (m).

f. JP-5 for use as boiler fuel.

g. Management of boiler water and feedwater.

h. Quality Assurance (QA) requirements for boiler repairs.

i. Maintenance and storage of boiler burner atomizers.

APPENDIX A

SAMPLE BOILER INSPECTION REQUEST MESSAGE

FM USS (SHIP'S NAME AND HULL NO)
TO: REGIONAL MAINTENANCE CENTER
INFO ISIC//
TYCOM
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
COMNAVSEASYSCOM WASHINGTON DC//
BT
UNCLAS
MSGID/GENADMIN/(USS SHIP'S NAME HULL NO)//
SUBJ/REQUEST FOR ROUTINE BOILER INSPECTION//
REFERENCE/A/DOC/COMUSFLTFORCOMINST 4790.3//
AMPN/REF A IS THE JOINT FLEET MAINTENANCE MANUAL//SHIPS POC//USS (SHIP'S NAME AND HULL NO)/EMAIL://
GENTEXT/REMARKS/1. PER REF A REQUEST RMC PROVIDE A CERTIFIED SGPI TO ACCOMPLISH ROUTINE BOILER INSPECTION OF (NO. BOILER(s)).
2. REQUEST PRIMARY INSPECTION START DATE OF (PROVIDE DATE) FOR BOILER (NO) AND AN ALTERNATE START DATE OF (PROVIDE DATE)
3. AWR ENTERED IN SHIP'S CSMP (JSN) JOB SEQUENCE NUMBER//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAIN LANGUAGE ADDRESS DIRECTORY (PLAD) IS UTILIZED.

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APPENDIX B

SAMPLE INSPECTION CONFIRMATION MESSAGE

FM REGIONAL MAINTENANCE CENTER (COMMAND)
TO USS (SHIP'S NAME AND HULL NUMBER)
INFO COMNAVSURFFOR//
TYCOM//
ISIC//
COMNAVSEASYSCOM WASHINGTON DC//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
BT
UNCLAS
MSGID/GENADMIN/
SUBJ/INSPECTION DATE CONFIRMATION//
REFRENCE/A/MSG/USS/ (SHIPS NAME HULL NUMBER)/DTG REQUEST//
REFERENCE/B/DOC/COMUSFLTFORCOMINST 4790.3//
NARR/REFERENCE A IS REQUESTING BOILER INSPECTION. REFERENCE B IS COMUSFLTFORCOMINST 4790.3 DEFINING JOINT FLEET BOILER INSPECTION CRITERIA AND PROCEDURES.//
POC/SENIOR SGPI/RATE/UIC/LOC:CITY/TEL:/DSN//
RMKS/1. IN RESPONSE TO REF A, AN (TYPE) MONTH BOILER INSPECTION WILL BE CONDUCTED IAW REF B BEGINNING (DATE) ON NUMBER ( ) BOILER. ONE OR MORE OF THE FOLLOWING CERTIFIED INSPECTORS ARE ASSIGNED TO CONDUCT THE INSPECTIONS:
INSPECTOR NAME/RATE//LAST 4//CLEARANCE.
2. POC E-MAIL ADDRESS IS: SENIOR SGPI//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX C

SUMMARY OF BOILER INSPECTION SCHEDULING AND RESPONSIBILITIES

Type Inspection	Schedule Date	Scheduling Responsibility	Responsibility for Inspections
1. Routine	Every 18 months	ISIC/Ship	Cognizant SGPI
2. Pre-Start of Availability Inspection	Schedule PSAI and operational testing in conjunction with Routine boiler appraisal 3-12 months prior to availability	ISIC	NSWCCD LCEM INSPECTOR and Cognizant SGPI
3. Start of Availability Inspection	At start of overhaul/with strength and integrity inspection	Naval Shipyard RMC	NSWCCD LCEM INSPECTOR and Cognizant SGPI
4. Strength and Integrity Inspection	Once every 60 Months	ISIC/RMC	NSWCCD LCEM INSPECTOR and Cognizant SGPI
5. ISV*	During availability	Industrial Activity or Supervising Authority	NSWCCD LCEM INSPECTOR and Cognizant SGPI
6. CAI	To be conducted before reassembling boiler for final hydrostatic test	Industrial Activity or Supervising Authority	NSWCCD LCEM INSPECTOR and Cognizant SGPI
7. Inactivation or Reactivation	Prior to final action	Industrial Activity, Supervising Authority or Inactive Ship Facility	NSWCCD LCEM INSPECTOR and Cognizant SGPI
8. Engineer Officer	Per PMS and references (b) and (c)	Engineer Officer	Engineer Officer
9. Special	Subsequent to major repairs No-Notice at SGPI discretion	ISIC (Coordinate with Regional Maintenance Center)	NSWCCD LCEM INSPECTOR and Cognizant SGPI
10. Operational Availabilities	Prior to and at completion of all CNO maintenance	TYCOM	Cognizant SGPI

*The ISV inspection may be waived by the TYCOM for availabilities of short duration.

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APPENDIX D

SAMPLE BOILER INSPECTION REPORT COVER LETTER

From: Commanding Officer, Regional Maintenance Center
To: Commanding Officer, USS (Ship's Name and Hull No.)

Subj: (Routine, etc.) INSPECTION OF BOILER(S) NUMBER (1A, 1B, 2A, etc.) AND REVIEW OF BOILER WATER/FEEDWATER TEST AND TREATMENT IN USS (Ship's Name and Hull No.)

Encl: (1) Boiler Inspection Report of Boiler(s) Number (1A, 1B, 2A, etc.)

1. (Parent Command) Steam Generating Plant Inspector, (Inspector's Name) inspected Boiler(s) Number (1A, 1B, 2A, etc.) in USS (Ship's Name and Hull No.) on (Day, Month, Year) while (ship's location).

2. Discrepancies which require corrective action are outlined in enclosure (1).

3. Advance copies of enclosure (1) have been delivered to the ship's Commanding Officer.

Copy to: (as appropriate)
TYCOM (N43AD)
ISIC
NSWCCD (Code 9222)

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APPENDIX E

SAMPLE BOILER INSPECTION - RBO/SEVERELY DEGRADED DEFICIENCIES MESSAGE

FM COMMANDING OFFICER, REGIONAL MAINTENANCE CENTER
TO USS (SHIP'S NAME AND HULL NO.)
INFO TYCOM//(AS APPROPRIATE)
ISIC//(AS APPROPRIATE)
COMNAVSEASYSCOM WASHINGTON DC//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
BT
UNCLAS //N09221//
MSGID/GENADMIN/COMMANDING OFFICER, REGIONAL MAINTENANCE CENTER
SUBJ/USS (SHIP'S NAME AND HULL NO.) NR (1A, 1B, 2A, ETC.) ROUTINE/STRENGTH AND INTEGRITY INSPECTION (AS APPROPRIATE)//
REF/A/DOC/COMUSFLTFORCOMINST 4790.3//
REF/B/DOC/NAVSEAINST 4790.8/OPNAVINST 4790.4//
NARR/REF A IS JOINT FLEET MAINTENANCE MANUAL VOL IV CH 3 AND PROVIDES GUIDANCE FOR BOILER INSPECTIONS. REF B IS 3-M MANUAL AND PROVIDES GUIDANCE FOR CSMP DOCUMENTATION//
RMKS/1. BOILER NUMBER (1A, 1B, 2A, ETC.) ROUTINE/STRENGTH AND INTEGRITY (AS APPROPRIATE). INSPECTION CONDUCTED (DATE) BY (INSPECTOR'S NAME) WHILE (SHIPS LOCATION). RBO DEFICIENCIES AND PROPOSED CORRECTIVE ACTION ARE REPORTED IAW REF A AS FOLLOWS:

A. (BIRMIS ITEM NO, DEFICIENCY, REPAIR, ETC.)
B.
C.

2. BOILER NUMBER (1A, 1B, 2A, ETC.) SHALL NOT BE STEAMED UNTIL ABOVE LISTED DEFICIENCIES ARE CORRECTED AND A REINSPECTION IS CONDUCTED IAW REF A.
3. SEVERELY DEGRADED DEFICIENCIES AND PROPOSED CORRECTIVE ACTION ARE REPORTED IAW REF A AS FOLLOWS:

A.
B.
C.

4. SEVERELY DEGRADED DEFICIENCIES ARE REQUIRED TO BE CORRECTED PRIOR TO STEAMING OR MUST BE SUBMITTED FOR MAJOR DEPARTURE FROM SPECIFICATION (DFS).
5. IAW REF A DEFICIENCIES COMPLETED SHALL BE REPORTED EVERY 30 DAYS USING THE GUIDANCE PROVIDED IN REF A APPENDIX F. ALL DEFICIENCIES HAVE BEEN DOCUMENTED IN THE SHIPS CSMP FOR CORRECTIVE ACTION IAW REF B.//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX F

SAMPLE RBO RESCISSION MESSAGE

TO USS (SHIP'S NAME AND HULL NO)
CC USS (SHIP'S NAME AND HULL NO)
INFO TYCOM//(AS APPROPRIATE)
ISIC//(AS APPROPRIATE)
COMNAVSEASYSCOM WASHINGTON DC//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
BT
UNCLAS
SUBJ/USS (SHIP'S NAME AND HULL NO) NUMBERS (1A, 1B, 2A, ETC.) (TYPE) BOILERS REPAIR BEFORE OPERATE (RBO)//
REF/A (ORIGINATING RBO MESSAGE DTG)
REF/B/CON/USS//(SHIP'S NAME AND HULL NO) (SHIP POC)
NARR/REF A ADDRESSES RBO DEFICIENCIES FOUND DURING BOILER INSPECTION CONDUCTED ON (DATES). REF B IS BTWN USS (SHIP'S NAME AND HULL NO) (SHIP POC)/AND RMC SGPI/(NAME) DISCUSSING RBO DEFICIENCIES CORRECTION.
GENTEXT/REMARKS/1. REF A RESTRICTIONS RESCINDED BASED UPON RE-INSPECTION.
THIS MESSAGE CONFIRMS REF B.
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX G

SAMPLE 30 DAY UPDATE MESSAGE

FM USS TO USS (SHIP'S NAME AND HULL NO)
CC USS (SHIP'S NAME AND HULL NO)
INFO TYCOM//(AS APPROPRIATE)
ISIC//(AS APPROPRIATE)
NSWCCD//
NAVSEA//
RMC//
BT
UNCLAS
MSGID/GENADMIN/USS (SHIP'S NAME AND HULL NO)//
SUBJ/USS (SHIP'S NAME AND HULL NO) NR (1A, 1B, 2A, ETC.) ROUTINE BOILER INSPECTION//
REF/A/DOC/BIRMIS REPORT FROM (RMC AND DATE)
REF/B/DOC/COMUSFLTFORCOMINST 4790.3//
REF/C/DOC/OPNAVINST 4790.4D//
NARR/REF A IS BIRMIS REPORT FROM COMMANDER (RMC). REF B IS COMUSFLTFORCOMINST 4790.3 JOINT FLEET MAINTENANCE MANUAL AND PROVIDES GUIDANCE FOR BOILER INSPECTIONS. REF C IS OPNAVINST 4790.4D 3-M MAINTENANCE MANUAL AND PROVIDES DIRECTION FOR CSMP DOCUMENTATION.//
GENTEXT/REMARKS/1. NR (1A, 1B, 2A, ETC.) BOILER(S) ROUTINE INSPECTION WAS CONDUCTED (DATE) BY (SGPI INSPECTOR NAME) ITEMS CORRECTED ARE REPORTED IAW REF B AS FOLLOWS:
1. (BOILER NUMBER)
A. BIRMIS ITEM (I.E., B14/01) JOB SUBMITTED JSN (NUMBER)
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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VOLUME IV

CHAPTER 4

DIESEL ENGINES

REFERENCES.

(a) OPNAVINST 9220.3 - Propulsion and Auxiliary Plant Inspection and Inspector Certification Program
(b) NAVSEA S9233-CJ-HBK-010/020 - U.S. Navy Diesel Engine Inspectors Handbook, Parts 1 (Inspection Procedures) and 2 (Technical Information)
(c) NAVSEAINST 4730.1 - Shipyard Inspection and Required Conditions of Propulsion Plant Systems (Non-Nuclear) on Nuclear Powered Submarines
(d) NAVSEAINST 4730.2 - Inspection and Required Conditions of Propulsion Plant Systems (Non-Nuclear) for Nuclear Powered Aircraft Carriers
(e) NWP 1-03.1 - Naval Warfare Publication Operational Report
(f) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual
(g) NAVSEA S9086-HB-STM-010 - NSTM Chapter 233 (Diesel Engines)
(h) NAVSEA S9086-H7-STM-010 - NSTM Chapter 262 (Lubricating Oil)
(i) NAVSEA S9086-GX-STM-020 - NSTM Chapter 220, V3 (Water Treatment)

LISTING OF APPENDICES.

A Assessment/Inspection Main Propulsion Diesel Engine and Ship Service Diesel Generators for LSD-41/49 and LPD-17 Class Ships

4.1 PURPOSE. To provide guidance for the conduct of diesel engine inspections, timely correction of discrepancies and the general operation and maintenance of diesel engines.

4.2 DIESEL ENGINE INSPECTOR CERTIFICATION. The Diesel Engine Inspector (DEI) Program Manager is Naval Sea Systems Command (NAVSEA) Philadelphia. The Regional Maintenance Center (RMC) is the administrative manager for their respective region. DEI certification and certification extension requirements as outlined in reference (a), are amplified as follows:

a. Initial Certification. All DEI candidates that have satisfactorily completed the required Certification course, Service School Command A-652-0311, shall receive an Interim Navy Enlisted Classification (NEC). The DEI candidate will have a period of one year from course completion date to satisfactorily perform two diesel inspections under instruction from a certified DEI. Upon completion of the second, successful inspection, the candidate must submit a request to be assigned the DEI NEC 4314, through his chain of command to the appropriate RMC for their review. The RMC will forward their endorsement to the Type Commander (TYCOM) for their endorsement, if required, and then to NAVSEA Philadelphia, who initiates the process of assigning the 4314 NEC. Initial qualification to perform diesel inspections will be for a period of 36 months. The requesting letter must contain:

(1) A copy of the two completed inspection reports performed under the observation and supervision of a DEI.

(2) Date of graduation from the certification course of instruction.

b. Transfer of the DEI will not require re-designation or re-qualification, as long as the DEI has maintained his qualifications in accordance with paragraph 4.2.c. of this chapter.

c. Maintaining Certification. All DEIs must maintain up to date knowledge of approved inspection practices and policies. Certification will be maintained by:

(1) Successfully conducting a minimum of two inspections annually in accordance with reference (b).

(2) In each calendar year, attending one of the semi-annual inspector seminars. DEIs unable to meet this requirement may obtain a waiver from the Program Manager.

(3) Extending Qualification. Qualified inspectors may request to extend their initial or subsequent qualifications, in 36 month increments, providing that the requirements in paragraph 4.2.c. of this chapter are met. To extend qualification:

(a) The DEI shall submit a letter to the RMC requesting qualification extension that includes a brief description of the inspector's duties during the qualification period, specify the date of the latest seminar attended and provide as enclosures a copy of the two most recent inspection report cover letters performed by the inspector.

(b) The RMC shall endorse the letter and forward it to the Diesel Program Manager.

(c) The TYCOM may require endorsement on these extension requests.

d. Revoking Certification. If an inspector has not maintained the qualification requirements of paragraph 4.2 of this chapter, the RMC may submit a request to the Program Manager to have the DEI NEC4314, removed from the inspector. The TYCOM requires endorsement on this action.

e. Reinstatement of Expired/Revoked Certification. A DEI whose certification either expired or was revoked may request reinstatement of his certification by submitting a letter to the Program Manager via his chain of command and the RMC. The letter must contain:

(1) A brief description of the DEI's duties during and following the certification period.

(2) Copies of the two most recent inspections performed. If the DEI's certification has been expired for more than six months prior to the request or was revoked, the two most recent inspections shall be completed under the instruction of a certified DEI.

4.3 DIESEL INSPECTIONS.

NOTE: FOR THE ASSESSMENT/INSPECTION OF MAIN PROPULSION DIESEL ENGINES (MPDE) AND SHIP SERVICE DIESEL GENERATORS (SSDG) ON LSD-41/49 AND LPD-17 CLASS SHIPS SEE APPENDIX A.

4.3.1 Diesel Engines Requiring Inspections.

a. All diesel engines, including main propulsion, ship service and emergency diesel generators onboard ships and submarines shall be inspected in accordance with references (a) and (b).

b. All small boat diesel engines, including main propulsion, ship service and emergency diesel generators that are 400 Brake Horsepower and above, unless otherwise determined by TYCOM, shall be inspected in accordance with references (a) and (b). TYCOMs may exempt diesel engines on small boats and craft from inspection requirements where the engine or boat configuration provides insufficient access to accomplish the inspection.

4.3.2 Periodicity of Inspections. Diesel engines shall be inspected in accordance with references (a) and (b) on the following events:

a. Routine/Pre-Availability Inspections.

(1) Once during the unit's cycle, not to exceed 24 months. The normal interval between routine diesel inspections is 18 months. Routine/Pre-Availability Inspections may be performed as early as 12 months or as late as 24 months to allow for maximum scheduling flexibility and utilization of assessment findings. The TYCOM, Immediate Superior in Command (ISIC) and other Fleet Maintenance Managers shall ensure the Routine/Pre-Availability Inspection is scheduled to allow adequate time prior to availabilities to utilize the inspection/assessment results to plan work on the diesel. As per reference (a), in no case shall the interval between Routine Inspections exceed 24 months. A Routine/Pre-Availability Inspection normally consists of all three phases as discussed in paragraph 4.3.4 of this chapter. For Emergency Diesel Generators (EDG) onboard nuclear powered vessels, industrial activity work on the diesel engine(s) or its support systems will not normally be approved except during a Chief of Naval Operations (CNO) Availability. The TYCOM/ISIC shall ensure that adequate upkeep time is made available prior to the availability to ensure there are a sufficient number of diesel engines with no outstanding discrepancies to provide the required standby power during the availability.

(2) For Submarine CNO Availabilities greater than six months.

(a) The Pre-Availability Inspection shall be integrated into the Shipyard's work definition period and shall be considered the Pre-Availability Test for the EDG.

(b) SUBMEPP shall enter this Pre-Availability Inspection in the applicable 000-Series SWLIN as a Pre-Availability Test assigned to Forces Afloat.

(c) The DEI shall include the Executing Shipyard (Code 260) and the Supervisor of Shipbuilding/NAVSEA Shipyard Representative's Office, as applicable, on distribution for all DEI reports conducted as a Pre-Availability Inspection or during the availability.

(d) As Lead Maintenance Activity, the executing shipyard will work with the TYCOM to assign all deferred inspection deficiencies to the appropriate repair activity for repair.

(e) The Shipyard's technical review of this inspection report may satisfy the Pre-Availability technical assessment requirement of reference (c).

b. Post Casualty/Pre-Overhaul. When major internal engine malfunctions have occurred or are suspected (e.g., crankcase explosion, major bearing, blower or crankshaft failure), or there are indications that the engine is in need for overhaul. Extent of disassembly/inspection is at the discretion of the DEI based on the casualty or observed indications. For Post Casualty Inspections, the DEI must determine the full extent of damage and the cause, along with recommendations for repairs. For Pre-Overhaul Inspections, the TYCOM may require the DEI confirm that an overhaul is required and determine the scope of the overhaul. Partial inspections do not satisfy the requirement for a complete Routine Inspection and this fact will be annotated in the DEI's written report.

c. Post Overhaul/Repair. When an engine has been overhauled or significant maintenance/repair has been completed. A Post Overhaul/Repair Inspection shall be conducted by a DEI prior to continuous operation. The DEI will make the final determination of whether the overhaul/repair was extensive enough to warrant a Post Overhaul/Repair Inspection. The inspection shall consist of a review of actions taken to complete the overhaul/repair, external visual inspection, tests of safety devices, review of required readings/clearances and a Phase III operational test. Unless there are indications of internal discrepancies, Phase II (internal inspection) is waived and the Routine Inspection periodicity requirement in paragraph 4.3.2.a of this chapter will be considered complete and valid. The Post Overhaul/Repair inspection should be an integral part of the overhaul/repair vice a separate inspection. Specifically, the Phase III operational test should be part of the final operational testing of the overhaul/repair vice a separate operational test.

(1) For contractor accomplished work, the contractor specification will contain requirements for the contractor to document required readings/clearances on applicable forms and have appropriate check points made by a DEI/Industrial Subject Matter Expert (SME) during the overhaul/repair. If there is evidence of poor workmanship, use of improper parts, discrepancies in reassembly/test documentation or missing information as part of the repair process or during the inspection, the DEI/Industrial SME will advise the Repair Project Manager of the quality issues and required actions. The Repair Project Manager will coordinate required actions with the RMC Technical Authority and Maintenance Team. The RMC shall liaise with the TYCOM and obtain TYCOM concurrence on all required actions and shall advise the TYCOM of all potential cost and schedule impacts.

(2) For Ship's Force/Fleet Maintenance Activity accomplished engine overhauls, a Post Overhaul/Repair Inspection will be conducted by a DEI prior to starting the engine. The scope of the inspection will be as specified in paragraph 4.3.2.c of this chapter. Commanding Officer (or designated representative) permission is required to perform Phase II (internal inspection) when requested by the DEI.

d. New Construction (Acceptance Inspection).

(1) Prior to the delivery of a newly constructed ship, when requested by the Board of Inspection and Survey. An acceptance inspection will normally be conducted in conjunction with the open-and-inspect phase of Board of Inspection Survey acceptance trials. The acceptance inspection does not satisfy the requirements of a routine inspection.

(2) The initial Routine Inspection on a new construction unit shall occur prior to initial start up by Ship's Force. The cognizant Supervisor of Shipbuilding should incorporate the DEI as part of the Government Test Plan/Acceptance Plan. The cognizant Supervisor of Shipbuilding shall notify the DEI for new construction acceptance test prior to Ship's Force accepting responsibility of the diesel engine. This will ensure that an inspection baseline is established and construction discrepancies are identified/corrected early in the life of the unit.

(3) For submarine and CVN construction programs, the initial Routine Inspection on a new construction unit shall occur prior to initial start up by Ship's Force. For ships with temporary systems in place or less than 95 percent load available, the Phase I (see paragraph 4.3.4a of this chapter) and Phase II (see paragraph 4.3.4b of this chapter) inspections shall occur in conjunction with crew Operational Control Transfer including an operational test at available load. The Phase III (see paragraph 4.3.4c of this chapter) inspection shall occur prior to ship delivery when sufficient loading is available. Any as found conditions requiring corrections shall be adjudicated via the normal shipyard Operational Control Transfer inspections adjudication process. The routine diesel inspection periodicity shall commence upon completion of all three diesel engine inspection phases.

e. Reactivation of Engines in Inactive Equipment Maintenance. Prior to the first operation of engines which have been placed in Inactive Equipment Maintenance. The inspection consists of a Phase I review of the actions taken to place the engine in and out of lay-up status, external visual inspection, test of safety devices and a Phase III operational test. Unless there are indications that an internal inspection (Phase II) is required, the inspection will be considered complete. This inspection should be requested far enough in advance of the first key event requiring use of the diesel. This will ensure any significant discrepancies found can be corrected prior to the start of the key event. This inspection does not satisfy the requirements of a routine inspection as per paragraph 4.3.2.a of this chapter unless a complete Phase II is accomplished.

4.3.3 Inspection Scheduling.

a. Diesel inspections are scheduled by the ship with RMC, via ISIC when appropriate, in accordance with reference (a) and the Planned Maintenance System (PMS). As part of this process, units shall contact the local RMC/ISIC Diesel Inspector to schedule the diesel inspection 120 days prior to the desired inspection date and submit a work request (OPNAV 4790/2K) to the appropriate RMC a minimum of 90 days in advance of the desired dates to allow for DEI scheduling.

b. It is the responsibility of the Fleet Maintenance Managers (the ship, ISIC, and Ashore Ships Maintenance Managers, as appropriate) to schedule the diesel inspection with the RMC during a period where the inspection's condition assessment can be best utilized for repair planning. The inspection may require that each engine being inspected normally be placed out of commission for five to seven days at the minimum. This time frame may increase when significant Repair Before Operating (RBO) discrepancies are discovered that require extensive repairs. Sufficient time must be allowed for the performance of the operational phase of the inspection which requires specific load testing as defined by PMS. SSDGs normally have the operational phase performed inport, whereas operational assessment of MPDEs requires the ship to be underway for a minimum of one day. Units with MPDEs must allot underway time to allow the DEI to complete the operational phase. The operational phase of the inspection must be completed within 90 days of the start of the inspection. If the operational phase cannot be completed within these 90 days, a TYCOM approved Departure From Specification (DFS) per Volume V, Part I, Chapter 8 of this manual is required. Without a DFS, the inspection will be terminated and rescheduled. Ships should integrate the operational phase of the inspection into the Fleet Response Training Plan underway schedule.

c. A Diesel Inspection shall be accomplished by an ISIC/RMC DEI. It is encouraged that persons holding the DEI NEC that may be assigned to the ship being inspected be part of this inspection.

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. An RBO condition is any condition existing that, if left unattended, would pose an immediate or near term hazard to personnel safety. Only a DEI that is currently certified may issue an RBO. RBO deficiencies require reinspection by a DEI that is currently certified after repairs and before the diesel engine is operated. A DFS will not be approved for RBOs. If there is not an immediate or near term danger to personnel but there is to the equipment, the discrepancy shall be assigned as SEVERELY DEGRADED with major operational restrictions. A diesel engine with SEVERELY DEGRADED condition cannot be operated until it is corrected/repaired and reinspected or has a properly approved Major DFS. 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 would pose a hazard to personnel.

e. Uncontrollable lube oil or fuel oil leaks.

f. Lube oil fuel dilution above safe levels.

g. Evidence of serious internal 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.

j. Jacket water treatment out of specification.

4.3.6.3 Minor Deficiency. Categorize all other deficiencies as minor.

4.3.6.4 Re-inspections. RBO deficiencies must be re-inspected prior to engine operation by a DEI. If possible, the original DEI should be used, if available. Re-inspection of major and minor deficiencies is not required unless stated in the engine's inspection report.

4.3.6.5 Recurring Discrepancies. A recurring discrepancy from a previous inspection will be so noted on the inspection report.

4.3.6.6 Component Certification (Aircraft Carriers only). With the exception of RBOs, deficiencies identified in the course of diesel engine inspections performed prior to or during a CNO availability do not necessarily affect component certification to support readiness conditions identified in reference (c) and reference (d). Evaluation of specific deficiencies by Ship's Force and Naval Supervisory Authority/project team personnel is necessary to determine system readiness conditions are met. An emergency diesel generator is considered certified for operation per reference (c) and reference (d) provided the diesel inspection and all required PMS are within periodicity, including completion of a satisfactory performance test.

4.4 REPORTING REQUIREMENTS.

a. Casualty Reporting (submarines only).

(1) Purpose. To provide guidance for Casualty Reporting (CASREP) requirements for submarine diesel generators. CASREPs are in addition to, and do not replace the reporting requirements of other documents (e.g., Naval Reactors Technical Bulletins, Operational Orders, Mishap Reports, etc.).

(2) Background. The significance of a submarine's emergency and backup power supplies cannot be overstated. Reference (e) defines the CASREP types, requirements and format. CASREP requirements of Out of Commission power generating or storage equipment require additional clarification.

(3) SSBN/SSGN Class Submarine EDGs. Report EDG casualties by message as allowed by operational constraints.

b. The ship's Commanding Officer shall:

(1) Ensure that each inspection/assessment is entered in the applicable machinery history with a brief description of any RBO conditions found at the conclusion of the assessment/inspection.

(2) All maintenance actions and parts usage as the result of the inspection/assessment are properly documented in accordance with reference (f).

(3) Send a Naval message listing the status of all discrepancies listed in the inspection/assessment report within 30 days of receipt of the serialized report and every quarter thereafter until all deficiencies are corrected/resolved or brokered by the Maintenance Manager. The message must contain the engine number, date of inspection, type of inspection conducted, and the status of deficiencies not previously reported as corrected or a listing of what has been brokered. All deficiencies not corrected during or immediately after the inspection must have a Job Control Number assigned and be listed in the message. The ISIC/Fleet Maintenance Managers shall ensure that the deficiencies listed in the inspection/assessment message are corrected at the earliest opportunity in the unit's maintenance cycle.

c. The DEI shall:

(1) The DEI shall ensure a maintenance ready 2-Kilo for every discrepancy found during the inspection is entered into the Current Ship's Maintenance Project. The DEI shall also make a verbal report to the ship's Commanding Officer or his designated representative. The verbal report should discuss the findings of the inspection/assessment, with special note of recurring discrepancies from previous inspections/assessments.

(2) Prepare the inspection report in accordance with reference (b) within 30 days following completion of the inspection. The write up shall further detail the cause or conditions that lead to the discrepancy noted on the 2-Kilo or in the report. The report shall identify what was accomplished during the inspection/assessment to correct any discrepancies and any actions required to correct outstanding discrepancies.

(3) Utilize the Diesel Inspection Management Information System using the DEI report generator for classes of ships that are currently in use. For classes of ships that are not yet in the system, use the current guidance that is in reference (b). This inspection shall be reviewed by the RMC prior to forwarding the report to the Commanding Officer of the inspected ship, with information copies to the ISIC, TYCOM, Fleet Maintenance Managers, the cognizant Shipyard (Code 260) and Supervisors of ShipBuilding/NAVSEA Shipyard Representative's Office (Pre-Availability and during Availability Inspections only) and In Service Engineering Agent.

4.5 OPERATION AND MAINTENANCE. This section does not supersede existing engine, ship or ship class specific guidance and is only meant to provide guidance where currently none exists.

a. Per reference (g), the light loading of a diesel engine (less than 60 percent) should be avoided. Consistently light loading a diesel engine will cause one or more undesirable conditions, depending on specific engine design:

(1) A loss of cylinder compression due to glazed cylinder walls, leading to an unnecessary premature engine overhaul.

(2) Carryover of engine lube oil into the exhaust, causing excessive exhaust smoke and creating conditions for a possible exhaust stack fire.

(3) Fuel oil dilution of lube oil, leading to frequent oil changes.

(4) Carbon formation on exhaust valves, leading to valve failure.

In situations where light loading of a diesel engine is unavoidable, arrangements should be made to operate the engine at 60-80 percent rated load capacity for a minimum of thirty minutes, preferably three hours, unless other guidance exists specific to the engine's application. This can help offset the detrimental effects of light loading; however, it is not to be considered a suitable alternative to the avoidance of light loading. Further details are provided for LSD-41/49 Class MPDE in Appendix A.

b. Per reference (h), diesel engines that have online purification capability shall operate the purifier continuously while the diesel engine is operating. On installations where multiple engines are serviced by one purifier, the purifier alignment should be shifted periodically within a 24 hour period to ensure all engines receive adequate oil purification and maintain satisfactory oil condition. Each engine's operating hours and oil condition should be considered when scheduling purification of several engines on a rotational basis.

c. Per reference (i) and PMS, diesel engine jacket water treatment must be tested and maintained to ensure proper corrosion control and freeze protection, as applicable.

d. Diesel engine operating hours since engine commissioning, engine overhaul and lifecycle maintenance requirement completions (PMS/Class Maintenance Plan requirements), at a minimum, shall be maintained on all MPDEs, SSDGs, and EDGs. The hours shall be documented and recorded in the appropriate machinery history records in order to assist with scheduling of overhauls and lifecycle maintenance requirements. An overhaul typically includes rebuilding/replacing, as complete sets to new criteria the following components: cylinder heads, piston rings, cylinder liners, main and connecting rod bearings. If one of these sets is not rebuilt/replaced, the repair is generally not considered an overhaul and engine operating hours since overhaul shall not be zeroed, however, machinery history will be

updated and lifecycle operating hours since the significant repairs shall be tracked. A certified DEI shall make the final determination if the extent of the work accomplished constitutes an engine overhaul for a particular engine or not during execution of the Post Overhaul/Repair Inspection detailed in paragraph 4.3.2(c) of this chapter.

4.6 COMPLIANCE.

a. All ships, submarines and craft shall comply with the procedures herein for the operation, maintenance and inspection of installed diesel engines.

b. Ship's Commanding Officers shall ensure all diesel records are readily available for the inspector's review and Ship's Force use, including:

(1) Engine operating logs.

(2) Navy Oil Analysis Program test results, or, for submarines, the applicable oil analysis results.

(3) Onboard lube oil testing logs.

(4) Diesel Maintenance/history records to include all maintenance and significant items accomplished on the engine since last engine overhaul.

(5) Diesel operating and maintenance documents, including Engineering Operational Sequencing System, Steam Plant Manual, Ship System Manual (Submarines only), PMS, Engineering Standing Orders, etc., as appropriate.

(6) Engine hours log.

(7) Diesel inspection reports since last overhaul and associated Naval message on the status of discrepancies.

(8) Fuel Oil Quality Management records.

(9) Diesel Engine Technical Manuals.

(10) References (g), (h) and (i).

(11) Appropriate diesel-related Training records.

c. The TYCOM/ISIC shall ensure that assigned ships operate and maintain diesel engines in accordance with the procedures in references (a), (b), (g), (h) and (i). Specifically, they shall:

(1) Ensure ships are complying with all required instructions by observation of diesel engine operations during shipboard visits.

(2) Conduct follow-up action to ensure that any unsatisfactory conditions found are correct at the earliest possible date.

(3) Maintain a library of technical material and appropriate visual aids for use by assigned ships in training diesel operations.

d. (Submarines only) Ensure the induction and exhaust systems are inspected in accordance with the appropriate Maintenance Requirement, and/or Maintenance Requirements for continued Unrestricted Operation.

4.7 SUBJECT MATTER EXPERT IN THE REPAIR AND MAINTENANCE OF DIESEL ENGINES. The SME provides technical oversight on all scheduled and emergent work performed by the RMC personnel, and contractor, as required. The SME ensures work packages include proper repair procedures and are used with maintenance standards and appropriate technical documentation related to the diesel engine assessment/inspection. The SME shall have direct communication with the RMC Engineering Department regarding resolutions of repairs that do not meet Original Equipment Manufacturer specifications.

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APPENDIX A

ASSESSMENT/INSPECTION MAIN PROPULSION DIESEL ENGINE AND SHIP SERVICE DIESEL GENERATORS FOR LSD-41/49 AND LPD-17 CLASS SHIPS

Purpose: To provide direction for assessment vice inspection of LSD-41/49 and LPD-17 Class ship engines.

1. ROUTINE/PRE-AVAILABILITY DIESEL INSPECTION. Per Commander Naval Surface Force policy and concurred by NAVSEA Technical Warrant, the Routine/Pre-Availability diesel inspection directed by reference (a) is replaced with this Appendix's diesel assessment process. Note that Paragraphs 4.3.2.(b) through 4.3.2.(e) of this chapter remain applicable for LSD-41/49 and LPD-17 class MPDE and SSDGs.

2. OBJECTIVE. Significant repairs and I/D-Level work packages shall be accomplished by directive maintenance. Condition based maintenance is defined as maintenance that is directed by the engine's condition. Engine condition shall be assessed by non-intrusive monitoring and analysis of operating data, supplemented by engine performance data. The goal is to avoid significant disassembly, which includes such things as removal of cylinder heads, bearings, vertical drive assemblies, etc. Significant disassembly does not include removal of covers, use of borescopes, conducting main bearing presses, or removal of fuel injection components.

3. ASSESSMENT. Assessment of engine condition shall be accomplished by two, interrelated processes: Continuous Assessment/Analysis of data and Formal Periodic Assessment/Analysis of equipment condition and on board documentation. This process is based on continuous assessment and continuous analysis, is focused on the integration of fluid management, measured engine performance, assessment, analysis, recommendations and feedback.

4. CONTINUOUS ASSESSMENT/ANALYSIS. Each engine's condition data shall be analyzed on a monthly basis to identify any abnormalities, downward trends or other issues. Results of each Continuous Assessment shall be reported, with recommendations for corrections of any problems/potential problems, to the Ship's Engineer Officer and ISIC and documented in the Shipboard Automated Maintenance Module (SAMM). Condition data assessed shall include, but not limited to:

a. Lube oil results from onboard oil test kits (Kittiwake).

b. Lube oil results from shore based oil testing lab (PREDICT).

c. Fuel oil log results.

d. Jacket water log results.

e. Engine hour data.

f. Engine repair data.

g. Electronic log review.

h. Engine performance data (DOCTOR).

If the ship is locally available, a visit shall be conducted to review the data with ship's personnel.

5. FORMAL PERIODIC ASSESSMENT/ANALYSIS. A Periodic Assessment will be accomplished with the same periodicity as non-LSD-41/49 and LPD-17 MPDE and SSDG diesel engine inspections. At the 18th month point, a formal data review of the previous 18 months of collected data will be completed to determine if the data supports continued engine operation without inspection. This analysis will also be used as the foundation for recommending directed inspection of specific engine components as required. A minor DFS is required to the TYCOM with recommendation from RMC to extend engine operation to 24 months without completion of the formal periodic assessment. Extension of the assessment beyond 24 months will require a major DFS granted by NAVSEA 05. The 18 month clock is either measured from the last Periodic Assessment, the last diesel inspection, or the one-time baseline assessment, or as directed by an approved DFS (see below), as applicable. The DEI shall perform everything in the Continuous Assessment plus Phase III – Operational Inspection (paragraph 4.3.4.c. of this chapter). The DEI will determine if a full Phase II (paragraph 4.3.4.b. of this chapter), a focused portion of Phase II, as required PMS MRCs related to a Phase II, or any other significant disassembly is warranted. If the DEI

concludes that all or part of Phase II, specific PMS MRCs, and/or significant disassembly is warranted, then the RMC shall recommend this to the TYCOM by Naval Message for TYCOM approval. If the DEI concludes that the diesel engine is in sound condition and does not warrant any part of Phase II, applicable MRCs, or significant disassembly, then the RMC shall recommend by Naval Message to the ship to submit a DFS extending their periodic assessment. TYCOM can extend the periodic assessment up to 24 months with a minor DFS; beyond 24 months will require a major DFS granted by NAVSEA 05. The DFS approval shall include when the next Periodic Assessment should be scheduled.

6. RESPONSIBILITIES.

a. TYCOM. Review/approve RMC recommendations resulting from Formal Periodic Assessments/Analysis.

b. ISIC. Ensure that the ship has available time in the schedule to execute the Formal Periodic Assessment/Analysis.

c. RMC. Maintenance Team to schedule Formal Periodic Assessments/Analysis. The RMC shall provide the Formal Periodic Assessment/Analysis recommendations to TYCOM by Naval Message. Maintenance Team will schedule diesel engine repair work based on results of the Continuous Assessments, Formal Periodic Assessments, Current Ship's Maintenance Project, emergent repairs and Class Maintenance Plan.

d. DEI. DEI will complete the appropriate sections of the DEI Report, defined by reference (b), for each Periodic Assessment and post them in SAMM. DEI will also post results of Continuous Assessments in SAMM. When performing steps 4.3.2.b through e of this chapter, DEIs shall utilize engine condition data to the fullest extent possible.

e. SHIP. To submit oil samples, record DOCTOR data, Kittiwake results, engine operating hours, maintenance actions accomplished (including PMS), fuel oil, jacket water data and any abnormal conditions in SAMM. To follow the actions recommended by the shore based technical community's assessment and report the actions taken and the results in SAMM.

f. IN-SERVICE ENGINEERING ACTIVITY. Monitor the Continuous Assessment/Analysis and Formal Periodic Assessment/Analysis process, utilizing SAMM.

7. FUEL OIL DILUTION. Additional guidance for fuel oil dilution of lube oil for LSD-41/49 MPDEs and SSDGs:

a. Fuel dilution 1.0-2 percent is a cautionary condition and requires monitoring by daily sampling.

b. Fuel dilution greater than 2 percent is a hazard condition and considered unacceptable for continued use.

c. Fuel dilution greater than 5 percent is a RBO per paragraph 4.3.6.1 of this chapter.

Source of fuel shall be identified and repaired. Sump and lube oil filters and strainers shall be drained and refilled with new oil when operationally feasible and resample to confirm corrected condition. Engines with fuel dilution levels greater than 2 percent may be operated at the discretion of the Commanding Officer if operational circumstance dictates (e.g., restricted maneuvering) with a TYCOM DFS.

8. LIGHT LOADING. Additional guidance for light loading of LSD-41/49 MPDEs: Light loading of Pielstick PC2.5 MPDE is defined as operation below 60 percent of the engine rating. This translates to operation of the engine at below 24 mm fuel rack position. Light loading of MPDEs should be avoided. In situations where light loading of engines is unavoidable, arrangements should be made to operate the engines at above 80 percent rated load (31 mm fuel rack). Operation above 80 percent rated load shall be conducted for a minimum of one hour (after operating temperatures and pressures have stabilized) for every four hours of light load operation during a twenty-four hour period.

VOLUME IV

CHAPTER 5

MARINE SANITATION DEVICES

REFERENCES.

(a) NAVSEAINST 9593.1 - Certification Program for Sewage Marine Sanitation Devices in U.S. Navy Surface Ships and Craft
(b) OPNAVINST 5090.1 - Environmental and Natural Resources Program Manual
(c) NAVSEA S9086-T8-STM-010 - NSTM Chapter 593 (Pollution Control)
(d) NAVSEA S9086-CH-STM-030 - NSTM Chapter 074 V3 (Gas Free Engineering)
(e) NWP 1-03.1 - Naval Warfare Publication Operational Report
(f) NAVEDTRA 10500 - Catalog of Navy Training Courses

5.1 PURPOSE. To provide guidance in the operation, maintenance and certification of surface ship Marine Sanitation Devices (MSD) and to specify the requirements, procedures and responsibilities applicable to those systems.

a. Sewage systems must be properly operated and maintained or serious health hazards can result. References (a) and (b) require that all MSD systems being installed on naval ships and craft be inspected and certified. The prevention of health, sanitation and safety problems associated with the various sewage handling and disposal systems shall be a priority matter.

b. Environmental considerations have made the operation of shipboard sanitation systems more restrictive with regard to the discharge of sewage to navigable waters. Local and State environmental laws are generally more restrictive than the requirements of reference (b). Senior Officer Present Afloat regulations are continually reviewed and revised to comply with the laws under which the Senior Officer Present Afloat is licensed to operate sanitation systems.

5.1.1 Scope. This chapter is applicable to all surface ships, service craft and small boats on which pollution abatement sewage systems are installed, either during construction or by alteration. It includes all types of shipboard sewage handling and treatment systems or MSDs certified in accordance with reference (a) and described in Section 4 of reference (c). Reference (d) describes the procedures, equipment, and records to be used during maintenance of MSD system components where toxic and/or combustible gases may be present. The most common pollution abatement sewage system in use on ships and craft is the Collection, Holding and Transfer system. Other systems in use include the Pall Trinity, JERED, GATX MK1 and the Vacuum Collection, Holding and Transfer System.

5.2 CERTIFICATION. The purpose of MSD certification is to confirm that the system, as installed, meets established design requirements, that adequate logistic support is available onboard, and that major installation deficiencies are corrected. A single level certification program has been implemented by Naval Sea Systems Command to supersede the older two level system (provisional and full). Ships that presently hold a “Full” certification are considered to be certified and require no further certification inspections.

5.3 RESPONSIBILITIES. The cognizant Type Commander (TYCOM) will coordinate the operation, maintenance, and certification of MSD systems installed on all units in accordance with the procedures established by references (a) and (c).

5.3.1 Type Commander/Immediate Superior In Command. The TYCOM/Immediate Superior In Command shall:

a. Ensure surface ships participate in the pollution abatement program to the maximum extent possible by utilizing their pollution control equipment when within U.S. territorial waters (three miles).

b. Ensure MSD systems are properly installed, operated, and maintained and that shipboard personnel working with sewage systems are properly trained in health and sanitation procedures.

5.3.2 Commanding Officer/Officer In Charge. The Commanding Officer/Officer In Charge shall:

a. Oversee the correction of discrepancies on MSD system installations in accordance with reference (a).

b. Prevent food stuffs from being stored in areas adjacent to or below sanitation system valves, flanges, or take down joints. Drip pans shall be installed beneath all sanitation system valves, flanges and take down joints in health sensitive areas.

c. Log the time, duration and justification for each unavoidable discharge of prohibited sewage in restricted waters. Notify the TYCOM and Immediate Superior In Command of each occurrence. In a situation where holding sanitary wastes would present a health or safety hazard, the system shall be reported by Casualty Report in accordance with reference (e) and secured.

5.4 SYSTEM MAINTENANCE AND INSPECTION.

5.4.1 Fleet Maintenance Activity Maintenance.

a. Ship-to-Shop Work. All Fleet Maintenance Activities are capable of accomplishing repair and overhaul of all MSD components on a ship-to-shop basis. When components are delivered to the Fleet Maintenance Activity, their cleanliness will be certified in writing by the delivering ship's Medical Department representative.

b. MSD Cleaning. The only authorized MSD pipe cleaning processes are hydroblast cleaning and acid cleaning. Acid cleaning may only be performed by qualified activities using the procedures of reference (c). Request cleaning for the removal of hard deposits which cannot be removed by ordinary shipboard means.

(1) Due to the extreme hazards involved in cleaning MSD systems, a high level of supervisory attention must be applied to all evolutions. An agreement on the procedures to be used by the Fleet Maintenance Activity and Ship’s Force shall be established by a locally prepared Memorandum Of Agreement which describes all aspects of the operation.

(2) Disposal of effluent must be accomplished in an environmentally safe manner. Depending on port availability, the following methods of disposal must be used in priority order:

(a) Discharge to pier side sewage system.

(b) Discharge to tank truck or barge.

(c) Discharge to sea (when hydroblasting while underway).

(d) If none of the above methods are available, and an emergency situation exists, refer to reference (b) for emergency disposal requirements.

5.5 TECHNICAL SYSTEM ASSESSMENT.

a. Technical System Assessments may be requested for training or, when necessary, to develop a work package.

b. Technical assist visits and assessments are described in Volume VI, Chapter 42 of this manual.

5.6 TRAINING.

a. Training courses in the maintenance and operation of MSD systems are offered by Fleet Training Centers at various locations. Consult reference (f) for current course offerings and details.

b. On ships with Collection, Holding and Transfer and JERED systems installed, the following school graduates are required:

(1) An Officer responsible for the operation and maintenance of the system.

(2) Senior enlisted personnel assigned the responsibility for operation and maintenance of the system.

(3) Other maintenance personnel; at least one in each inport duty section.

VOLUME IV

CHAPTER 6

OXYGEN AND NITROGEN SYSTEMS

REFERENCES.

(a) NAVSEA S9086-SX-STM-010 - NSTM Chapter 550 (Industrial Gases; Generating, Handling, and Storage)
(b) MIL-STD-1330 - Standard Practice for Precision Cleaning and Testing of Shipboard Oxygen, Helium, Helium-Oxygen, Nitrogen and Hydrogen Systems
(c) NAVAIR A6-332AO-GYD-000 - Laboratory and Aviators Breathing Oxygen Field Guide

6.1 PURPOSE. Oxygen - Nitrogen (O_2-N_2) producing storage and transfer systems are installed onboard all Aircraft Carriers, Submarine Tenders and other surface force ships and shore stations to provide liquid and gaseous oxygen and nitrogen for use by Ship's Force and embarked air wings. Guidance for the proper operation and maintenance of these systems is provided by this chapter and references (a) and (b).

6.2 PRECAUTIONS.

a. Oxygen is not flammable but supports and rapidly accelerates the combustion of all flammable materials. Any substance that burns in a normal atmosphere will burn much more rapidly in concentrated oxygen with a much higher flame temperature. Combustible material (e.g., dirt, dust, soap, oil, cloth, paper, wood, cork, carbon black and gasoline) should not be allowed to come in contact with an enriched oxygen environment. Oxygen can cause combustion of substances not normally considered burnable (notably steel wool, thin gauge metals and certain types of cloth).

b. Gaseous nitrogen is an almost totally inert gas, does not burn, and does not support combustion or respiration. It is not poisonous but can displace oxygen from the air and cause asphyxia.

c. Cryogenic fluids (liquid oxygen and liquid nitrogen) are extremely dangerous. They can cause severe burns or frostbite if they contact the skin. Prolonged exposure to the cold vapors can damage delicate tissues such as those of the eye, windpipe and lung. The cold surface of piping components, and vessels containing cryogenic fluid can burn or freeze bare flesh and cause it to stick to the cold metal. At the temperature of cryogenic fluids many metals and other materials become brittle. Ship structural steel can crack if contacted by cryogenic fluid. Liquid oxygen and nitrogen will produce a very large volume of gas when they vaporize. In a closed compartment with inadequate ventilation, vaporizing liquid can create a hazardously high concentration of oxygen or nitrogen. The cloudy vapor that appears from vaporizing liquid, or cold gas venting is condensed moisture, making the issuing gas visible. When handling liquid cryogenic products, personnel must utilize protective clothing in accordance with the requirements of reference (b) and comply with all safety rules.

6.3 AVIATORS BREATHING OXYGEN TESTING.

a. Because of the severe consequences of liquid oxygen failing to meet the standards for Aviators Breathing Oxygen (ABO), stringent requirements for testing and ABO certifications have been established. Liquid oxygen/nitrogen is to be sampled and tested for production and stowage in accordance with reference (a) and Planned Maintenance System procedures.

b. All Aircraft Carriers producing ABO have certified ABO test sites and are capable of certifying shipboard produced liquid oxygen. These ABO test sites are under the control of the shipboard Aviation Intermediate Maintenance Department. The testing and surveillance requirements of Aircraft Carrier shipboard O_2-N_2 plant oxygen/nitrogen products must be accomplished in accordance with reference (a) and meet the spectrographic analysis requirements of reference (c).

c. Aircraft Carrier O_2-N_2 producers are known to experience high levels of methane (i.e., aircraft exhaust fumes, Collection, Holding and Transfer system discharge and boiler/Emergency Diesel Generator exhaust gases) which exceed the current established maximum limit of 25 parts per million per reference (c). The following direction is established for aircraft carrier O_2-N_2 producer liquid samples as stated in reference (a).

(1) For shipboard produced liquid oxygen, the limit for methane, when sampled at the storage tank, is 75 parts per million. This limit shall not be exceeded.

(2) Liquid oxygen samples drawn from the storage tank are "customer/user" samples, for issuance in compliance with the ABO surveillance program. Samples from the O_2-N_2 producer are Maintenance samples used for monitoring and contaminate analysis and correction.

d. If at any time a liquid oxygen test sample or test method is found unsatisfactory, Ship's Force O_2-N_2 Plant operators and Aviation Intermediate Maintenance Department ABO laboratory personnel shall work together to identify and correct the problem. Guidelines to follow for this are outlined in references (a), (b), and (c).

e. Certification of high pressure gaseous storage flasks shall be performed in accordance with reference (b).

6.4 OPERATIONS AND MAINTENANCE.

a. In accordance with reference (a), only qualified personnel with full knowledge and understanding of the applicable safety requirements and hazards associated with oxygen production and handling shall be permitted to handle gaseous and liquid oxygen aboard ship. Equipment such as O_2-N_2 producing plants, storage tanks, and pump-vaporizer units shall be operated only under the supervision of a Fleet Cryogenics School graduate that holds a current Navy Enlisted Classification (NEC)-4283 qualification. Ideally, all operating personnel, as well as supervisory personnel, will be graduates of the Cryogenics School; however, there may be cases where sufficient personnel with this formal training are not available. In this event, operators trained by a currently qualified NEC-4283 supervisor may be used if they have successfully completed the required Personnel Qualification Standard and are designated in writing by the Commanding Officer.

b. Only qualified personnel will be authorized to perform oxygen clean maintenance and repairs to shipboard oxygen or nitrogen system components. The procedures and guidelines, as stated in reference (b), must be followed.

c. High-Pressure O_2-N_2 Producers onboard Aircraft Carriers are equipped with R-22 Refrigeration Units. When maintenance or repairs are being conducted on this equipment strict guidance must be followed to prevent the release of any ozone depleting substances (i.e., CFCs and HCFCs) to the atmosphere as mandated by the Environmental Protection Agency Clean Air Act. The Environmental Protection Agency Clean Air Act, Section 608 prohibits individuals from knowingly venting ozone depleting compounds, used as refrigerants, into the atmosphere while maintaining, servicing, repairing, or disposing of air-conditioning or refrigeration equipment. Only the following four types of ozone depleting substance venting releases are permitted under this section of the act.

(1) Absolute minimum quantities of refrigerant released in the course of making good faith attempts to recapture and recycle or safely dispose of refrigerants.

(2) Refrigerants emitted in the course of normal operation of air-conditioning and refrigeration equipment, (i.e., purging of air and non-condensable gases), as opposed to during the maintenance, servicing, repair or disposal of the equipment.

(3) Mixtures of nitrogen and R-22 that are used as holding charges or as leak test gases, because in these cases, the ozone depleting compound is not used as a refrigerant. However, a technician may not avoid recovering refrigerant by adding nitrogen to a charged system.

(4) Small releases of refrigerant which result from purging hoses or from connecting or disconnecting hoses to charge or service appliances. Additionally, refrigerant recovery and recycling equipment must be equipped with low-loss fittings.

d. Personnel who perform maintenance or repairs to equipment that utilize ozone depleting substances, are required to successfully pass an Environmental Protection Agency approved technician certification test and be licensed before any commencement of work begins.

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VOLUME IV

CHAPTER 7

ACCOUNTABILITY AND CERTIFICATION OF NUCLEAR PROPULSION PLANT TEST AND SUPPORT EQUIPMENT

REFERENCES.

(a) NAVSEA 0989-031-4000 - Reactor Plant Instrumentation and Control Equipment Maintenance
(b) NAVSEA 0989-064-3000 - Cleanliness Requirements for Nuclear Propulsion Plant Maintenance and Construction

LISTING OF APPENDICES.

A Nuclear Test Equipment Check-Out/Check-In Form
B Nuclear Support and Test Equipment Certification Record

7.1 PURPOSE. To promulgate requirements for the certification and accountability of Nuclear Propulsion Plant Test and Support Equipment as required by the applicable Reactor Plant Manual (RPM) and reference (a). Nuclear Propulsion Plant Test and Support Equipment is commonly referred to as Nuclear Test Equipment (NTE).

7.1.1 Discussion. NTE specified by the applicable RPM and reference (a) to support planned and corrective maintenance of Nuclear Propulsion Plant systems must be carefully controlled. Maintaining accountability and certifying accuracy, operability, and reliability per the most current Field Changes and technical specifications is an essential element of reactor safety. The basic elements of the NTE program are certification and verification.

a. Certification is the detailed technical evaluation of the equipment to conclude that the item conforms to the required specification. Certification is conducted prior to initial issue and after any event that invalidates the certification, such as repair, Field Change installation or a revision to the equipment reference drawing/figure and is recorded on a NTE Certification Record. Equipment will normally be maintained in a Ready for Issue, certified condition, requiring verification prior to each issue.

b. Verification is the validation that the equipment is certified based on a review of records and is in a physically acceptable condition for issue and use. Verification is conducted prior to each issue and is recorded on a NTE Check-out/Check-in Form contained in Appendix A of this chapter.

7.2 NUCLEAR TEST EQUIPMENT CATEGORIES. For purposes of this chapter, NTE is divided into three categories.

a. General Purpose Electronic Test Equipment.

b. Electronic/Electrical Test Equipment, non-General Purpose Electronic Test Equipment (e.g., switchboard test equipment, scram breaker time response equipment, etc.).

c. Mechanical Test Equipment.

7.3 ACTION. The Repair Officer shall implement the requirements of this chapter. The Nuclear Repair Officer is designated as the custodian of NTE and shall ensure that assigned personnel carry out the requirements of this chapter.

7.4 PROCUREMENT. Only test equipment meeting the specifications of the applicable RPM and reference (a) may be used to conduct testing on Nuclear Propulsion Plant Systems. Requisitions for new equipment shall contain sufficient detail to ensure the correct item is purchased. Allowance Equipage Lists for required NTE are provided in the tender Coordinated Shipboard Allowance List or Q-Coordinated Shipboard Allowance List. The requirements for General Purpose Electronic Test Equipment to support nuclear electrical/electronics testing are contained in the applicable Ship's Portable Electronic Test Equipment Requirements List.

7.5 NUCLEAR TEST EQUIPMENT CERTIFICATION. NTE shall be certified using a Formal Work Package (FWP) for Electronic/Electrical Test Equipment and a Controlled Work Package (CWP) for Mechanical Test Equipment. Certification is required for new equipment prior to initial issue and following repairs or modifications which could impact performance. Periodic recertification is not required. The FWP/CWP should be as simple as possible. As a minimum, the FWP/CWP shall provide the exact equipment reference and indicate the attributes that must be verified and the required testing. Recertification following repair shall be a step in the repair FWP/CWP. Certification shall be documented on NTE Certification Records and is discussed in detail in paragraph 7.5.4 of this chapter. Certification shall be accomplished per paragraph 7.5.1 or 7.5.2 of this chapter. The ultimate objective is to demonstrate that the NTE available for Nuclear Propulsion Plant application is technically correct.

7.5.1 Electronic/Electrical Test Equipment. The FWP shall require completing and retaining an NTE Certification Record.

a. To certify new or existing measuring and recording equipment, such as a Visicorder or strip chart recorder, verify that the specifications given in the equipment technical manual match the specifications required by the applicable RPM, reference (a), or applicable test reference.

b. To certify repaired or re-calibrated measuring and recording equipment, the repair and/or calibration activity shall certify that the item still conforms to the original technical specifications and is properly calibrated (as evidenced by a calibration sticker). The Fleet Maintenance Activity Work Center performing the repair/calibration shall complete the NTE Certification Record. If the repair/calibration was not performed by the Fleet Maintenance Activity, Nuclear Repair shall certify the equipment. Work orders for repair shall require conformance to referenced drawings and figures.

c. To certify other existing electrical test equipment not previously certified, such as switch boxes, jumper boxes, cables, Under Voltage/Under Frequency test boxes, etc., each component and the wiring configuration shall be compared to the referenced drawing for correctness.

d. To certify other new electrical test equipment verify the test equipment as correct with respect to what was ordered and the nameplate data or other markings compared to the equipment requirements of the RPM, reference (a), or referenced test procedure.

7.5.2 Mechanical Test Equipment.

a. To certify existing or newly manufactured mechanical test equipment, the CWP that manufactures the test equipment shall include steps to verify that the material specifications and configuration match the equipment reference. The CWP shall also include all required testing.

b. To certify purchased mechanical test equipment, the CWP shall include steps to verify the equipment as correct with respect to what was ordered, compare the equipment to the requirements of the RPM, reference (a) and or referenced test procedure and shall also specify any testing that may be required prior to use.

7.5.3 Recertification Following Reference Revision. To certify existing equipment after a revision to the equipment configuration reference, take the actions necessary for the NTE to conform to the revision and complete an NTE Certification Record for recertification. The FWP for Electronic/Electrical Test Equipment and a CWP for Mechanical Test Equipment used to accomplish the equipment changes will specify recertification. A new NTE Certification Record will be generated regardless of whether or not the equipment required modification. The new certification record will serve to update the applicable revision and will provide evidence that the NTE was in fact validated to the correct revision.

7.5.4 Certification Documentation. The FWP or CWP shall contain a NTE Certification Record. The minimum attributes are shown in Appendix B of this chapter.

a. The Certification Record page (current and superseded) shall be retained by the Nuclear Repair Officer for the life of the equipment. This record shall be available for review by personnel checking out equipment.

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 FWPs 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.

APPENDIX A

NUCLEAR TEST EQUIPMENT
CHECK-OUT/CHECK-IN FORM

Receiving Activity: _____Date _____

Lending Activity: _____

1. **Equipment description and serial numbers.** Include all individual components. _____

_____
_____
_____
_____
_____
_____
_____
_____
_____

2. Required return date:

ATTRIBUTE	CHECK-OUT			CHECK-IN		
	SAT	UNSAT	N/A	SAT	UNSAT	N/A
Physical condition of assembly/item						
Calibration current						
Tamper resistant seals intact						
Level of cleanliness is as required						
Operational test. Protective feature set point _____. For hydro rigs, complete Test Rig Determination and Inspection Check List (see Chapter 9 of this volume) and provide with hydro rig.						
Equipment previously certified. Review Certification Record Card						
Equipment verified correct to current revision/advance change notice of referenced drawing or manual.						

3. Equipment found to be unsatisfactory has been segregated from satisfactory equipment and repair request submitted.

CHECK-OUT	CHECK-IN
YES (🗐)	YES (🗐)
_____	_____

CHECK-OUT and CHECK-IN signatures on reverse.

CHECK-OUT

Prepared and Issued By:

Signature _____

Printed Name _____

Received By:

Signature _____

Printed Name _____

NOTE: RECEIPT SIGNATURE ACKNOWLEDGES THAT ONLY THE ISSUING ACTIVITY IS AUTHORIZED TO REPAIR NTE AND THAT TAMPERING WILL INVALIDATE CERTIFICATION. THIS SIGNATURE ALSO ACKNOWLEDGES THAT A REVIEW OF CERTIFICATION RECORDS CONFIRMS THAT THE EQUIPMENT CONFORMS TO THE REQUIRED TEST REFERENCE REQUIREMENTS.

CHECK-IN

Returned by:

Signature _____

Printed Name _____

Received by:

Signature _____

Printed Name _____

APPENDIX B

NUCLEAR SUPPORT AND TEST EQUIPMENT CERTIFICATION RECORD

1. SHIP/ACTIVITY	2. FWP/CWP NUMBER	3. DATE CERTIFIED (CIRCLE ONE) INITIAL CERTIFICATION RECERTIFICATION
4. EQUIPMENT IDENTIFICATION		
5. EQUIPMENT CONFIGURATION REFERENCE, INCLUDING EXACT REVISION AND ACN TO WHICH THE EQUIPMENT WAS BUILT		
6. CERTIFICATION TEST(S)/CHECK(S) PERFORMED AND RESULTS (include certification method)		
7. REASON FOR RECERTIFICATION (not applicable to initial certification)		
8. CERTIFIED BY: DATE:_____ SIGNATURE:_____ PRINTED NAME:_____		9. ACCEPTED BY NRO: DATE:_____ SIGNATURE:_____ PRINTED NAME:_____

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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.

8.6 REPORTS. Before departing the ship, the ESU will debrief the Commanding Officer, or designated officer, on the material condition of the elevator system. The ESU shall provide the ISIC and TYCOM a report, outlining the results, not later than 30 days following the visit.

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VOLUME IV

CHAPTER 9

SYSTEM TEST CHECK LIST

REFERENCES.

(a) NAVSEA 0387-046-8000 - System Hydrostatic Test Requirements
(b) NAVSEA S9086-RJ-STM-010 - NSTM Chapter 504 (Pressure, Temperature and Other Mechanical and Electromechanical Measuring Instruments)
(c) NAVSEA S9505-AF-MMA-010 - Submarine Non-Nuclear Piping Systems Test Manual
(d) NAVSEA S9086-RK-STM-010 - NSTM Chapter 505 (Piping Systems)

LISTING OF APPENDICES.

A Nuclear Test Rig Determination and Inspection Check List
B Non-Nuclear Test Rig Determination and Inspection Check List
C Nuclear/Non-Nuclear Pre-Test Inspection Check List
D Nuclear/Non-Nuclear Performance of Test Check List

9.1 PURPOSE. To provide standard check lists for the proper preparation for the conduct of and recovery from nuclear and non-nuclear tests. Appendices A through D of this chapter are applicable to installed ship systems, individual components and support equipment tested in conjunction with Formal Work Packages (FWP) and Technical Work Documents (TWD).

9.1.1 Background.

a. Appendices A through D of this chapter are similar to a standard FWP that will require entries, prior to each use, to detail the specifics of the test to be performed. When TWDs are utilized, the locally developed FWP should direct execution of the check lists and need only direct other actions that are not included in the check lists. For example, since Forces Afloat rarely perform hydrostatic tests on hot systems, the check lists are prepared based on system temperatures less than 200 degrees F. In the event that a hydrostatic test is performed with temperatures greater than 200 degrees F, the locally developed FWP must contain additional requirements for the test from the referenced test manual.

b. These lists are developed from references (a) through (d) and **are not inclusive of all requirements**. All applicable test references must be reviewed in preparation for the test to ensure no requirement or precaution is overlooked. Other references such as the Reactor Plant Manual (RPM), Propulsion Plant Manual, Steam Plant Manual, Steam and Electric Plant Manuals, Ship Systems Manuals, Ships Information Books, Test Pressure Drawings, component technical manuals, etc., provide additional guidance and requirements that shall be included in the locally developed FWP for the test.

9.2 GENERAL INSTRUCTIONS.

a. Blank spaces are provided throughout the check lists so that requirements for the specific test to be performed may be added. These specifics shall be entered during FWP preparation.

b. Portions that are not applicable shall be marked “N/A” prior to FWP approval.

c. Multiple “Completed by” signature blanks are provided at the end of each check list since one individual may not be able to fully complete a particular check list. Additional signature blanks may be added if required.

d. The Test Rig Determination and Inspection Check List, Appendices A and B of this chapter, shall be completed by the activity issuing the test equipment. It is the responsibility of both the issuing and receiving activity to ensure that the correct test gear is used. Local exceptions to gages specified in reference (b) Table 504-6-1 will be approved by an individual with a technical warrant. When gage exceptions are invoked, the approved exception shall be included with associated test form. This may be accomplished by requesting the correct test equipment, and the issuing activity completing the

check list and providing it with the test equipment for review. To satisfy the scope of this chapter, the activity requesting the test equipment must include in their request (OPNAV 4790/2L) the information necessary for the issuing activity to complete Item 1 of Appendices A or B of this chapter, as applicable.

e. These check lists may also be used when a maximum operating pressure test is specified and an external pressure source is required to obtain this pressure. Installed system equipment shall be used whenever possible to perform operating pressure tests.

f. Appendices B, C, and D of this chapter may contain classified information when filled in (i.e., the nuclear information or classified test pressures). It will be the responsibility of the requesting activity to ensure the proper classification is annotated on the document when applicable.

9.3 RECORD RETENTION. System Check Lists do not require retention after the test has been satisfactorily completed, documented in the FWP or TWD, and the FWP or TWD is closed. Additional reviews of testing information are provided as follows:

a. For Ship's Force testing to recertify TWD work performed by the Fleet Maintenance Activity (FMA), the completed check lists, or copies shall be provided with the test documentation provided to the FMA. When the FMA Quality Assurance Officer accepts the completed retest, the check list may be discarded.

b. For FMA shop testing of controlled work, the completed check lists, or copies, shall be provided with the test documentation required by the Controlled Work Package until the FMA Quality Assurance Officer or Quality Assurance Supervisor accepts the testing objective quality evidence. Once the tests are accepted, the check list may be discarded.

APPENDIX A

NUCLEAR
TEST RIG DETERMINATION AND INSPECTION CHECK LIST

References: (a) NAVSEA 0387-LP-046-8000 - System Hydrostatic Test Requirements

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
1. Complete the following based on the information provided by the requesting activity.		
a.	System/component to be tested	
b.	Test Pressure _____ Reference_____	
c.	Number of test gages required: Total_____ Primary _____ (per reference (a) Appendix D). Backup _____ Indicate zero if multiple primary gages are required, one of which will also serve as a backup or if an installed system gage will be used.	
d.	Level of cleanliness required	
e.	Planned method of over pressure protection (e.g., manual using installed system valve plus one automatic relief included with test rig, or other combination). Unless otherwise specified, the rig will be provided with one manual and one automatic relief.	
2. GAGES: Normally installed instrumentation may be used as backup pressure indication. If an installed gage is not available and the backup gage will be a temporary gage, then complete Items a-f for both primary and backup gages. Otherwise, a-f apply to primary gage(s) only.		
a.	Complete and attach reference (a), Exhibit F.1-2 for selection of test gages.	
b.	Reference (a), Exhibit F.1-2, Item 8 (maximum gage error at test pressure) must not exceed 2% of test pressure.	
c.	Nominal indicated test pressure shall be no less than 25% of the primary gage's range. Nominal indicated test pressure shall be no less than 10% of the backup gage's range, if the backup gage is a temporary gage.	
d.	The gage range shall be capable of indicating the manual over pressure protection pressure at no greater than 90% of full scale and the potential maximum overpressure at no greater than 98% of full scale.	
e.	Temporary gages shall be single scale analog gages or digital pressure instruments calibrated in psig.	
f.	RECORD GAGE DATA: Primary gage range _____ psi Cal due date_____ Ser Number_____ Backup gage range _____ psi Cal due date_____ Ser Number_____	

(CONFIDENTIAL When filled in)

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
g.	Gages have been calibrated within the required periodicity. Circle applicable item: (1) Normal metrology requirements list calibration frequency (This is the frequency unless specified otherwise for the specific test). (2) Special frequency _____ Required by _____(Indicate required frequency and reference).	
3. OVERPRESSURE PROTECTION:		
a.	The manual release of pressure is the primary method of protection.	
b.	Automatic backup relief valve will be provided.	
c.	If the temporary relief valves provided are to be installed in the system, installation shall be such that it does not cause damage to the system or system components.	
d.	The over-capacity of relief valves should not cause excessive thermal and pressure shock. (Relief valve capacity should not be grossly higher than pressure source capacity).	
e.	The blow down characteristics shall be compatible with the system being tested. (The reseating characteristics of automatic reliefs should be consistent with the requirements of the system being tested. For example, a relief that does not reseat until pressure is reduced to zero would not be acceptable for a primary hydro). (Review manufacturer's data).	
f.	Valve accumulation at the flow of the test pressure source shall not exceed 10% of the relief valve set point.	
g.	Temporary automatic relief valves which have more than one inlet and therefore provide different relief valve performance characteristics (e.g., set pressure) shall not be used.	
h.	Temporary automatic reliefs which require no tools for setpoint adjustment (e.g., employ hand adjustment knob) must: (1) Have some means to positively lock the setting once it has been made or (2) Must be designed to prevent ready access to the adjustment knob.	
4. OVERPRESSURE PROTECTION SETPOINT DETERMINATION:		
a.	Record required hydrostatic test pressure _____ psi.	
b.	Record required overpressure protection setpoint _____ psi. Circle applicable determination method: (1) As specified in the applicable RPM. (2) Other Naval Sea Systems Command (NAVSEA) approved document (identify reference). (3) Using Reference (a), Exhibit F.1-2 (attach).	
c.	Potential maximum overpressure (Reference (a), Exhibit F.1-2, item 29) conforms to the requirements of reference (a) Section E.3.3.	

(CONFIDENDIAL When filled in)

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
5. TEMPORARY EQUIPMENT REQUIREMENTS:		
a.	Temporary connections and equipment (cap, spoolpieces, jumpers, blank flanges, etc.) shall be verified to be capable of withstanding hydrostatic test pressure.	
b.	Verify that within the last year and subsequent to disassembly or replacement of any test rig equipment, the assembled test rig (pump, hoses, gages, connecting tubing) has been satisfactorily tested to a pressure at least equal to the maximum pressure which might be encountered during this hydrostatic test. (Hydro is not required to test pressure gage and relief valve replacement or fittings between subassemblies designed to be broken for portability. Setpoint testing of the test rig relief valve while on the test rig meets this requirement).	
c.	Verify the rig has been cleaned to meet the system cleanliness requirements of the system being tested. If the rig is not maintained clean, comply with the cleanliness boundary requirements of reference (a), Section E.4.	
d.	No quick-disconnects with check features are to be used in the hydro rig.	
6. OPERATIONAL TEST:		
INSTRUCTIONS: The following checks shall be performed with the test rig isolated from the system being tested. This may be done by blanking the hose prior to connecting the rig to the system. Equipment provided by an FMA will be tested at the FMA prior to being issued to a tended ship. The operational test need not be repeated by the tended ship receiving the test gear. **NOTE: FOR SHOP TEST FACILITIES (I.E., INTERMEDIATE MAINTENANCE ACTIVITIES, NAVAL SHIPYARDS AND TENDERS) WHERE HYDROSTATIC TESTS ARE CONDUCTED AT LEAST ONCE EVERY TWO WEEKS AND WHERE THE TEST GAGES (BACKUP AND MASTER) ARE COVERED UNDER THE NAVY METROLOGY AND CALIBRATION (METCAL) SYSTEM, CROSS CHECKING THE GAGES BEFORE TEST IS NOT REQUIRED.**		
a.	Mark hydro gages with a red pointer at the required relief setpoint.	
b.	Raise rig pressure to the specified test pressure. If the backup gage is included with the test rig, (vice an installed system gage) verify primary and backup gages are in agreement. (Maximum difference after height correction is no more than the sum of the specified accuracies plus a readability error of one half the smallest graduation of each gage). Required accuracy +/-_____ psig. If not in agreement, replace or re-calibrate and repeat this step until satisfied.	
c.	Record required overpressure protection setpoint _____ psig. Continue to raise pressure to the specified overpressure protection setpoint. If the manual relief is installed on the rig, with the pressure source operating at the specified manual relief setpoint, verify that the **manual** relief and associated piping relieve the capacity of the pressure source.	
d.	Set/confirm setpoint of the automatic relief valve. With the pressure source operating and at the relief setpoint, verify that the **automatic** relief and associated piping relieve the full capacity of the pressure source.	
e.	Vent the rig to reduce pressure to reseat the automatic relief valve. Slowly raise pressure again to recheck the automatic relief setpoint.	

(CONFIDENTIAL When filled in)

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
f.	With the rig vented, verify that pressure gages that will be installed as primary or backup pressure indication, which are not equipped with a dial adjustment device read zero (within the gage accuracy plus the readability of one half of the smallest graduation on the dial face).	
g.	With the rig completely assembled, verify cleanliness by operating the pump to flush the pump and any attached piping or equipment.	
h.	Ensure cleanliness controls are established on the rig such that cleanliness is not lost in the interim period between flushing and the operational test and connection to the system being tested.	

Completed by _____ Items Completed _____Date _____

Completed by _____ Items Completed _____Date _____

Reviewed (Div Off/Engineering Duty Officer (EDO)) _____Date _____

(CONFIDENTIAL When filled in)

APPENDIX B

NON-NUCLEAR
TEST RIG DETERMINATION AND INSPECTION CHECK LIST

References:
(a) NAVSEA S9086-RJ-STM-010 - NSTM Chapter 504 (Pressure, Temperature and Other Mechanical and Electromechanical Measuring Instruments)
(b) NAVSEA S9505-AF-MMA-010 - Piping Systems/Submarine Non-Nuclear Piping Systems Test Manual
(c) NAVSEA S9086-RK-STM-010 - NSTM Chapter 505 (Piping Systems)

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
1. Complete the following based on information provided by the requesting activity.		
a.	System/component to be tested.	
b.	Test Pressure _____ Reference _____	
c.	Number of test gages required: Total_____ Primary_____ Backup _____ Indicate zero if an installed system gage will be used.	
d.	Level of cleanliness required_____	
e.	Planned method of overpressure protection (e.g., manual using installed system valve plus one automatic relief included with test rig, or other combination). Unless otherwise specified, the rig will be provided with one manual and one automatic relief.	
2. GAGES:		
NOTE:	**TYPICAL GAGES FOR MOST NON-NUCLEAR TESTS ARE LISTED IN REFERENCE (a), TABLE 504-6-1.**	
CAUTION:	**REFERENCE (a) TABLE 504-6-1 ALLOWS EXCEPTIONS TO THE GAGES LISTED IN THE TABLE. IF USING A GAGE NOT LISTED ON THE TABLE, IT MUST STILL COMPLY WITH THE CRITERIA SPECIFIED BELOW.**	
a.	The pressure gage range based on the maximum test pressure up to and including the relief valve setting must be: - greater than the test pressure **and** - not more than 200% of the maximum test pressure.	
b.	For tests 0-60 psi and below, the range may exceed 200% of the test pressure but will be as low as practical.	
c.	Test gage pressure graduations are equal to or smaller than those specified by reference (a) Table 504-6-1.	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
d.	Primary gage accuracy shall be at least +/- 1.0% of the gage span.	
e.	RECORD GAGE DATA: Primary gage range _____ psi Cal due date_____ Ser Number_____ Backup gage range _____ psi Cal due date_____ Ser Number_____	
f.	Gages have been calibrated within the required periodicity. Circle applicable item: (1) Normal metrology requirements list calibration frequency (This is the frequency unless specified otherwise for the specific test). (2) Special frequency _____ required by _____ (Indicate required frequency and applicable reference).	
3. OVERPRESSURE PROTECTION:		
a.	The manual release of pressure is the primary method of protection.	
b.	Backup relief valve, automatic or manual, will be provided. (Automatic preferred unless otherwise specified).	
c.	If the temporary relief valves provided are to be installed into the system, installation shall be such that it does not damage the system or system components. Review reference (b) or (c), as applicable.	
d.	The over-capacity of relief valves should not cause excessive thermal and pressure shock. (Relief valve capacity should not be grossly higher than pressure source capacity).	
e.	The blow down characteristics shall be compatible with the system being tested. (The reseating characteristics of automatic reliefs should be consistent with the requirements of the system being tested). (Review manufacturer's data).	
f.	Valve accumulation at the flow of the test pressure source shall not exceed 10% of the relief valve set point.	
g.	Temporary automatic relief valves which have more than one inlet and therefore provide different relief valve performance characteristics (e.g., set pressure) shall not be used.	
h.	Temporary automatic reliefs which have a rapid adjustment feature by which the setpoint may be inadvertently changed shall not be used.	
4. OVERPRESSURE PROTECTION SETPOINT DETERMINATION:		
a.	If performing a maximum operating pressure test, verify that installed system relief valves are unisolated and not blocked/gagged. The setpoint for the manual release of pressure shall be based on installed system relief setpoints.	
CAUTION:	**WHEN PERFORMING MAXIMUM OPERATING PRESSURE TESTS, INSTALLED RELIEF VALVES PROVIDE SYSTEM PROTECTION. SYSTEM RELIEF VALVES MUST NOT BE REMOVED FROM SERVICE.**	
b.	Record required hydrostatic test pressure _____ psi.	
c.	Record required overpressure protection setpoint _____ psi. Circle applicable determination method: the lesser of: (1) 100 psi over test pressure. (2) 10% above test pressure.	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
5. TEMPORARY EQUIPMENT REQUIREMENTS:		
a.	Temporary connections and equipment (cap, spoolpieces, jumpers, blank flanges, hoses, etc.) shall be verified to be capable of withstanding the test pressure.	
b.	Verify that within the last year and subsequent to disassembly or replacement of any test rig equipment the assembled test rig has been satisfactorily tested to a pressure approximately 15% above the maximum pressure it will witness during the system hydrostatic test. (Hydro is not required to test pressure gage and relief valve replacement or fittings between subassemblies designed to be broken for portability. Setpoint testing of the test rig relief valve while on the test rig meets this requirement).	
c.	Verify the rig has been cleaned to meet the system cleanliness requirements of the system being tested.	
d.	No quick-disconnects with check features are to be used in the test rig.	
6. OPERATIONAL TEST:		
INSTRUCTIONS: The following checks shall be performed with the test rig isolated from the system being tested. This may be done by blanking the hose prior to connecting the rig to the system. References (b) and (c) provide a sample step by step procedure for these checks. Equipment provided by an FMA or Industrial Activity shall be tested prior to being issued to a tended ship. If documentation is provided by the issuing FMA or Industrial Activity that the assembled test rig has been verified to meet all of the below requirements, the operational test need not be repeated by the end user. **NOTE: FOR SHOP TEST FACILITIES (I.E., INTERMEDIATE MAINTENANCE ACTIVITIES, NAVAL SHIPYARDS AND TENDERS) WHERE HYDROSTATIC TESTS ARE CONDUCTED AT LEAST ONCE EVERY TWO WEEKS AND WHERE THE TEST GAGES (BACKUP AND MASTER) ARE COVERED UNDER THE NAVY METROLOGY AND CALIBRATION (METCAL) SYSTEM, CROSS CHECKING THE GAGES BEFORE TEST IS NOT REQUIRED.**		
a.	Mark hydro gages with a red pointer at the required relief setpoint, half way between the test pressure and the relief valve setpoint.	
b.	Raise rig pressure to the specified test pressure. Verify primary and backup gages are in agreement. Maximum difference between the two gage readings after height correction is no more than 2%. Calculate 2% for each gage using the full scale pressure measured by each gage (i.e., a 0-100 psi gage, 2% = 2 psig, the maximum difference between two gages with a 0-100 psi scale at a given pressure is 2 psig). Required accuracy +/-_____ psig. If not in agreement, replace or re-calibrate and repeat this step until satisfied.	
c.	Continue to raise pressure to the specified overpressure protection setpoint. If the manual relief is installed on the rig (vice using an installed system valve), with the pressure source operating and at the specified manual relief setpoint, verify that the **manual** relief and associated piping relieve the capacity of the pressure source.	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
d.	Set/confirm setting of the automatic relief valve. With the pressure source operating and at the relief setpoint, verify that the **automatic** relief and associated piping relieve the capacity of the pressure source.	
e.	Vent the rig to reduce pressure to reseat the automatic relief. Slowly raise pressure again to recheck the automatic relief setpoint.	

Completed by _____ Items Completed _____ Date _____

Completed by _____ Items Completed _____ Date _____

Reviewed (Div Off/EDO) _____ Date _____

APPENDIX C

NUCLEAR/NON-NUCLEAR
PRE-TEST INSPECTION CHECK LIST

References: (a) NAVSEA S9505-AF-MMA-010 - Piping Systems/Submarine Non-Nuclear Piping Systems Test Manual
(b) NAVSEA 0387-LP-046-8000 - System Hydrostatic Test Requirements

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
1. REVIEW TEST PREPARATIONS: The following attributes are necessary for proper test accomplishment and may be included in the test procedure, indicated on the Quality Assurance (QA) form 26 or covered in the pre-test briefing.		
a.	Test equipment installation location and method of installation is clearly indicated in sketch on the QA form 26, or is clearly defined. Test accomplishment will be in accordance with reference (a).	
b.	Specific jumpers/gagging devices/blanks etc. are indicated for both installation and removal. These items shall be danger or caution tagged.	
c.	Boundaries of test and specific inspection points are clearly identified.	
d.	Instructions are provided for returning the system to normal or to a specifically stated condition upon completion of the test.	
e.	Procedure minimizes the amount of system to be pressurized to accomplish the test.	
f.	All components within the test boundary are capable of withstanding the test pressure (gages not over-ranged, etc.).	
g.	Necessary precautions as identified on the test pressure drawing have been taken (List or none). Use reverse if additional space required.	
h.	Applicable chapter (maintenance section) or maintenance instruction of the RPM reviewed for test/flush requirements (List or none). Use reverse if additional space required. (Not applicable to non-nuclear tests).	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
i.	Specific actions/precautions taken are included in the test procedure as a result of a review of reference (b), sections 7.2.3, 7.2.4 and 7.2.5 to preclude damage to installed system components due to pressure or temperature conditions that may occur during the test (List or none). Use reverse if additional space required (Not applicable to non-nuclear tests).	
2. WALKTHROUGH OF THE TEST AREA: The below listed attributes are basic quality control checks that should be conducted/supervised by the Petty Officer in charge of the test.		
a.	Piping in the test boundary is free from dents, gouges, arc strikes and other external defects (Removal of additional lagging or other interference is not required to perform this check).	
b.	Conditions for detecting leaks are satisfactory (e.g., joints being tested are not covered/lagged).	
c.	Hot piping and/or equipment that could result in a safety hazard to personnel has been insulated or precautions have been taken to minimize the hazard.	
d.	The hydrostatic test will not be a hazard to other evolutions adjacent to the test area (e.g., Work on an open oxygen system adjacent to a seawater hydro).	
e.	Adequate measures have been taken to prevent spray damage to electrical equipment in the event of a leak during pressure testing.	
f.	Pipe hangers removed for work have been reinstalled.	
g.	All mechanical joints are re-made; system integrity established.	
h.	No obvious loose fasteners.	
i.	No obvious instances of missing fasteners or improper fastener material or material mismatch (e.g., no carbon steel fasteners in seawater systems, no improper use of black oxide coated fasteners).	

Completed by _____ Items Completed _____ Date _____

Completed by _____ Items Completed _____ Date _____

Reviewed (Div Off/EDO) _____ Date _____

APPENDIX D

NUCLEAR/NON-NUCLEAR
PERFORMANCE OF TEST CHECK LIST

NOTE: DO NOT PRESSURIZE TEST PUMP WITH AIR AND WATER SUPPLY UNTIL READY TO ACTUALLY START THE TEST. DO NOT LEAVE TEST PUMP UNATTENDED DURING ANY PORTION OF THE TEST.

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
1. VERIFY SYSTEM LINE-UP:		
a.	Verify the system to be tested is aligned for the test by performing valve lineup checks or by aligning valves via procedural steps in the test procedure or by steps in an operating instruction.	
b.	Verify that required plant conditions have been established.	
c.	All valves are **DANGER TAGGED OPEN** that: Could block either the primary or backup pressure relief point from the pressure source unless they are to be used during the test to isolate the pressure source from the portion of the system being tested. Could block discharge from the pressure relieving point. Could block either the primary or the back up pressure gage from the pressure source. (To ensure pressure indication, a clear pressure path between the applied pressure source and at least one pressure gage must be confirmed by danger tagging any isolation valve in this path. Confirmation that the other pressure gage is not isolated will be made by comparison with the tagged open gage). Would isolate the test pressure gages and the portion of the system being tested. Are vent paths in adjacent systems when the design or test pressure of the adjacent system is less than that of the system being tested.	
d.	If a section of pipe will be pressurized downstream of a check valve and no provisions are available for measuring the pressure in that section of piping, ensure that: (1) Pressure sources in that portion of the system are isolated or inoperative as discussed in item e below. (2) Provisions are included to manually depressurize any section of pipe isolated by a check valve as soon as possible after test completion.	
e.	Potential pressure sources within the test area boundaries that are not required for testing are isolated or rendered inoperative by danger tagging out fuses, danger tagging shut appropriate valves, etc.	
f.	There shall be no valves in the pressure-relieving path which could shut as a result of depressurization and thereby block the relief path from relieving the applied test pressure.	
g.	System relief valves within the test boundary are rendered inoperable to permit reaching elevated test pressure.	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
h.	Systems susceptible to chloride stress corrosion are isolated to protect in-leakage of chlorides from adjacent systems being tested to an elevated pressure. This isolation may be accomplished either by using double valve isolation with leakoff in between or by pressurizing the system susceptible to chloride stress corrosion to prevent in-leakage. If such isolation cannot be attained by practical means or is not assured, then the system susceptible to chloride stress corrosion shall be flushed outwardly before and after the elevated pressure test and appropriate samples taken to confirm the absence of contaminants. (Not applicable to non-nuclear tests).	
i.	Verify test equipment: (1) Installation is as specified on the QA form 26. (2) Test gages are within required calibration periodicity. (3) Automatic relief valves setpoint have been checked within 30 days prior to the test.	
j.	If test gages are provided with a dial adjustment which does not affect calibration, the dial should be adjusted to zero after the gage is installed for the test and prior to opening the valve that isolates the gage from the system being tested.	
k.	Verify calibration and dial adjustment devices, if readily accessible, are protected from inadvertent movement or adjustment during the test.	
l.	The discharge of test medium for overpressure protection is directed into areas where the discharge will not cause damage to equipment, create personnel hazards or radioactive problems.	
m.	Pressure gages shall be clearly visible and readable by test personnel.	
n.	The location of gages is such that no path exists whereby pressure could be applied to any portion of the system undergoing test without a pressure gage (primary or backup) indicating this pressure.	
o.	The primary and backup pressure gages shall be located on different branch lines (where this can be done without extending the test boundaries).	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
2. VERIFY PERSONNEL ARE READY TO CONDUCT TEST:		
a.	Brief personnel, ensuring that the following attributes are understood: (1) Personnel assignments. (2) Maintaining communications. (3) Test gage requirements: - Gage locations. - Calibration cross checks. - Gage indication and pressure readings. - Primary pressure indications. - Back up pressure indications. (4) Overpressure setpoint. (5) Type and location of primary overpressure protection. (6) Type and location of back up overpressure protection. (7) Duties of test pressure source operator. (8) Duties of system inspector(s) and required inspection points. (9) Duties of manual overpressure relief operators. (10) Immediate action shall be taken to secure the test pressure source and investigate the problem should any of the following occur: - Pressure gages fail to respond to changes in test pressure. - A rupture of a test gage occurs. - Pressure gage readings do not agree with the sums of their accuracies plus readability errors +/-_____ psig. - Changes in test pressures are erratic or operation of the test pumps after the system is filled solid does not produce a corresponding increase in pressure. (11) Immediate action shall be taken to secure the test pressure source and relieve system pressure if the pressure at which manual overpressure protection is to be initiated is exceeded on any primary or backup pressure gage. (12) Plant and system status. (13) Preliminary leak checks. (14) Valve packing leak checks (if applicable). (15) Criteria for an acceptable elevated pressure test. (16) Pressurizing to elevated test pressure. (17) Depressurization following completion of test.	
b.	Manual overpressure protection relief valve operators have no other responsibilities assigned. **NOTE: WHEN PRESSURE IS BEING APPLIED BY A HAND-OPERATED TEST PUMP OR WHEN THE PRIMARY AND BACKUP TEST GAGES AND THE MANUAL OVERPRESSURE PROTECTION VALVE(S) ARE ALL INSTALLED ON THE HYDROSTATIC TEST RIG, THE TEST PUMP OPERATOR MAY ALSO SERVE AS THE PRIMARY OVERPRESSURE PROTECTION WATCH, PROVIDED THAT:** **(1) THE MANUAL OVERPRESSURE PROTECTION VALVE IS WITHIN EASY REACH.** **(2) PROPERLY SET AND TESTED BACKUP RELIEF VALVE PROTECTION IS PROVIDED (FOR OTHER THAN HAND-OPERATED TEST PUMPS, EITHER AN AUDIBLE OVERPRESSURE ALARM IS PROVIDED OR A SECOND BACKUP RELIEF VALVE IS INSTALLED ON THE TEST RIG).** **(3) THE USE OF THIS EXCEPTION DOES NOT RESULT IN ONE INDIVIDUAL BEING SOLELY RESPONSIBLE FOR SATISFACTORY TEST PERFORMANCE.**	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
c.	Adequate communications have been established between testing personnel.	
d.	Rate of pressurization and depressurization is specified at 100 psi/minute maximum. If testing a small component or small volume system such that 100 psi/minute is not practicable, control rate as low as possible.	
3. PERFORM ELEVATED PRESSURE TEST:		
a.	Obtain permission to conduct test.	
b.	Verify that the water purity of the test medium will not degrade system cleanliness or the required purity of water already in the system.	
c.	Note depressurized gage readings of all primary gages for comparison later, at test completion. Location _____ _____ psig Location _____ ____ psig Mark all test gages with a red mark at the overpressure protection setpoint, half way between the test pressure and the relief valve setpoint.	
d.	Raise rig pressure to the specified test pressure. Verify primary and backup gages are in agreement. Maximum difference between the two gage readings after height correction is no more than 2%. Calculate 2% for each gage using the full scale pressure measured by each gage (i.e., a 0-100 psi gage, 2% = 2 psig, the maximum difference between two gages with a 0-100 psi scale at a given pressure is 2 psig). Required accuracy +/-_____ psig. If not in agreement, replace or re-calibrate and repeat this step until satisfied.	
e.	If a less accurate gage is used for backup and is indicating higher than the primary gage during gage cross checks, increase the overpressure setpoint mark on the backup gage by the indication differential after the second cross check.	
f.	Increase pressure in increments and perform preliminary leak checks.	
g.	Unless required to be positioned differently (e.g., throttle valves), backseat all valves that were aligned for packing leak checks prior to increasing pressure above normal operating pressure.	
h.	Hold test pressure for 30 minutes prior to commencing final inspection unless otherwise specified.	
i.	Primary and backup gages are in agreement at test pressure. (Same criteria as above) +/-_____ psig.	
j.	Results of inspection _____. Also record data on QA form 26. Remarks:	
k.	Slowly depressurize the test area at less than 100 psi/minute. If testing a small component or small volume system such that 100 psi/minute is not practicable, control rate as low as possible. For nuclear tests only: When depressurizing systems which are adjacent to systems potentially contaminated with chlorides, ensure that the potentially contaminated systems are depressurized before depressurizing the system susceptible to chloride stress corrosion to prevent in-leakage. Ensure that the depressurization path is selected such that any fluid flow produced by depressurization will tend to keep chlorides away from the system of concern.	

ITEM NO.	ATTRIBUTE	CHECK OFF or N/A
l.	Note the depressurized gage readings of all primary gages. Location _____ _____ psig Location _____ _____ psig Compare to pre-test depressurized readings. Gages shall agree within the gage accuracy and readability error. Disagreement is not cause for rendering the elevated pressure test unsatisfactory, provided gage cross-checks in items d and i above are satisfactory. However, disagreement should be considered unusual and warrant further investigation.	
m.	Remove temporary equipment.	
n.	Perform system restoration as directed by the FWP.	

Completed by _____ Items Completed _____ Date _____

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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 upkeeps), 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 30 days.

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.

(5) Keeping the Commanding Officer and the Engineer Officer informed as to the status of close-outs and significant deficiencies noted.

b. Personnel performing tank, void and space close-out or entry are responsible for:

(1) Obtaining a copy of Appendix G and Appendix H.

(2) Forwarding to the DCA completed copies of Appendix H.

c. Responsibility for Re-Entry Controls (REC) and final certification is as follows:

(1) In cases where entry is required to be made for production work by both Ship's Force and FMA personnel, the FMA will be responsible for REC and Ship's Force will be responsible for final certification close-out.

(2) For cases where only FMA work is anticipated, the FMA will be responsible for REC and Ship's Force will be responsible for final certification close-out. For the cases in which only the maintenance activity has access (e.g., waterborne entry into mud tanks or ballast tanks by divers) the maintenance activity will be responsible for final certification close-out.

(3) For cases where only Ship's Force work is anticipated, Ship's Force will be responsible for REC and final certification close-out.

10.5.4 Applicability. All SSN and SSBN/SSGN Class submarines and FMAs.

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APPENDIX A

WORK AUTHORIZATION FORM

1. USS	2. SYSTEM	3. WAF NO.
4. JSN	5. DIVISION/LWC/RA	
7. JOB DESCRIPTION	6. TECHNICAL WORK DOCUMENT	

PREPARATION FOR WORK

8. POST WORK TESTING AS SPECIFIED: ☐ BELOW ☐ IN THE TWD ☐ NO TEST REQD ☐ FORMAL TEST PROGRAM

9. RESTRICTIONS/PRECAUTIONS/REMARKS

10. DIVISION/REPAIR ACTIVITY READY TO COMMENCE WORK.
LPO/DIV OFF /RA _____ DATE_____

AUTHORIZATION TO WORK

11. SAFETY OF SHIP (Submarine Only): ☐ YES ☐ NO

RA SSO (if SPOD used) or QUALIFIED WATCH/DUTY OFFICER (if SOSMIL used)

_____ _____ DATE _____

12. CONCURRENCES:

_____ DATE _____ _____ DATE _____ _____ DATE _____

13. TAGOUT REQUIRED: ☐ YES ☐ NO

TAGOUT NO._____

SYSTEM/COMPONENT IS LINED UP FOR WORK, A TAGOUT IS HUNG, VERIFIED AND SIGNED BY THE REPAIR ACTIVITY (IF REQUIRED) AND SHIP.

_____
WATCH/DUTY OFFICER DATE

14. PLANT/SHIP CONDITIONS (E.G., DRAINED, DE-PRESSURIZED, DE-ENERGIZED) SET. DIVISION/RA IS AUTHORIZED TO START WORK.

_____
WATCH/DUTY OFFICER DATE

_____
REPAIR ACTIVITY DATE

NOTIFICATION OF WORK COMPLETION

15. RESTRICTIONS/PRECAUTIONS/REMARKS

16. WORK IS COMPLETE LPO/DIV OFF or RA _____DATE _____	17. TESTING IS COMPLETE WATCH/DUTY OFF or RA _____DATE_____

18. WAF CLOSED OUT

RA_____DATE_____ WATCH/DUTY OFF _____DATE_____

☐ CHECK IF CONTINUED ON ANOTHER SHEET

Sheet _____

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 B

TECHNICAL WORK DOCUMENT RECORD SHEET

TWD RECORD SHEET								
SYSTEM/COMPONENT:			WAF SERIAL NO.					
TWD LINE ITEM NO.	TWD (TGI, DL, DR, CWP, FWP)	BRIEF DESCRIPTION	TWD AUTHORIZATION			STATUS C-COMPLETED, T-TRANSFERRED X-CANCELED		REMARKS
			1ST CHECK (INI)	2ND CHECK & AUTH (INI)	DATE AUTH	C/T/X	INI & DATE	

☐ CHECK BOX IF CONTINUED ON ADDITIONAL SHEET PAGE_____

TECHNICAL WORK DOCUMENT RECORD SHEET COMPLETION INSTRUCTIONS

NOTE: THE ACTIVITY USING THE TWD RECORD SHEET SHALL FILL IN ALL BLOCKS.

BLOCK	INFORMATION REQUIRED
SYSTEM/COMPONENT	Enter system or component.
WAF SERIAL NO.	Enter WAF serial number.
TWD LINE ITEM NO.	Enter next sequential number (1, 2, 3, etc.).
TWD (TGI, DEFICIENCY LOG, DEFICIENCY REPORT, CWP, FWP)	Enter TWD (e.g., TGI, Deficiency Log, Deficiency Report or other unique document identification.)
BRIEF DESCRIPTION	Enter brief description.
1ST CHECK	Initials of 1st person who reviews and ensures the line item is within the WAF work description and tagout boundaries. (NOTES 1 and 2)
2ND CHECK AND AUTHORIZATION	Initials of 2nd person (independent from 1st) who reviews and ensures work is within the WAF work description, tagout boundaries, that the WAF is in an authorized status and authorizes the line item. (NOTES 1 and 2)
DATE AUTH	Date line item was authorized. (NOTE 1)
STATUS	
LINE ITEM BLOCK (C/T/X)	Status of line item.
(INI) & DATE	Initials and date of person that verifies a line item is complete, transferred to another WAF or canceled.
REMARKS	Write any pertinent information (may be left blank).

NOTE 1: 1st and 2nd checks of TWD Record Sheet will be based on a review of the issued TWD. All TWDs not reviewed (i.e., left blank) at time of WAF authorization are not authorized until reviews are completed.

NOTE 2: Activities which choose to use the TWD Record Sheet shall track and status only the TWDs approved and executed by their activity.

APPENDIX C

WORK AUTHORIZATION FORM CONTINUATION SHEET

1. USS	3. WAF NO.	REV

☐ CHECK IF CONTINUED ON ANOTHER SHEET

Sheet _____

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WORK AUTHORIZATION FORM REVISION SHEET

1. USS	3. WAF NO.	REV

9. RESTRICTIONS/PRECAUTIONS/REMARKS

AUTHORIZATION TO WORK

11. SAFETY OF SHIP (Submarine Only): ☐ YES ☐ NO

RA SSO (if SPOD used) or QUALIFIED WATCH/DUTY OFFICER (if SOSMIL used)

_____ _____ DATE _____

12. CONCURRENCES:

_____ DATE _____ DATE _____DATE _____

13. TAGOUT REQUIRED: ☐ YES ☐ NO

SYSTEM/COMPONENT IS LINED UP FOR WORK, A TAGOUT IS HUNG, VERIFIED AND SIGNED BY THE REPAIR ACTIVITY (IF REQUIRED) AND SHIP.

TAGOUT NO._____

_____

WATCH/DUTY OFFICER DATE

14. PLANT/SHIP CONDITIONS (E.G., DRAINED, DE-PRESSURIZED, DE-ENERGIZED) SET. DIVISION/RA IS AUTHORIZED TO START WORK.

_____

WATCH/DUTY OFFICER DATE

_____

REPAIR ACTIVITY DATE

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Sheet _____

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APPENDIX D

BARRIER CRITERIA FOR SUBMARINE HULL PENETRATIONS

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

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

a. Single closure can be used only with the specific permission of the Commanding Officer. If single closure is approved, the barrier must be verified by a satisfactory leak check of the single closure before opening the system for maintenance as follows:

(1) The system should be isolated using the single closure barrier.

(2) If the system has not been drained, open the closest system high-point vent to conduct a controlled leak check of the single closure.

(3) If the system has been drained, open the closest low-point drain to conduct a controlled leak check of the single closure.

b. Prior to undocking:

(1) If undocking becomes necessary prior to completing all sea connected system maintenance and testing, obtain double closure through reassembly, then satisfactorily hydrostatic test all pressure boundary joints outboard of the backup valve seat and verify the integrity of the hull and backup valve seats by performing a hydrostatic seat leakage check of both valves.

(2) Where schedule, resources or other constraints prevent accomplishment of the above at the time of undocking, a blank flange(s) shall be installed, tested and identified external to the hull penetration to provide double closure. This condition shall be identified both internally and externally to prevent inadvertent removal. The installation of the blank flange shall be approved by the Commanding Officer. Removal of these blank flange(s) shall not commence until the required valve(s) and associated local Valve Position Indicator(s) have been reinstalled and tested to support removal of the blank and blank removal has been approved by the Commanding Officer.

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

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

a. Hull penetrations less than four feet above the waterline.

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

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

(2) Other penetrations/openings which do not meet the above criteria or which cannot be isolated by some type of single closure will be attended at all times by personnel with access to equipment capable of securing flooding, should it ever occur. Exceptions require specific permission of the Commanding Officer. Single closure may be affected by any suitable temporary watertight closure.

b. Hull penetrations greater than four feet above the waterline. Penetrations/openings not in their normal as-built condition are not required to be watertight but should be provided with protection against unwanted fluid entry.

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

a. If an external blank flange is installed, any additional precautions should be determined by the Commanding Officer.

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

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

a. Ship's Force will identity the hull opening by noun name, docking plan number, frame number, side and distance off centerline and item number (as obtained from the ship's docking plan) and provide this information to the FMA.

b. The FMA planning division will verify the data provided by Ship's Force and calculate the circumferential distance from the centerline.

c. The FMA LWC will provide the verified data and the fitting/flange, including the required installation hardware, to the diving supervisor.

d. Ship's Force shall mark the fitting location using a weighted and marked line, referenced from frame marks topside.

e. The Ship's Duty Officer shall authorize the installation of the fitting/flange and coordinate the pre-brief for the installation evolution. As a minimum, the brief shall be attended by the Ship's Duty Officer, LWC Supervisor and Diving Supervisor. The mechanism for authorizing the hull blank installation shall be the Work Authorization Form (Appendix A), in accordance with this chapter.

f. The divers, in conjunction with Ship's Force and the LWC Supervisor shall verify the location of the hull opening and weighted/marked line prior to the divers entering the water.

g. A diver accompanied by Ship's Force shall tap on the internal hull opening until the in-water diver acknowledges the location by returning the signal except where permanent markings identifiable by a diver uniquely identify a specific hull fitting/penetration (markings such as a fitting name or number welded as raised characters on/adjacent to the fitting/penetration).

h. After installation, the hull fitting/flange location and installation shall be independently verified by a second diver.

i. Divers, assisted by the LWC and Ship's Force, shall verify the hull fitting/flange integrity with a 100 psig air test.

j. Divers and the LWC Supervisor shall mark the hull fitting/flange by attaching a tether from the fitting/flange to topside. At the topside attachment point the tether shall be labeled "Hull Fitting (Noun Name) Installed".

k. Positive verification from inboard of the hull fitting/flange placement and integrity must be achieved for each installed fitting/flange prior to proceeding with any maintenance. The verification shall be accomplished using the method for testing a single closure described in paragraph 2.a of this Appendix. If either of the leak check methods of paragraphs 2.a.(2) or (3) of this Appendix are not possible, the Commanding Officer shall be notified and give specific permission for continuing/conducting the maintenance.

l. If internal verification of hull fitting/flange integrity is not possible due to system configuration, the fasteners shall not be fully removed from the pressure boundary being disassembled until the system is fully drained and hull fitting/flange integrity has been verified.

m. If a hull fitting/flange is left installed for system and/or at sea operations, the guidance of Volume V, Part I, Chapter 8 of this manual concerning Departure From Specification shall be followed.

6. REMOVAL OF HULL FITTINGS/FLANGES. Prior to removal, divers, in conjunction with Ship's Force, shall verify the label of the tether of the fitting/flange to be removed and check for the presence of danger or caution tags. The divers shall then follow the tether to the fitting/flange to ensure the removal of the correct fitting/flange.

7. BULKHEAD VENTILATION VALVES. Bulkhead ventilation valves shall either be operational and capable of being shut or made water tight with a blank. Bulkhead penetrations shall either be in their normal condition or be rendered watertight if unattended. Temporary closures are permitted.

8. FABRICATION OF NON-NUCLEAR PIPING BLANKS. For fabrication of non-nuclear piping blanks to be used during hydrostatic testing and maintenance on submarine piping systems, the following general guidelines apply:

a. The material must be the identical type, level and pedigree required for the system application in accordance with reference (h) or as required by NAVSEA drawings.

b. Blanks must be constructed such that the design sealing surface dimensions and fitup characteristics of the system are maintained.

c. Dimensions of blanks will be in accordance with reference (h).

d. Applicable hydrostatic strength and porosity testing will be performed as required by system test pressure drawings.

e. All blanks shall be marked in accordance with reference (h). Maximum allowable pressure will be the hydrostatic test pressure (e.g. 6750 psi for a 4500 psi application, 4500 psi for a 3000 psi application, etc.). Additionally, mark piece with nominal operating pressure and material used. Ensure pressure markings are annotated "MAX" and "NOM" as appropriate.

f. Blanks installed for maintenance or testing will be identified by a plain tag stating the purpose of the blank. This tag will be in addition to any danger tags used.

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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

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 28 Mon	29 Tue	23 Wed	24 Thurs	25 Fri	26 Sat	27 Sun	Scheduled end date	Remarks
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
2. MBT blow removed
3. Belly bands, hull blanks, cofferdams
4. Dewatering ability removed
5. Firefighting capability removed
6 Bleeding charging Oxygen banks
7. Weapons handling
8. EAB system maintenance
9. Fueling or defueling
10. Diver operations
11. Pumping or flooding sonar dome
12. Special coordination btwn S/F and FMA
13. Battery charges
14. Nitrogen load
15. Refrigerant on/off load
16. Evolutions with an expected draft change of >3 inches (e.g., ballasting, lead load, etc.)
17. Securing the Emergency Diesel Generator
18. Pressure hull watertight bulkhead/doors maintenance
19. Bilge alarm/emergency announcing circuit maintenance
20. Normal/emergency lighting maintenance

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:

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. ___ Mon	___ Tue	___ Wed	___ Thurs	___ Fri	___ Sat	___ Sun	9. Scheduled end date	10. Remarks

The following items are Safety of Ship:

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

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

VOLUME IV

CHAPTER 11

TECHNICAL DATA AND INFORMATION MANAGEMENT

REFERENCES.

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

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

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

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

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

b. The Technical Librarian shall promptly apply ATIS changes within one week of being received on board.

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

d. 3M System Coordinator shall report completion of ATIS and/or TDKM updates to the Executive Officer. For Aircraft Carriers the point of contact is the MSC Officer and the Maintenance Officer.

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

a. Acquisition of new documents and data and the updating of existing materials.

b. Cataloging, indexing and filing all documents, data and information materials to allow for effective use of library technical information.

c. Accountability and control to ensure continuous integrity of the library collection and to enhance periodic inventories.

d. Central control point for all technical documents received, held, used, transferred or disposed of by the repair department (FMA only) or command. For FMAs having a Nuclear Support Facility (NSF), all Naval Sea Systems Command Nuclear Propulsion Directorate (NAVSEA 08) controlled documents shall be controlled by the NSF. For MSCs aboard aircraft carriers, all NAVSEA 08 controlled documents shall be controlled by the Reactor Department Technical Publication Library. All aircraft maintenance related documents shall be controlled by the Aircraft Intermediate Maintenance Department.

e. Maintain access to the following computer networks/websites whenever possible.

(1) Technical Data Management Information System (TDMIS).
https://mercury.tdmis.navy.mil/default.cfm

(2) Military Engineering Drawing Asset Locator System.
https://www.dlis.dla.mil/medals

(3) Naval Surface Forces, Atlantic Planning and Execution of Alterations and Repair (FMA and COMNAVSURFLANT and COMNAVSURFPAC commands only)
https://www.spear.navy.mil click on SPEAR info.

(4) Maintenance and Modernization IT Systems.

(5) Monthly Advance Change Notice Report.
https://nsdsa.nmci.navy.mil

(6) ASSIST Quick Search http://quicksearch.dla.mil

(7) https://assist.dla.mil

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

a. Have a sufficient understanding of technical library organization requirements in references (a) through (n) (as applicable) to supply the necessary technical information.

b. Have **a minimum** security clearance equal to the highest security classification of any document held within the library.

c. Supervise personnel assigned to library.

d. Operate the technical library in the following manner:

(1) Schedule and carry out a frequent and recurring on the job training program for all personnel assigned to the technical library staff or to satellite librarian positions. As a minimum, training shall include topics that provide guidance for performing each library or satellite library function. Satellite librarian training may be tailored to cover only those areas applicable to satellite libraries. Lesson plans shall be developed for each topic.

(2) Maintain and provide applicable and current plans, prints, specification, manuals and all other technical documents and information needed by the cognizant department. FMAs will also provide technical documents to tended units, other FMAs, non-FMA government activities or qualified Department of Defense contractor personnel.

(3) Maintain an inventory of technical publications/manuals and manufacturer instruction books and other technical/repair documents available in the technical library and/or any satellite libraries (Work Centers/division offices, etc.).

(4) Develop a system for checking out/in and recall of library technical publications issued to individuals in order to maintain the integrity of the library and ensure revisions/changes are made as received and also to minimize lost materials due to unaccountability. The system should include a recall capability that would allow for the location and recall/reissue of materials after 90 days. FMAs issuing technical publications/documents to tended units should establish a 90-day or end of fleet maintenance availability recall whichever comes first.

(5) Requisition technical documentation needed for maintenance and repair procedures but not already available on board. Maintain a separate file of material on order. Track the status of requisitioned documents until received. Initiate follow-up action for those documents where supply status has not been received for a 30-day period, unless previous supply status indicates no follow-up is required.

(6) Ensure proper security for the contents of the technical library.

(7) Exercise positive control over access to the Library Management or TDMIS database functions using locally generated procedures.

(8) Maintain written procedures which describe how to perform each function carried out by the technical library (i.e., check-out/check-in of technical documents, updating library document files, operating reproduction equipment, performing updates, requisitioning, inventories and audits of library documents, etc.).

(9) Ensure maintenance calls/contracts are made for all viewing, reproduction, computer and powered document retrieval systems/equipment used to carry out library functions. The program shall include devices associated with this equipment.

(10) Perform an inventory of technical publications/manuals and manufacturer's instruction books.

(a) Ships are to perform an annual inventory of technical publications/manuals and manufacturer's instruction books and other maintenance/repair documents available in the technical library and satellite libraries (work center/division offices).

(b) Shore facilities and submarine tenders are to perform an inventory of technical publications/manuals and manufacturer's instruction books and other maintenance/repair documents available in the technical library and satellite libraries (work center/division offices) every 12 months.

(11) Ensure manuals within library's inventory contain applicable Advance Change Notices (ACN), or Interim Rapid Action Changes (IRAC). Verify each manual against the ACN report available from Naval Systems Data Support Activity (NSDSA), Port Hueneme, CA, and the NATEC IRAC Tracker Report.

(12) Perform an annual data verification (configuration audit) of technical manuals and other repair documents available in the technical library and satellite libraries. Afloat libraries should perform verifications as often as operational constraints permit, within 6 months of major deployments, is recommended if verifications are not conducted annually.

(a) Verify each NAVSEA/Space and Naval Warfare Systems Command technical manual held with the data listed in TDMIS using LMD for manual or automated verification. Verify Naval Supply Systems Command (NAVSUP) manuals with the modem Internet access.

(b) Verify NAVSUP manuals against reference (c) (i.e., NAVSUP 600 CD) or by performing a process verification file with LMD/TDMIS.

(c) Compare each technical manual held with the ACN Report provided from NSDSA, Port Hueneme, CA. This should be performed monthly.

(d) Compare each technical manual held with TDMIS (Index of Technical Publications) to ensure library is receiving the technical manual automatically.

(e) Compare each technical manual held with the Technical Manual Deficiency Evaluation Report file to make sure information received from Technical Manual Deficiency Evaluation Report submissions is reflected in applicable technical manuals.

(f) Make sure each technical manual is in good material condition (i.e., does not have loose or unrepaired torn pages, is readable and has an outside cover).

(g) For Naval Air Systems Command manuals, submit an Automatic Distribution Requirements List annually to NATEC to update distribution and verify manuals in accordance with reference (a).

(13) Keep a record of annual inventories for 24 months. The annual inventories should include an assessment of recorded deficiencies in the technical data management program to determine areas that require improvement.

(14) Establish procedures to incorporate changes/revisions to technical documents held within library or satellite libraries as soon as practical after receipt. Updates involving the safety of personnel or equipment (ACNs) shall be entered within 48 hours of receipt. Routine changes shall be installed before publication use or within 30 days of receipt, whichever occurs first.

(15) Establish procedures that assure positive control of all technical documents held by the library. If Process Instructions or documents listed in ASSIST Quick Search http://quicksearch.dla.mil or any alteration text documents are held in Satellite library inventories, verify that these documents are up-to-date at least semiannually.

(16) Establish procedures for issuing technical documents to Department of Defense contractor personnel using guidance provided in references (d) (FMA only).

(17) Be the department point-of-contact for the Integrated Logistics Overhaul team with respect to technical documentation.

(18) Ensure all superseded technical documentation is removed and disposed of in accordance with local procedures.

11.3.1.1 Technical Library Non-Supervisory Personnel. The Technical Library non-supervisory personnel will carry out the daily operations of the technical library as directed by the Technical Library Supervisor. The Technical Library non-supervisory personnel shall:

a. Be a reliable and motivated petty officer (E5 or above for FMA/MSC or full time civilian equivalent).

b. Military should be assigned for at least 12 months. On Aircraft Carriers they are assigned for 18 months in accordance with reference (b).

c. Personnel assigned as satellite librarians will be reliable and motivated petty officers appointed in writing and assigned for at least 9 months. Satellite librarians will have **a minimum** security clearance equal to the highest security classification of any document held within the library in accordance with reference (n).

11.3.2 Technical Library Materials. The technical library has a wide variety of technical information and data in many different forms and formats. For FMA Technical Libraries eight broad categories of information exist which are described in reference (e).

11.3.2.1 Indices. Indices serve as reference or information sources that name systems, supplies and other information sources. Examples of indices include:

a. Ships Drawing Index (SDI).

b. Index of Technical Publications (ITP).

c. TDMIS.

d. Navy publications, forms and instructions (Reference (c)).

e. ASSIST Quick Search http://quicksearch.dla.mil

f. ATIS Systems

11.3.2.2 Technical Manuals. Technical manuals outline inspection and repair procedures for shipboard systems. Examples of technical manuals include:

a. Ship's Information Books.

b. General Information Books.

c. Naval Ships' Technical Manual (NSTM).

d. Propulsion Operating Guide.

e. General Specifications for Overhaul.

f. Equipment Technical Manuals.

g. Organizational Maintenance and Management System - Next Generation (OMMS-NG).

h. Ordnance Publications.

i. Ordnance Data.

11.3.2.3 Drawings. Drawings have engineering and design requirements needed to repair equipment to original specifications. Drawings are also used to find the location of shipboard systems and system equipment and components. Drawings stored in technical libraries include:

a. Ship's construction drawings.

b. Ship Alteration installation drawings.

c. Selected Record Drawings.

d. Ship's Equipment Drawings.

e. Vendor/Manufacturer's Drawings.

f. Booklet of General Drawings.

11.3.2.4 Handbooks and Cataloging. Handbooks have detailed information about specific systems or equipment and may also list equipment repair procedures. Examples of handbooks include the following:

a. Micro-Electronic Device Date Handbook.

b. Identification Markings for Fasteners.

c. Gasket Material (Non-metallic).

d. Guide for Sampling Inspections.

e. Shipyard welding procedures.

11.3.2.5 Military Specifications and Standards. Military specifications and standards are specific, detailed requirements for equipment or material. ASSIST Quick Search http://quicksearch.dla.mil

11.3.2.6 Documents and Lists. Documents and lists are catalogs of parts, equipment or publications and alteration records. The following are examples of documents and lists typically found in technical libraries:

a. Navy Management Data List (NAVSUP Publication 4100).

b. Navy Directive List.

c. Introduction to Federal Supply Catalogs and Related Publications (NAVSUP Publication 4400).

d. Ship Changes.

e. Planning Yard Work Instructions.

11.3.2.7 Instructions, Technical Publications and Bulletins. These publications give guidelines for the operation of equipment, introduce new equipment and may have lists of available items. Instructions, technical publications and bulletins commonly stocked in technical libraries include:

a. General Services Administration Supply Catalog.

b. Electronics Information Bulletins.

c. Field Change Bulletins.

d. N AVSEA Instructions.

e. Type Commander Instructions.

f. Technical Directives.

11.3.2.8 Repair Standards. These standards are detailed repair procedures for the troubleshooting and overhaul of specific equipment and guidance for standard processes. Examples of repair standards include:

a. Technical Repair Standard.

b. Maintenance Standard.

c. Intermediate Maintenance Standard.

d. Unified Industrial Process Instruction.

11.4 INDEX OF TECHNICAL PUBLICATIONS AND SHIP'S DRAWING INDEX. Due to the wide variety of types of materials that may be included in a technical library, it may be confusing as to what are the minimum titles and requirements needed for a particular ship. The ITP and SDI have been developed for each ship and list the titles and drawings applicable to the ship.

11.4.1 Index of Technical Publications. The ITP is a guide to facilitate the identification of technical manuals used on board a ship. The ITP is tailored to the configuration of a specific ship and lists technical manuals needed to operate, maintain and repair ship systems and equipment. It also lists any other general and ship related manuals needed by Ship's Force. The ITP will:

a. Contain a list of the technical manuals needed on board a ship.

b. Identify technical manuals for specific systems and equipment.

c. List the systems and equipment supported by a specific technical manual.

d. Include information about each technical manual.

e. Be in electronic (EXCEL) format and sorted by APL/Repairable Identification Code and Hierarchical Structure Code.

11.4.2 Ship's Drawing Index. The SDI is a list of ship drawings and related design reference information that shows the actual current configuration of the ship. SDIs are required by General Specifications for Shipbuilding for all ships over 200 feet in length.

a. The original SDI is prepared by the shipbuilder and approved by Supervisor of Shipbuilding. After acceptance of the ship by the Navy, the SDI is sent to the selected planning yard which is assigned as custodian of the index.

b. Corrections to the SDI are submitted by the industrial activity to reflect work performed during Chief of Naval Operations maintenance availabilities and Fleet maintenance availabilities. Original SDIs are to be corrected by the planning yard to reflect changes reported by the ship or other activities when changes are made between regular overhauls.

c. SDI information includes:

(1) Drawing title.

(2) NAVSEA drawing number and revision.

(3) Builder or contractor drawing numbers of Hull Mechanical and Electrical drawings applicable to the individual ship.

11.5 MAINTENANCE SUPPORT CENTERS (AIRCRAFT CARRIERS ONLY).

a. MSCs provide a centralized support facility to aid work center technicians in Integrated Logistics Support processing and problem resolution services. The MSC provides shipboard management of technical documentation and libraries in support of ship's maintenance and material requirements. The MSC will function within the policy and procedural guidelines of references (a) and (b).

b. The MSC manages and maintains an accurate equipment/component configuration database, identification of required technical support (e.g., repair part APLs, drawings, technical manuals, test equipment, Planned Maintenance System, etc.), and facilitates resolution of repair part support problems.

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VOLUME IV

CHAPTER 12

HULL INSPECTION OF SHIPS AND CRAFT

REFERENCES.

(a) NAVSEA S9086-DA-STM-000 - NSTM Chapter 100 (Hull Structures)
(b) ABS Guide for Building and Classing High Speed Naval Craft (2007)
(c) NAVSEA T9074-AS-GIB-010/271 - Requirements for Nondestructive Testing Methods

LISTING OF APPENDICES.

A Sample Layout of Inspection Areas
B Hull Reporting Format

12.1 PURPOSE. To provide general guidance for the inspection of ship's hulls to detect structural defects or hull thickness degradation and to establish supplemental procedures and periodicities for the conduct of hull inspections of thin hulled ships and craft for the timely detection of corrosion or erosion.

12.1.1 Scope. Thin hull ships are defined as those ships and craft with hull plating less than 1/2 inch design thickness at any location below the waterline. Hull Inspections and repair for wooden hulled ships and craft are addressed in Chapter 24 of this volume. Guidance contained in this chapter applies to all thin steel hull ships and craft.

a. Detailed direction for thin hull assessment can be found in reference (a) for the following classes of surface force ships:

(1) DDG 51

(2) FFG 7

(3) CG 47

(4) LPD 17

b. The following classes of surface force ships were built to reference (b), therefore reference (a) does not apply:

(1) LCS

(2) PC

12.1.2 Discussion.

a. All ship's hulls must be inspected in accordance with Planned Maintenance System (PMS). Reference (a) contains additional guidance and check lists for conducting a thorough internal and external visual hull inspection. Should visual hull inspections reveal suspect areas, these areas should be ultrasonically tested to determine the need for repairs.

b. Hull inspections will reveal the ship's hull condition through self-inspection of inner shell structure by Forces Afloat. These inspections will permit detection of structural defects and hull thickness degradation resulting from the cumulative effects of unarrested corrosion, and identify any areas in need of repair and/or preservation. Shell plating areas which are inaccessible can be measured ultrasonically by divers from outside the hull.

c. Besides verbal descriptions of damage, graphical layouts of hull structure for some ship classes are available for use in the inspection. These schematics are for the purpose of plotting damage locations, as well as assisting the inspector in orientation and report analysis in assessing damage effects.

d. Main machinery spaces are most prone to corrosion due to the severe environmental extremes of temperature and humidity arising from continuous operation of the propulsion machinery and supporting systems. This alternate wetting and drying of the interior hull surfaces resulting from normal ship's operations and shutdowns over a long period produces oxidation cycles which lead to corrosion.

e. Inspections should take place inport during a period when the machinery plant will be secured for at least one week. During the work definition period, prior to a scheduled dry-dock availability, an inspection should be scheduled so that it precedes the availability in enough time to permit the identification of all hull structure in need of repair (i.e., approximately nine to ten months prior to the scheduled availability). The ISIC/TYCOM will coordinate and schedule the inspections as requested by the ship's Commanding Officer.

f. The inspection is primarily intended for areas which are subject to both high stress and heavy corrosion, namely, bottom shell structure in the main machinery spaces of the ship. Accordingly, all fire rooms and engine rooms must be surveyed for structural deterioration, with emphasis on the following areas:

(1) Under boilers and turbines, where access is difficult and environmental extremes are most severe.

(2) Around boiler feedwater tanks, which are continuously wet from "sweating".

(3) Around the various overboard intakes and discharges, where external turbulence often produces erosion.

(4) Along the interior of the side shell in way of the exterior waterline. Here the design thickness of the shell plating is thinnest, and exterior corrosion from wave action is always present.

(5) Around "wet" equipment, which continuously operate with steam/water emission (e.g., pumps, condensers, evaporator, etc.).

(6) Areas of the bottom shell which are subject to the corrosive action of bilge water.

g. Items such as deck plating in way of uptake spaces, pump rooms, refrigeration spaces, heads, etc., are omitted from this inspection. These "wet" areas are considered to be "housekeeping" items and will be surveyed during the pre-overhaul hull inspection. All tank and void spaces, which are in proximity to the machinery spaces being surveyed, are also omitted from this inspection, as these compartments do not meet the above criteria. The interiors of these spaces are inspected during industrial availabilities.

h. Procedures regarding hull inspections which are associated with Pre-CNO Maintenance Availability planning, are issued separately for each availability as determined by the requirements for each ship.

12.2 ACTION. Both internal and external hull inspections shall be accomplished in accordance with reference (a) and (c) on all ships and craft identified in paragraph 12.1.1 of this chapter. Periodicities shall be as specified by the TYCOM or as required by PMS.

a. At the beginning of any dry-docking period, (regular overhaul, Docking Selected Restricted Availability, interim dry-docking, etc.) an extensive hull survey will be conducted using the ship's plans and a sampling plan similar to that shown in Appendix A of this chapter. The inspection shall be conducted using ultrasonic techniques, drill testing or caliper method as appropriate.

b. A pre-overhaul inspection of the hull should be conducted prior to a dry-docking availability to ensure known hull repairs are included in the planned work package and to ensure unexpected costs are kept to a minimum. Dry-docking is not required for a pre-overhaul inspection; however, maximum use should be made of available tools and techniques to accurately determine the condition of the hull.

c. A minimum of one hull reading every other frame, and every other strake (as shown in Appendix A of this chapter) up to the waterline, shall be taken and the results recorded in the inspection report of Appendix B of this chapter. Suspect areas, as determined by visual inspection, shall have several readings taken and the least thickness recorded. Any area showing a reading less than the minimum allowable shall have additional readings taken in an expanding fashion to determine the actual extent of the excessive deterioration.

d. In locations where there is an inner hull, such as bilge area tank tops, inside readings shall be taken in addition to those readings taken on the hull. These readings shall be taken every other frame, port and starboard, recorded in the format of Appendix B of this chapter, and submitted with the hull inspection report.

e. In general, hull sections and structures which have suffered 25 percent or greater reduction in cross-sectional area from their original thickness, should be cut out and replaced. Scattered pits of depth at least 25 percent, but not greater than 45 percent of the original thickness, may be repaired by clad welding.

f. An engineering analysis considering current and probable future corrosion may be performed to determine if the corroded structure is within allowable stress levels, rather than performing an automatic repair when corrosion has resulted in a 25 percent or greater reduction of cross sectional area. The repair criteria shall be based on the applicable General Specifications for Overhaul.

12.3 REPORTS. The results of all hull inspections shall be forwarded to the ship, with an information copy to the TYCOM/ISIC, using the format of Appendix B of this chapter. Areas having unsatisfactory results shall be superficially noted in the report cover letter. Unsatisfactory areas shall be defined by size in feet and inches and location in relation to strake and frames.

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APPENDIX A

SAMPLE LAYOUT OF INSPECTION AREAS

	G	1	3	4	2	1	3	4	2	1	3
	F	4	2	1	3	4	2	1	3	4	2
	E	1	3	4	2	1	3	4	2	1	3
	D	4	2	1	3	4	2	1	3	4	2
STRAKE	C	1	3	4	2	1	3	4	2	1	3
	B	4	2	1	3	4	2	1	3	4	2
	A	1	3	4	2	1	3	4	2	1	3
		18	19	20	21	22	23	24	25	26	27

FRAME

Numbers denote the areas to be tested on each inspection (i.e., the first inspection consists of all number 1 - Requirements for Nondestructive Testing Methods, the second inspection, all number 2’s, etc).

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APPENDIX B

HULL REPORTING FORMAT

Strake

Frame Boundary Nos.	Original Drawing Thickness	Minimum Allowable Thickness (75% of Orig)	Actual Thickness	Frame Boundary Nos.	Original Drawing Thickness	Minimum Allowable Thickness (75% of Orig)	Actual Thickness

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VOLUME IV

CHAPTER 13

WEIGHT HANDLING EQUIPMENT TESTING AND INSPECTION

REFERENCES.

(a) NAVFAC P-307 - Management of Weight Handling Equipment
(b) NAVSEA 0989-LP-043-0000 - Commissioned Surface Ship General Reactor Plant Overhaul and Repair Specification
(c) NAVSEA 0989-LP-037-2000 - Commissioned Submarine General Reactor Plant Overhaul and Repair Specifications
(d) NAVSEA 0989-LP-058-0000 - AS/AD Tender Nuclear Support Facilities Preventive Maintenance Index
(e) NAVSEA S9086-XG-STM-010 - NSTM Chapter 700 (Shipboard Ammunition Handling and Stowage)
(f) NAVSEA S9086-TX-STM-010 - NSTM Chapter 583 (Boats and Small Craft)
(g) NAVSEA S9086-T4-STM-010 - NSTM Chapter 589 (Cranes)
(h) NAVSEA S9086-T3-STM-010 - NSTM Chapter 588 (Aircraft Elevators)
(i) NAVSEA STD DWG 803-5959209 - Aircraft Deck Tiedown Fittings
(j) NAVSEA STD DWG 805-1916300 - Aircraft Securing and Engine Run-up Fittings
(k) NAVSEA S9086-TV-STM-010 - NSTM Chapter 581 (Anchoring)
(l) NAVSEA SG420-AP-MMA-010 - Periodic Testing Arrangements for Ordnance Handling Equipment
(m) NAVAIR 17-1-127 - Periodic Proofload Testing of Weapons Support Equipment W/IPB
(n) NAVSEA OP 4098 - Handling Ammunition, Explosives and Hazardous Material with Industrial Materials Handling Equipment
(o) NAVSEA OP 3347 - Ordnance Safety Precautions, U.S. Navy
(p) NAVORD OP 4 - Ammunition Afloat
(q) NAVSEA S9086-TM-STM-000 - NSTM Chapter 573 (Booms)
(r) NAVSEA S9086-ZN-STM-000 - NSTM Chapter 772 (Cargo and Weapons Elevators)
(s) NAVSEA STD DWG 805-2276338 - Cleats
(t) NAVSEA STD DWG 803-5000902 - Safety Net, Deck Edge, Steel Frame and Nets
(u) NAVSEA STD DWG 803-5184097 - Safety Net, Deck Edge, Aluminum Frame and Nylon Nets
(v) NAVSEA STD DWG 805-1639000 - Deck Screw Reversible Eyebolts
(w) NAVSEA S9086-TL-STM-000 - NSTM Chapter 572 (Shipboard Stores and Provision Handling)
(x) NAVSEA S9086-UF-STM-010 - NSTM Chapter 600 (Structural Closures)
(y) NAVSEA STD DWG 805-1645271 - Portable Davits
(z) NAVSEA S9AA0-AB-GOS-010/020 - General Specifications for Overhaul of Surface Ships (GSO)
(aa) NAVSEA STD DWG 804-5184163 - Trunk Safety Nets
(ab) NAVSEA S9086-TK-STM-010 - NSTM Chapter 571 (Underway Replenishment)
(ac) NAVSEA STD DWG 804-1213717 - Vehicle Tiedown Deck Fittings
(ad) NAVSEA STD DWG 709-5549373 - Weapons Handling Equipment SSN 688 Class Test Loads/ Methods and Inspection Procedures
(ae) NAVSEA STD DWG 709-6633924 - Vertical Launch System Weapons Handling Equipment SSN 688 Class Test Loads/Methods and Inspection Procedures
(af) NAVSEA STD DWG 709-5549374 - Weapons Handling Equipment SSN 726 Class Test Loads/ Methods and Inspection Procedures
(ag) NAVSEA STD DWG 709-6726350 - Weapons Handling Equipment SSN 21 Class Test Loads/ Methods and Inspection Procedures
(ah) NAVSEA S9086-UU-STM-010 - NSTM Chapter 613 (Wire and Fiber Rope and Rigging)
(ai) NAVSEA 0989-LP-030-7000 - Lifting Standard

13.1 PURPOSE. To ensure Weight Handling Equipment (WHE) is capable of continued reliable and safe operation.

a. WHE shall be of sufficient rated capacity to safely handle the calculated load; including, all slings, shackles, turnbuckles, strongbacks and chain hoists.

b. The WHE selected shall be inspected before each use for obvious material deficiencies, equipment capacity markings, and load test expiration date (as applicable).

13.1.1 Scope. The following guidance has been utilized to incorporate both Naval Sea Systems Command (NAVSEA) and Naval Facilities Engineering Command requirements:

a. For shipboard WHE used both afloat and ashore, including Floating Drydocks, NAVSEA technical requirements are cited and invoked as the top-level guidance.

b. For shore based WHE used only ashore, Naval Facilities Engineering Command and the Code of Federal Regulations technical requirements are cited and invoked as the top-level guidance.

c. For general purpose lifting and rigging, shore based rigging gear and portable hoists meeting the requirements of reference (a) may be used aboard ship when the ship is pierside.

d. For Reactor Plant Lifting and Handling Equipment and lifts of major reactor plant components, additional guidance is provided in Section 9400-0 of reference (b) and in reference (c). Reference (d) provides guidance for lifting radioactive material or reactor plant components when NAVSEA approved lifting equipment is not available (i.e., use of the B & M crane to lift portable effluent tanks or radioactive waste). These requirements apply to all commissioned ships, shipyards and Naval shore-based activities.

13.2 NAVAL SEA SYSTEMS COMMAND AFLOAT REQUIREMENTS.

13.2.1 Definitions.

a. Dynamic Load Test. An operational overload test conducted to verify the ability of the lifting equipment to operate with rated load while being subjected to dynamic conditions associated with ship motions.

b. Load Bearing Members. Those members of the lifting and handling equipment which support the load and upon failure could cause dropping, uncontrolled shifting, or movement of the load.

c. No-Load Test. A test which verifies equipment functional performance without a load.

d. Rated Load. The maximum permissible load carried during use (also called "Safe Working Load" (SWL)). The weights of handling gear; such as slings, strongbacks, handling dolly, which are not an integral part of the equipment being tested, shall be considered as part of the rated load.

e. Rated Load Test. A load test at 100 percent of the rated load, conducted at rated speed through the complete range of operating limits. The test is performed to determine the proper operation of the equipment, repeatability of functions and heat dissipation ability.

f. SWL. See Rated Load.

g. Factor of Safety. The ratio of the yield stress load on a structure to the estimated maximum load in ordinary use.

$$\text{Factor of Safety} = \frac{\text{Actual Yield Strength}}{\text{Required Strength}}$$

h. Static Load Test. A stationary overload test conducted to verify the structural and mechanical integrity of the lifting equipment. The lifting equipment holds the test load for a short period of time while the test inspector checks the equipment for signs of brake slippage or damage.

13.2.2 Procedure. Fabrication, repair and testing of Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment will be conducted using a Controlled Work Package developed in accordance with Volume V, Part I, Chapter 2 of this manual. This requirement does not apply to periodic weight test of Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment. Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment requiring a weight test based on Planned Maintenance System (PMS) or other periodic testing requirements, excluding tests in conjunction with repair or manufacture, will be inspected and tested using Technical Work Documents, such as a pre-existing maintenance procedure, test load methods drawing, technical manual or Formal Work Package. Periodic weight testing must be witnessed by a qualified inspector.

a. Testing Sequence. Newly installed/overhauled equipment shall be tested in the following order:

(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).

(12) Vertical ladders.

13.2.5 Crane Certification Program.

a. A Crane Certification Program shall be implemented in each ship with a crane installed or assigned, in accordance with reference (g).

b. Guidelines for training and qualification of personnel responsible for shipboard crane operation and maintenance are contained in reference (g).

13.2.6 Daily Inspections. Daily, before use visual inspections shall be conducted as follows:

a. Ammunition handling equipment.

(1) A daily, before use visual inspection shall be performed in accordance with PMS for the assigned equipment before any load handling operations.

(2) A no-load operational test shall be conducted by each shift prior to handling ammunition.

b. All handling equipment selected (including slings, shackles, turnbuckles, strongbacks, chain hoists and taglines) shall be visually inspected before use for obvious material deficiencies, equipment capacity markings and load test expiration date (as applicable).

c. Before beginning crane operations for each new day, a qualified crane operator shall perform an inspection of each crane to check for discrepancies in the crane's structure or operating controls using the crane Operator's Daily Check List provided in reference (g).

13.2.7 Use of Nylon Straps.

a. The use of knotted nylon strapping as handling equipment is prohibited.

b. Rigging with nylon straps is permitted only when nylon strapping is equipped with sewn (lifting) eyes and static load tested to 200 percent of rated load.

c. When available handling equipment (for example, wire rope slings) cannot be properly attached, or load surface damage may occur, 6,000-pound (rated breaking strength) nylon strapping is permitted only for loads up to 1,000 pounds.

d. Webbing slings shall be inspected for abrasions and fraying of the webbing and stitching, and broken stitches. Slings shall not be used if signs of deterioration are noted.

NOTE: REFERENCE (a) IS TO BE USED ONLY WHEN THE SHIP IS ACTUALLY PIERSIDE.

13.2.8 Weight Test Procedure Matrix. The following matrix provides sources of load test procedures for shipboard equipment/systems that may require periodic load testing or testing following fabrication or repair:

EQUIPMENT/SYSTEM INSPECTIONS AND TESTING	GOVERNING DOCUMENT(S) FOR MAINTENANCE
Aircraft Elevators	Reference (h), PMS
Aircraft Tiedowns	References (i) and (j)
Anchoring	Reference (k), PMS
Ammunition Handling	References (e), (l) through (p), PMS
Boats & Boat Davits	Reference (f), PMS
Booms	Reference (q), PMS
Cargo & Weapons Elevators	Reference (r), PMS

EQUIPMENT/SYSTEM INSPECTIONS AND TESTING	GOVERNING DOCUMENT(S) FOR MAINTENANCE
Cleats	Reference (s)
Cranes	Reference (g), PMS
Deck Edge Safety Nets	References (t) and (u)
Deck Screw Reversible Eyebolts	Reference (v)
Hoists	Reference (w), PMS
Hull Fittings	Reference (x), PMS
Portable Davits	Reference (y)
Reactor Plant Lifting and Handling Equipment	References (b) through (d)
Stores & Provision Handling	Reference (w), PMS
Temporary Padeyes	Reference (z), Section 611
Trunk Safety Nets	Reference (aa)
Underway Replenishment	Reference (ab), PMS
Vehicle Tiedowns	Reference (ac)
Weapons Handling Equipment SSN 688 Class	Reference (ad)
Vertical Launch System - Weapons Handling Equipment SSN 688 Class	Reference (ae)
Weapons Handling Equipment SSBN/SSGN 726 Class	Reference (af)
Weapons Handling Equipment SSN 21 Class	Reference (ag)
Wire and Fiber Rope and Rigging	Reference (ah)
Shipboard Crane and Miscellaneous Rigging Gear	Reference (g)

13.2.9 Identification of Equipment. (Submarines only) Following the weight test, ensure the Weapons Handling Equipment is properly marked as detailed in accordance with reference (e) section 4.

13.2.10 Witnessing Qualification. (Submarines only) Tended units Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment requiring weight test based on PMS or other governing documents for periodic purposes must be witnessed by a qualified Weight Handling Test Inspector. The Weight Handling Test Inspector will be qualified in accordance with Quality Maintenance Personnel Qualification Standard (NAVEDTRA 43523) and certified by the Commanding Officer.

13.2.11 Record Keeping. (Submarines only) QA form 17W will be used to document Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment weight testing. The Weight Handling Test Inspector will sign the Quality Assurance blocks of QA form 17W. The signed QA form 17W or a copy will be provided to the activity who maintains the Shipboard Weight Handling and/or Weapons Handling Equipment in all cases. QA form 17W will be retained by the end user and/or maintaining activity until superseded by successive testing for each piece of Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment. QA form 17W used to document Shipboard Weight Handling and/or Weapons Handling and Stowage Equipment testing in a Controlled Work Package will be retained with the Controlled Work Package as prescribed by Volume V of this manual.

13.3 NAVAL FACILITIES ENGINEERING COMMAND ASHORE REQUIREMENTS. WHE assigned to naval shore activities and utilized only in ashore operations or aboard ships when the ship is pierside shall be certified, tested, inspected and operated in compliance with reference (a). For general purpose lifting and rigging, shore based rigging gear and portable hoists meeting the requirements of reference (a) may be used aboard ship when the ship is pierside (this does not apply to ordnance or radiological lifting and handling). Reference (a) covers line handling mechanisms on floating cranes, hoists and chainfalls which are used in multiple locations, and portable and adjustable gantry cranes and floor cranes. Material handling equipment is covered by Naval Supply Systems Command criteria.

13.3.1 Certification Program. The Commanding Officer is responsible for ensuring safety within the activity and shall designate a WHE certifying official who shall ensure the activity's WHE is inspected, tested and certified in accordance with reference (a).

13.3.2 Operator Licensing Program. All Navy civilian and military personnel assigned duties involving the operation of Navy shore based Category 1, 2, Cab Operated Category 3 or Category 4 WHE shall be qualified and licensed in accordance with the provisions of reference (a).

13.3.2.1 Operator Qualification and Testing. All applicants for Crane Operation Licenses shall meet the requirements of reference (a).

13.3.2.2 Licensing Procedures and Documentation. Reference (a) contains the necessary procedural requirements for licensing and documentation.

13.3.3 Inspections.

a. Pre-Use Check (Category 1, 2, Cab Operated Category 3 and Category 4 Cranes). The operator shall perform an inspection of their assigned crane using a Crane Operator's Daily Checklist as required by reference (a).

b. Reference (a) gives specific instructions for conducting and reporting the following inspections:

(1) Walk Around Inspection.

(2) Machinery House Inspection.

(3) Operator Cab Inspection.

(4) Operating Inspection.

c. Pre-Use Check (Non-Cab Operated Category 3 Cranes) shall be performed in accordance with reference (a).

13.3.4 Test Procedures. Reference (a) contains instructions for performing crane test procedures.

13.3.5 Special Purpose Service. Activities using special purpose service cranes shall follow the requirements of reference (ai) in addition to criteria contained in reference (a).

13.4 SLINGS. Slings used in conjunction with other material handling equipment for the movement of material ashore by hoisting are covered by references (a) and (g).

a. A sling is an assembly which connects the load to the material handling equipment.

b. Slings include those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).

13.4.1 Crane Rigging Gear and Miscellaneous Equipment. Reference (a) contains maintenance, inspection and test requirements for the following common rigging gear used ashore and reference (g) contains maintenance, inspection and test requirements for the following common rigging gear used shipboard. Reference (g) allows shore based rigging gear and portable hoists meeting the requirements of reference (a) to be used aboard ship with shipboard cranes when the ship is pierside.

a. Slings.

b. Shackles, links, rings, swivels, eye bolts, turnbuckles, hooks and swivel hoist rings.

c. Tackle blocks.

d. Portable load indicating devices (dynamometers, load cells, crane scales, etc.).

e. Lashing (e.g., wire rope, synthetic rope, synthetic webbing).

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CHAPTER 14

MAGAZINE SPRINKLER INSPECTION REQUIREMENTS

REFERENCES.

(a) NAVSEA S9522-AA-HBK-010 - Description, Operation and Maintenance Handbook for Magazine Sprinkler Systems

(b) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual

14.1 PURPOSE. To provide guidance for the performance of magazine sprinkler inspections.

14.2 RESPONSIBILITIES.

14.2.1 Commanding Officers.

a. Ensure that sprinkler systems are tested in accordance with Planned Maintenance System.

b. Ensure that magazine temperatures are checked and recorded daily.

c. Ensure that magazines are properly maintained.

d. Ensure that prior to acceptance of a sprinkler system in new construction or when design changes (Ship Changes) are made to a sprinkler system during construction or overhaul, the cognizant industrial activity provides written verification that each system is completely operational. A certified magazine inspector will perform the verification of system operability in accordance with reference (a).

e. Ensure that magazine sprinkler system inspection requirements are conducted in accordance with reference (a) and when directed by Planned Maintenance System. These inspection requirements apply to both the thermo-pneumatic and hydraulic control systems. All tests will be in accordance with reference (a) and will be followed by a complete operational test by Ship's Force using the appropriate Maintenance Requirement Card. A certified magazine inspector will conduct all thermo-pneumatic tests.

f. Ensure that a magazine sprinkler system verification inspection is scheduled prior to ordnance on-load (if required by paragraph d. or e. above). A certified magazine sprinkler inspector shall conduct the inspection.

g. Take necessary action to correct all discrepancies noted during magazine sprinkler inspections. Within 30 days following receipt of the magazine sprinkler discrepancy list, report the status to the Immediate Superior In Command (ISIC) with information copy to the Type Commander via message, identifying corrective action(s) taken and/or applicable Plan of Action and Milestones.

h. Ensure that design discrepancies are reported to the Type Commander and submitted into the Current Ships' Maintenance Project. Procedures for reporting discrepancies are included in reference (b) and Type Commander instructions.

14.2.2 Verification Activity.

a. Ensure Magazine Sprinkler System Inspector has completed applicable qualifications of the Magazine Sprinkler Systems Inspector Course (Course Number: K041-2137).

b. Provide a sprinkler system discrepancy list by the categories **SAFETY, MAJOR, MINOR** and **INSTALLATION** to the Ship's Commanding Officer and ISIC.

c. Provide written recommendations to the Ship's Commanding Officer and ISIC to continue or discontinue thermo-pneumatic certification until correction of any discrepancies and completion of satisfactory sprinkler system operational tests.

14.2.3 Immediate Superior In Command.

a. Ensure that Shipboard Explosive Safety Inspection is scheduled in accordance with reference (a).

b. Follow-up on all discrepancies reported by the verification activity. Those items that are discrepancies as a result of design problems should be reviewed by the cognizant Naval Engineering Agency and recommended corrective actions should be performed at the earliest convenient availability.

c. Shall act as sole grantor of all magazine sprinkler systems re-certification via message. Re-certification is based on verifying activity's recommendation.

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CHAPTER 15

CIRCUIT BREAKERS

REFERENCES.

(a) NSWC Philadelphia ltr 9320, Ser 934/010 dated 19 Mar 2001, titled Shipboard Circuit Breaker Maintenance and Overhaul Policy

15.1 PURPOSE. To promulgate the Naval Sea Systems Command (NAVSEA) policy on maintenance and overhaul of Navy shipboard shock-hardened circuit breakers of both ACB and AQB types specified in reference (a).

15.2 CIRCUIT BREAKER FUNCTION AND ACQUISITION ON NAVY SHIPS. Circuit breakers onboard Navy ships and submarines are used primarily to provide electrical system protection against disruptive and sometimes destructive abnormal currents. This protection is so precise that it selectively removes only the cause of the abnormal current (such as electrical system damage acquired in battle) while continuing to power other unaffected weapons, electronics and electrical systems. This continuous supply of electrical power is also ensured by the unique ability of these circuit breakers to maintain proper position during severe impacts produced by missiles, bombs, mines, torpedoes and other detonation sources. Due to the unique nature and critical function of Navy shock-hardened circuit breakers, their acquisition is controlled through a Qualified Products List (QPL) governed by requirements set forth in appropriate military specifications. There is no equivalent commercial requirement.

15.3 CIRCUIT BREAKER OVERHAUL FACILITIES AND PART PROCUREMENT. Type AQB circuit breakers with non-replaceable trip units (100 amp and smaller sizes) are not repairable. All other circuit breakers are classified as Depot Level Repairable. NAVSEA has designated Puget Sound Naval Shipyard and the Original Equipment Manufacturer (OEM) as Designated Overhaul Points (DOP) for these items. The current OEMs offering overhaul service for their products are SPD Technologies, Inc., Whipp & Bourne, and Eaton/Cutler-Hammer (for Westinghouse breakers). Other (obsolete) ACB and AQB circuit breakers are overhauled by the Navy DOP. The ability to repair and refurbish circuit breakers is a "core" Naval Shipyard and TRIDENT Refit Facility (TRF) function, with all Naval Shipyards expected to maintain and execute this capability. This does not imply all Naval Shipyards or the TRFs will be appointed DOP status. The single Navy DOP at Puget Sound Naval Shipyard along with the OEMs and their service centers provide production capability and capacity to meet the requirements for restoration of stock assets to Ready For Issue condition and meet other routine circuit breaker overhaul requirements. Prior to the initial listing of a vendor's circuit breaker on the QPL, the OEM must successfully demonstrate by appropriate tests and inspections that the circuit breaker passes all the requirements contained in the military specification. To maintain the integrity of the circuit breaker as a qualified product, NAVSEA prohibits the local manufacture or fabrication of certain (restricted) parts during repair or overhaul. Due to the critical nature and stringent materials and manufacturing requirements, the Navy restricts the manufacture of these parts to the OEM listed for the particular circuit breaker. Specifically, all replacement parts for circuit breakers, except fasteners and general hardware items, are restricted parts. Non-restricted parts include nuts, bolts, screws, washers, lockwashers, cotter pins, O-rings, indicator lights, and indicator light globes (colored and clear). The restricted replacement parts shall be obtained from the Federal Stock System, the OEM or approved material diversion.

15.3.1 Submarines. NAVSEA has established a pool of circuit breakers removed from inactivated SSN 688 Class submarines to support SSN 688 and SSBN/SSGN 726 Class submarine's lifecycle requirements. The OEM has designated some circuit breakers still in use as obsolete and may no longer readily support them with parts. For obsolete breakers no longer supported by the Federal Stock System, Puget Sound Naval Shipyard and in some cases Ship's Maintenance Monitoring Support Performance Monitoring Teams (PMT), may be a source of parts. The ship must obtain the parts by approved material diversion. This will allow Puget Sound Naval Shipyard to either make parts or purchase parts from the OEM. The OEM can still manufacture the obsolete parts but the cost could be excessive. Even after the shipboard repairs are complete, the pay back is critical to ensure the lifecycle pool is maintained. If the lifecycle pool is allowed to deteriorate, circuit breakers for future requirements may not be available.

15.4 NAVY POLICY ON SHIPBOARD CIRCUIT BREAKER MAINTENANCE AND OVERHAUL.

a. Not Repairable Circuit Breakers. Type AQB circuit breakers with non-replaceable trip units (100 amp and smaller) are not repairable. Any attempt to open and repair this type of circuit breaker results in an unacceptable risk to subsequent performance, even if retest is performed.

b. Overhauls shall be performed by the Navy DOP at Puget Sound Naval Shipyard or the OEM. Class A and B overhauls are defined below:

(1) Class A Overhaul. An extensive overhaul that involves complete disassembly and refurbishment, such as re-plating mechanical and electrical parts, and replacing the wire harness. The "most recent" design and technical specifications will be met. The end product shall be in "like new" condition in appearance, operation and performance. All manufacturers' and technical manual performance standards and specifications, and all technical documentation, unless superseded by proper authority, shall be met. The repair activity shall demonstrate that the end product successfully meets all performance criteria of the governing specifications. Defining an overhaul as Class "A" means that all actions required to meet the definitions are authorized.

(2) Class B Overhaul. A less extensive overhaul that re-uses most of the existing parts to restore the operating and performance characteristics of a circuit breaker to its original design and technical specifications. Machinery Alterations, field changes and modifications, even if applicable, are not to be accomplished unless specified by proper authority. The repair activity shall demonstrate that the end product successfully meets all performance criteria of the governing specifications.

c. Non-OEM Vendors. When commercial repair facilities other than the OEM express an interest in performing repair and overhaul work, they must demonstrate to NAVSEA the capability to perform the work. Capability to perform circuit breaker overhaul and repair work includes having the facilities, trained mechanics, and access to the OEM's qualified parts and repair procedures. Use of nonqualified, restricted parts violates the integrity of the circuit breaker, nullifying the breaker's prior qualification under the QPL process. Restricted parts must be obtained from the OEM either directly or via the Federal Stock System (with the exceptions as noted above). If a restricted part is replaced with an unqualified part, the qualification of the particular circuit breaker is revoked until the full set of QPL required tests are repeated and submitted to NAVSEA for approval.

d. Fleet Maintenance Activities and Organizational Level Maintenance and Repair. Maintenance and repair of circuit breakers by Organizational and Fleet Maintenance Activities includes cleaning, inspection, lubrication, accomplishment of technical manual specified corrective maintenance, and operational testing and replacement of the bolt-on parts (obtained from qualified sources). Bolt-on parts include charging motors, arc chutes, auxiliary switches, closing relays, electronic trip units (only units that are adjustable with a portable trip unit calibration test set), indicator lights and indicator light transformers, rectifier units and resistors, secondary disconnects, shunt trip units, transformers, undervoltage trip units, and wiring and connections. Repairs which alter the breaker calibration, require major disassembly of the operating mechanism, or require re-plating must be performed at either a depot level activity or a TRF. Repairs of this type conducted by a non-depot level activity (other than a TRF) to meet operational commitments, must be certified at the earliest available opportunity by an authorized depot activity (DOP, TRF, or Naval Shipyard with demonstrated circuit breaker repair and retest capability). Type Commanders should ensure a Departure From Specification is processed for the above types of emergent repairs.

e. (Submarines Only) Performance Monitoring Teams. PMTs are permitted to perform in-depth circuit breaker maintenance and repairs as an augmentation to Forces Afloat maintenance when the PMT member is designated, trained, certified, and provided with the proper equipment. The PMT shall not make calibration repairs or adjustments that require shop verification by primary current injections. These types of calibration and certification adjustments shall only be accomplished by an authorized depot activity. NAVSEA 08 has authorized the Ship's Maintenance Monitoring Support PMTs to conduct repairs on NAVSEA 08 cognizant circuit breakers similar to those on non-nuclear applications.

f. NAVSEA 08 cognizant circuit breakers. If questions or technical issues arise regarding NAVSEA 08 cognizant circuit breakers which cannot be resolved by consulting the applicable technical manual, prepare a Trouble Record or Liaison Action Request and submit to Assistant NAVSEA Technical Representative, Schenectady, NY in accordance with the Commissioned Submarine/Surface Ship General Reactor Plant Overhaul and Repair Specification.

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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.

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CHAPTER 17

STEAM CATAPULT INSPECTION

REFERENCES.

(a) OPNAVINST 9220.3 - Propulsion and Auxiliary Plant Inspection and Inspector Certification Program
(b) NAVSEA S9587-B1-MMA-010 - Catapult Steam Support Systems for CV/CVN Class Ships; Description, Operation and Maintenance
(c) NWP 1-03.1 - Naval Warfare Publication Operational Report
(d) OPNAVINST 5100.19 - Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat
(e) NAVSEA S9086-CH-STM-030 - NSTM Chapter 074 V3 (Gas Free Engineering)
(f) NAVSEA S6470-AA-SAF-010 - Gas Free Engineering Manual
(g) NAVSEA S9086-RK-STM-010 - NSTM Chapter 505 (Piping Systems)
(h) NAVSEA S9587-AT-MMA-010 - Electronic Controls Charging System Tech Manual

LISTING OF APPENDICES.

A Sample Catapult Accumulator Inspection Request
B Sample Inspection Confirmation Letter
C Summary of Catapult Accumulator Inspection Scheduling and Responsibilities
D_1 Sample Catapult Accumulator Inspection Report Cover Letter
D_2 Sample 5 Year Strength and Integrity Catapult Accumulator Inspection Report Cover Letter
D_3 Sample Other Catapult Accumulator Inspection Report Cover Letter
E Sample Catapult Accumulator Inspection RBO-Deficiencies Message
F Sample 30 Day Update Message
G Sample Catapult Accumulator Rescission Message

17.1 PURPOSE. To establish policy and provide procedures and inspection requirements for Steam Catapult Accumulators and support systems including:

a. Inspection scheduling.

b. Required preparations.

c. Inspection guidelines.

d. Reporting requirements.

17.1.1 Policy. Periodic standardized inspections are required of all steam catapult accumulators and associated support systems including steam fill and blowdown systems, feed water fill and drain systems, steam piping and accumulator drain systems, control and indicating systems associated with the fill, pressurization and blowdown of the steam catapult accumulators, and steam supply and drain piping for the trough heating system. Inspections shall be conducted by a certified Steam Generating Plant Inspector (SGPI) and/or Naval Surface Warfare Center, Carderock Division (NSWCCD) Life Cycle Engineering Manager (LCEM), as applicable in accordance with the requirements of reference (a). The maximum interval between inspections and other occasions requiring inspections, as well as responsibilities for continuation and standardization of the inspection program, are formally assigned in reference (a). Specific inspection criteria, attributes and intervals are detailed in reference (b).

17.2 TYPES OF INSPECTIONS.

a. Routine Inspection.

b. Pre-start of Availability Inspection (PSAI).

c. Start of Availability Inspection (SAI).

d. Strength and Integrity Inspection.

e. Industrial Support Visit (ISV).

f. Completion of Availability Inspection (CAI).

g. Inactivation or Reactivation inspection.

h. Special Inspections.

17.3 RESPONSIBILITIES.

17.3.1 Naval Sea Systems Command. Naval Sea Systems Command (NAVSEA) shall provide Technical Authority oversight over all steam catapult accumulators and associated equipment. The designated NAVSEA Technical Warrant Holder shall:

a. Assure safe and reliable system operation.

b. Set and enforce all technical requirements.

c. Be the approval authority for all major Departure from Specifications (DFS).

d. Provide technical oversight and management of the SGPI and NSWCCD LCEM programs.

(1) Establish and enforce requirements for SGPI certification and recertification.

(2) Ensure periodic SGPI Seminars are conducted.

(3) Ensure periodic technical audits of all Integrated Logistics Support documentation and training.

(4) Maintain the Steam Catapult Inspection and Repair Management Information System (SCIRMIS).

(5) Routinely evaluate and ensure state of the art inspection, maintenance and repair tools and techniques are used.

17.3.2 Naval Surface Warfare Center, Carderock Division.

a. Provide support to NAVSEA for the SGPI and NSWCCD LCEM programs. Ensure that the required technical documentation to support the SGPI/NSWCCD LCEM Inspector programs is maintained current.

b. Establish and monitor the requirements and standards for routine and industrial inspections of steam catapult accumulators.

c. Develop, implement and maintain a program to train and certify NSWCCD LCEM Inspectors in accordance with reference (a).

d. Ensure that inspection of ships undergoing major overhaul and/or conversion are conducted in accordance with this instruction.

e. Conduct periodic technical audits of the SGPI Training Course per reference (a).

f. Provide management of technical data, SCIRMIS accumulator history associated repair management information database system.

g. Provide technical support to the semi annual SGPI seminars.

h. Maintain a roster of all Certified SGPIs by name, rating, duty station, date of certification and expiration date of certification. Recommend inspector certification and initiate action to decertify inspectors who fail to comply with the requirements of reference (a).

i. Ensure that the requirements for SGPI certification, recertification and certification extensions are met prior to final approval.

j. Conduct PSAI, SAI, ISV, Strength and Integrity Inspections, CAI and Special Inspections as specified in section 17.6 of this chapter and reference (b).

17.3.3 Type Commander.

a. Provide or arrange for certified SGPIs to perform inspections in accordance with the requirements of reference (b).

b. Schedule inspections of all catapult accumulators and support systems required by reference (b). Coordinate the inspections with the appropriate technical activities to avoid unnecessary opening of accumulators.

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 required to correct these deficiencies.

d. Review the SCIRMIS to ensure deferred inspection deficiencies are entered into the Current Ship's Maintenance Project (CSMP) and are planned/programmed for repair.

17.3.4 Regional Support Group/Regional Maintenance Center/Fleet Maintenance Activity Commanding Officers. Maintenance Activity Commanding Officers shall provide a certified SGPI, when requested by the ship, Immediate Superior in Command (ISIC) or Type Commander (TYCOM), to conduct the accumulator inspections.

17.3.5 Ship Commanding Officer.

a. Request inspections via Naval Message with the desired primary and alternate dates to the TYCOM with info copies to Cognizant Regional Maintenance Center (RMC) and NSWCCD for accomplishment of the inspections using the format in Appendix A.

b. Prepare for the scheduled inspections in accordance with references (a) and (b).

c. Conduct Ship's Force responsible inspections and provide reports required by reference (b).

d. Review inspection results and initiate corrective action for those deficiencies within Ship's Force capability. Initiate requests for those corrective actions beyond Ship's Force capability. If any discrepancies of paragraph 17.9.2 of this chapter cannot be corrected within 72 hours following completion of the inspection, or if said discrepancies will impact ship's operational schedule, initiate a Casualty Report for the affected catapult accumulator(s) in accordance with reference (c).

e. Assess the impact of corrective actions (if any) on the ship's operating schedules and advise the TYCOM and operational commanders of any adverse effects.

f. Submit reports per paragraph 17.7.2 of this chapter.

g. Schedule catapult accumulator inspections as required by appropriate Planned Maintenance System (PMS)/Class Maintenance Plan items.

17.3.6 Regional Maintenance Center Senior Inspector. RMC Senior Inspector shall:

a. Ensure all assigned SGPIs maintain current SGPI certificates per reference (a).

b. Perform catapult accumulator inspections per reference (a).

c. Review and submit reports per paragraph 17.7.2 of this chapter.

d. Coordinate inspections in cognizant maintenance areas.

e. Send inspection confirmation messages using Appendix B of this chapter.

f. Maintain an up to date list of required catapult accumulator inspections which shall include the latest inspection for all ships assigned to the RMCs in their geographic area of responsibility.

17.3.7 Steam Generating Plant Inspector.

a. Maintain certification per the requirements of reference (a).

b. Perform inspections in accordance with the requirements of reference (a), (b) and section 17.9 of this chapter when directed.

c. SGPIs are part of the technical authority chain-of-command and are accountable to the NAVSEA Technical Warrant Holder for the performance of their inspection duties.

17.4 INSPECTION SCHEDULING. Commands will initiate inspection requests in a timely manner to assist with inspection scheduling coordination. Commands shall ensure inspection scheduling complies with reference (b) and the following:

a. Commanding Officers/Officers In Charge of ships shall request inspections by message. In addition, OPNAV 4790/2-Kilo shall be submitted to the RMC requesting a certified SGPI/NSWCCD LCEM inspector as required to conduct inspections.

b. Inspections should coincide with the required routine waterside maintenance.

c. Inspection services shall be coordinated by geographic areas for optimum utilization of SGPIs/NSWCCD LCEM Inspectors.

d. The TYCOM may utilize PSAIs and CAIs, which are documented in SCIRMIS to satisfy the pressure vessel portion of a routine inspection. This will reduce the number of catapult accumulator openings. A Routine Inspection will not be considered completed until an SGPI has certified all items required have been accomplished.

17.5 SAFETY PROCEDURES. The safety of personnel must be given the highest priority. Observance of good engineering practices will reduce the frequency of pressure vessel entry.

a. Ensure idle accumulator condition is accomplished in accordance with the provisions of the Catapult Engineering Operational Sequencing System and reference (b) in preparations for the inspection. Where conflicts occur, an Engineering Operational Sequencing System feedback form should be submitted for resolution.

b. Ensure the idle catapult accumulator is tagged out (valves wired shut and danger tagged). Observe two-valve protection per Chapter 10 of this volume. Open to the atmosphere the drain connections on all dead interconnecting piping to observe drainage.

c. Place signs warning at the catapult control console/central charging panel that personnel are working in the accumulator and in conspicuous places in the accumulator room and in rooms containing fill/blowdown isolation valves. The signs shall remain there until the work has been completed and personnel are clear of the secured accumulator.

d. Ensure all precautions cited in Section 5.3 of reference (b) are followed before entering an accumulator.

e. Do not enter any part of the accumulator until it has been fully ventilated and certified by a Naval Maintenance Facility Gas Free Engineer/National Fire Protection Agency Marine Chemist as safe for entry. 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 (d), (e) and (f), as applicable, and Chapter 25 of this volume.

f. The use of unshielded or non approved lighting in an open accumulator is prohibited. Portable lighting shall be watertight (National Stock Number (NSN) 9S-6230-00-701-2947).

g. Station an attendant outside the accumulator to provide assistance when any personnel are working inside the accumulator.

h. Maintain accountability of all items taken into an accumulator. Foreign Material Exclusion closures will be used to the maximum extent practical to prevent tools or other foreign materials from being inadvertently left in the accumulator or associated ship's systems.

(1) Personnel entering accumulators will remove all jewelry and empty their pockets of all unnecessary items.

(2) Removal of all items and foreign material exclusion closures from the accumulator will be verified and accounted for prior to conducting a final close-out inspection. Final close-out inspection of the catapult accumulator shall be accomplished by the Chief Engineer or his designated representative.

17.6 CATAPULT ACCUMULATOR INSPECTIONS AND REQUIREMENTS. Catapult accumulator inspections conducted in accordance with the requirements of reference (b) shall fulfill all other catapult accumulator inspection requirements. When practical, various inspections should be scheduled for coincidental performance. Appendix C of this chapter is a summary of inspection scheduling and responsibilities.

17.6.1 Routine Inspection. Routine inspections will be conducted at least once every 18 months not to exceed 24 months from its last inspection. For newly constructed ships, the 24 month period shall begin at the completion of the Board of Inspection and Survey Acceptance Trials. The normal interval between routine inspections shall be 18 months. The 18 month period begins with the first warm-up of the catapult accumulator to normal operating temperature and pressure following the previous routine inspection. To provide scheduling flexibility, inspections may be performed as early as 12 months not to exceed 24 months after the previous inspection. Inspections that exceed the 18 month interval will require a minor Departure From Specification to the TYCOM with concurrence from NSWCCD-SSES. Any catapult accumulator which exceeds the inspection interval shall be placed out of commission until inspected by a certified SGPI or a Major DFS is approved by the NAVSEA Technical Warrant Holder to operate beyond 24 months without a Routine inspection.

a. The catapult accumulator inspection will be scheduled by the TYCOM.

b. The catapult accumulator inspection will be performed by a certified SGPI.

c. The TYCOM may utilize PSAIs, CAIs and Strength and Integrity Inspections which are documented in SCIRMIS, to satisfy the pressure vessel portion of a routine accumulator inspection. This will reduce the number of boiler openings. A Routine Inspection will not be considered completed until an SGPI has certified all items required have been accomplished. Once completed, this resets the periodicity required for the next inspection to 18 months not to exceed 24 months.

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

a. The PSAI will be scheduled by the TYCOM.

b. The PSAI will be performed by the NSWCCD LCEM Inspector and an SGPI.

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

a. The SAI will be scheduled by the TYCOM, Industrial Activity or Supervising Activity as applicable.

b. The SAI will be performed by the NSWCCD LCEM Inspector and an SGPI.

17.6.4 Strength and Integrity Inspection. The normal interval between strength and integrity inspections shall be 60 months. Strength and Integrity Inspections may be conducted as early as 48 months not exceed 72 months after the last Strength and Integrity Inspection to provide flexibility in scheduling. Inspections that exceed the 60 month interval will require a minor DFS to the TYCOM with concurrence from NSWCCD-SSES. Any catapult accumulator which exceeds the inspection interval shall be placed out of commission until inspected by a certified SGPI, or a Major DFS is approved by the NAVSEA Technical Warrant Holder to operate beyond 72 months without a Strength and Integrity Inspection.

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

a. The ISV inspection will be scheduled by the industrial activity or Supervising Authority, as applicable.

b. The ISV inspection will be performed by an NSWCCD LCEM Inspector and an SGPI.

17.6.6 Completion of Availability Inspection. The CAI will be conducted prior to final close-out of the catapult accumulator.

a. The CAI will be scheduled by the industrial activity or Supervising Authority, as applicable, and may be conducted in conjunction with a Routine inspection.

b. The CAI will be performed by an NSWCCD LCEM Inspector and an SGPI, preferably the same SGPI who conducted the SAI.

17.6.7 Inactivation or Reactivation Inspection. This Inactivation or Reactivation inspection shall use the attributes of a strength and integrity inspection and shall be conducted prior to the final action (in the case of inactivation) unless a strength and integrity inspection has been conducted in the last 18 months. In this instance, the last inspection report may be used to document accumulator lay-up condition. For reactivations, a strength and integrity inspection shall be scheduled by the cognizant activity and conducted by NSWCCD and a cognizant RMC SGPI prior to reactivation of the unit.

17.6.8 Special Inspections. Additional catapult accumulator inspections, arranged by Ship's Force in coordination with the TYCOM and performed by an SGPI, will be conducted in accordance with the requirements of reference (a) whenever the following conditions exist:

a. Variations in end speed exist. Whenever variations in catapult end speed are experienced, a special inspection will be accomplished by an NSWCCD LCEM Inspector and an SGPI.

b. Re-inspection of replaced manifold gasket. Whenever the internal steam charging flanged joint gasket is replaced, the joint shall be re-inspected on a not to interfere with operations basis, upon the first cool down following initial operations. This Inspection is accomplished by the Engineering Officer.

c. Whenever major work as defined below by reference (b) is accomplished, the inspection is arranged by Ship's Force in coordination with the TYCOM and performed by a NSWCCD-SSES LCEM inspector and an SGPI.

   (1) Repair or adjustments to safety devices or remote isolation devices.

   (2) Repairs to the accumulator pressure vessel, including nozzles, circumferential welds, shell and head plates, manhole plate and attachment hinge welds which exceed reference (b), section 5.8 criteria.

   (3) Repairs to or replacement of pressure vessel piping and valves.

   (4) Repairs to the internal charging manifold.

d. When the TYCOM desires to assess the material condition, the inspection is arranged by Ship's Force in coordination with the TYCOM and performed by a NSWCCD-SSES LCEM inspector and or an SGPI.

17.7 INSPECTION GUIDELINES AND REPORTS.

17.7.1 Guidelines.

a. All inspections will be conducted using the requirements of reference (b). The catapult accumulator, including the support systems identified in paragraph 17.1.1 of this chapter will be inspected and the results documented in the SCIRMIS.

b. Routine Inspection of catapult accumulators and associated systems will be conducted by an SGPI.

c. All Repair Before Operate (RBO) deficiencies shall be corrected and re-inspected by a certified SGPI or NSWCCD LCEM inspector and preferably the same SGPI/NSWCCD-SSES/LCEM inspector who originally identified the discrepancy prior to warm-up of the catapult accumulator. As RBOs are safety related, all inspector-designated RBO discrepancies discovered in accordance with reference (b) and section 17.9.2 of this chapter shall be corrected prior to catapult operation and reinspected by a certified SGPI or NSWCCD LCEM Inspector, as applicable, and preferably the same SGPI/NSWCCD LCEM Inspector who originally inspected the accumulator. RBO discrepancies include those for which continued unrestricted operation could endanger personnel. RBOs may not be departed via DFS. If there is not an immediate or near future danger to personnel, the discrepancy shall be assigned as SEVERELY DEGRADED with major operational restrictions.

d. All catapult accumulator related DFSs will be verified by the SGPI during the inspection for conformance with JFMM requirements prior to placing the accumulator into operation.

17.7.2 Reports. The inspector(s) conducting the inspection shall personally debrief and provide a preliminary report of the inspection results to the ship's Commanding Officer (or designated representative) following completion of the inspection. The results shall also be entered into the SCIRMIS database. A copy of the final report will be provided to the TYCOM, Regional Maintenance Center/Fleet Maintenance Activity and NSWCCD no later than 10 days after the completion of all repairs identified during the inspection using the Appendix D_1, D_2 or D_3 cover letter format, as appropriate.

a. The inspector conducting the inspection shall report RBO deficiencies discovered during the inspection to the TYCOM by message within 24 hours using the format in Appendix E of this chapter.

b. The SGPI shall report by message to the TYCOM, using the format in Appendices F and G of this chapter, the correction and re-inspection of all RBO deficiencies prior to close-out and warm up of the accumulator.

c. The ship's Engineering Officer shall report corrected deficiencies, by message, using the format in Appendix F of this chapter within 30 days of the completed inspection and at 30 day intervals thereafter until all deficiencies are corrected.

17.8 CATAPULT ACCUMULATOR INSPECTION PREPARATION.

a. Demonstrate the performance of the catapult electronic controls, including the uninterruptible power source and the safety devices of the fill and blowdown valves.

b. Prepare the accumulator in accordance with reference (b) paragraph 5.6.1 for routine inspections and paragraph 5.6.2 for strength and integrity inspections.

c. Wire shut and danger tag all steam and water valves to the catapult accumulator per the Ship's Tag-Out Instruction and the Tag-Out Users Manual. Post warning signs, PERSONNEL WORKING IN ACCUMULATOR, in accordance with reference (a).

d. The ship's Engineering Officer shall ensure all Ship's Force responsibilities are complete.

17.9 CATAPULT ACCUMULATOR INSPECTION.

17.9.1 Catapult Accumulator Inspection Forms. Catapult accumulator inspections will be conducted using the appropriate SCIRMIS forms. Include specific comments on the state of preservation and material condition of the accumulator and all support systems.

17.9.2 Catapult Accumulator Inspection Areas. A discrepancy is classified as "Repair Before Operating" if left uncorrected it could cause injury to personnel. All RBO items shall be corrected prior to operation and re-inspected by a certified SGPI or NSWCCD LCEM inspector, as applicable, and preferably the same inspector who originally inspected the accumulator. RBO discrepancies may include but are not limited to the following:

a. Inoperative/misadjusted safety devices.

b. Fire/Safety hazards, oil soaked lagging, oil leaks or other fire hazards such as inoperative or missing fire fighting equipment.

c. Inoperative electronic controls (Fairmont controllers, Smars transmitters, uninterruptible power source).

d. Non-deferrable defects, defects indications within the pressure vessel boundary.

e. Ultra-sonic test results of pressure vessel piping that are below minimum requirements, out of periodicity or inspectors discretion of piping of questionable service.

f. Improperly assembled internal steam charging flanged joint.

g. Improperly assembled flanged joints (mixed fasteners, undersized flexitallic gaskets, non level in Level I systems).

h. In-operative system remote isolation devices.

i. Out of periodicity, in-operative temperature or pressure measuring instruments.

j. Valve tightness integrity which limits its ability to perform intended function and exceeds the criteria of reference (g).

k. Non-conformance of electrical safety and deteriorated or damaged wiring or components.

17.9.3 Completion of Inspection. A debrief and a preliminary inspection report, including a summary of restrictive deficiencies, will follow the inspection. Paragraph 17.7.2 of this chapter identifies official reporting requirements.

17.9.4 Automatic Controls Systems Inspection Guidelines. The automatic control system consists of a series of transmitters, controllers, interface devices, control valves and positioners. Inspection, calibration and alignment of this equipment is detailed in reference (h) and applicable system PMS for test and inspection guidelines.

17.9.5 Operating and Casualty Procedures. Each ship with steam catapults will have approved Operating Procedures in the format prescribed by their respective TYCOM. They shall contain detailed procedures and precautions for:

a. Normal operations including startup and shutdown.

b. Infrequent operations such as initial charging following an availability.

c. Operating parameters, limitations, alarms and set points.

d. Casualty conditions including indications, immediate and supplementary actions.

e. Quality Assurance requirements for repairs.

APPENDIX A

SAMPLE CATAPULT ACCUMULATOR INSPECTION REQUEST

FM USS (SHIPS NAME AND HULL NO)//
TO (RMC)//
INFO COMNAVAIRPAC SAN DIEGO CA/COMNAVAIRLANT NORFOLK VA (as applicable)//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
COMNAVSEASYCOM WASHINGTON DC //
BT
UNCLAS//
MSGID/GENADMIN/ USS (SHIPS NAME HULL NO)//
SUBJ/REQUEST FOR ROUTINE CATAPULT ACCUMULATOR INSPECTION//
REF/A/DOC/COMUSFLTFORCOMINST 4790.3//
AMPN/REF A IS THE JOINT FLEET MAINTENANCE MANUAL//
RMKS/1. PER REF A REQUEST RMC PROVIDE A CERTIFIED SGPI TO
ACCOMPLISH ROUTINE CATAPULT ACCUMULATOR INSPECTION OF (NUMBER
CATAPULT).
2. REQUEST PRIMARY INSPECTION START DATE OF (PROVIDE DATE) AND AN
ALTERNATE START DATE OF (PROVIDE DATE).
3. AWR ENTERED IN SHIP'S CSMP (JSN NUMBER).//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAIN LANGUAGE ADDRESS DIRECTORY (PLAD) IS UTILIZED.

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APPENDIX B

SAMPLE INSPECTION CONFIRMATION LETTER

FM (RMC)//
TO USS (SHIPS NAME AND HULL NUMBER)//
INFO COMNAVAIRPAC SAN DIEGO CA/COMNAVAIRLANT NORFOLK VA (as applicable)//
COMNAVSEASYCOM WASHINGTON DC //
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
RMC//
BT
MSGID/GENADMIN//
SUBJ/INSPECTION DATE CONFIRMATION//
REF/A/ (INSPECTION REQUEST MESSAGE DTG)//
REF/B//DOC//COMUSFLTFORCOMINST 4790.3//
NARR/REF A IS REQUESTING CATAPULT INSPECTION. REF B IS COMUSFLTFORCOMINST 4790.3 DEFINING CATAPULT INSPECTION CRITERIA AND PROCEDURES.//
POC/ (SENIOR INSPECTOR NAME/ RATE/UIC/LOC: CITY/TEL: DSN//
SUBJ/INSPECTION DATE CONFIRMATION//
RMKS/1 IN RESPONSE TO REF A, A CATAPULT INSPECTION WILL BE CONDUCTED IAW REF B BEGINNING (DATE) ON NUMBER ( ) CATAPULT. ONE OR MORE OF THE FOLLOWING CERTIFIED INSPECTORS ARE ASSIGNED TO CONDUCT THE INSPECTIONS. INSPECTOR/NAME/RATE/LAST FOUR/CLEARANCE.//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX C

SUMMARY OF CATAPULT ACCUMULATOR INSPECTION SCHEDULING AND RESPONSIBILITIES

Type Inspection	Schedule Date	Scheduling Responsibility	Responsibility for Inspections
Routine	**Every 18 Months**	**TYCOM**	**Certified SGPI**
Start of Availability Inspection	**At start of availability with strength and integrity inspection**	**TYCOM**	**NSWCCD INSPECTOR and Certified SGPI**
Strength and Integrity Inspection	**Once every 60 months**	**TYCOM**	**NSWCCD LCEM INSPECTOR and Certified SGPI**
ISV	**During availability**	**Industrial Activity Supervisory Authority**	**NSWCCD INSPECTOR and Certified SGPI**
CAI	**To be conducted prior to final close-out**	**Industrial Activity Supervisory Authority**	**NSWCCD INSPECTOR and Certified SGPI**
Inactivation or Reactivation	**Prior to final action**	**Industrial Activity Supervisory Authority Inactive Ship Facility**	**NSWCCD INSPECTOR and Certified SGPI**
Special	**Variations in end speed**	**TYCOM**	**NSWCCD INSPECTOR and Certified SGPI**
Special	**Replacement of Steam Charging Flange Gasket**	**Ship's Force**	**Engineer Officer**
Special	**Major Repairs/Mechanical casualty**	**TYCOM**	**NSWCCD Inspector and Certified SGPI**
Engineering Officer	**PMS Requirements**	**Engineering Officer**	**Engineering Officer**

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APPENDIX D_1

SAMPLE CATAPULT ACCUMULATOR INSPECTION REPORT COVER LETTER

From: Commanding Officer, Regional Maintenance Center
To: Commanding Officer, USS (Ship's name and Hull No.)

Subj: Routine Inspection of Catapult(s) Number(s)

Ref: (a) COMUSFLTFORCOMINST 4790.3, Joint Fleet Maintenance Manual
(b) NAVSEA S9587-B1-MMA-010, Catapult Steam Support System CV/CVN Class Ships; Description, Operation and Maintenance

Encl: (1) Catapult Inspection Report of Catapult(s) Number(s)
(2) Catapult Operational Test sheets (Figure 5-5 of Ref (b))

1. (Parent Command) Steam Generating Plant Inspector(s) (Inspector's Name) inspected Catapult(s) Number(s) in USS (Ships Name and Hull No) on (date) while (ship's location).

2. Discrepancies, which require corrective action, are outlined in enclosures (Number of Enclosures).

3. Catapult operational test results are outlined in (Number of Enclosure).

4. Advance copies of Enclosure(s) have been delivered to the Ship's Commanding Officer.

5. (Command) point of contact is (Senior Inspector), Code (Number), commercial telephone (Number), DSN (Number) e-mail address is: (Address).

COPY TO (W/ENCL):

CNAP/CNAL N43 (as applicable)
USS (Name Hull Number)
COPY TO (W/O ENCL):
NSWCCD-SSES (C922)

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APPENDIX D_2

SAMPLE 5 YEAR STRENGTH AND INTEGRITY CATAPULT ACCUMULATOR INSPECTION REPORT COVER LETTER

From: Commanding Officer, Regional Maintenance Center
To: Commanding Officer, USS (Ship's name and Hull No.)

Subj: 5 Year Strength and Integrity Inspection of Catapult(s) Number(s)

Ref: (a) COMUSFLTFORCOMINST 4790.3, Joint Fleet Maintenance Manual
(b) NAVSEA S9587-B1-MMA-010, Catapult Steam Support System CV/CVN Class Ships; Description, Operation and Maintenance

Encl: (1) Catapult Inspection Report of Catapult(s) Number(s)
(2) Catapult Operational Test sheets (Figure 5-5 of Ref (b))

1. NSWCCD-SSES Inspector(s) (Inspector's Name) inspected Catapult(s) Number(s) in USS (Ship's Name and Hull No.) on (date) while (ship's location).

2. Discrepancies, which require corrective action, are outlined in enclosures (Number of Enclosures).

3. Catapult operational test results are outlined in (Number of Enclosure).

4. Advance copies of enclosure(s) have been delivered to the Ship's Commanding Officer.

5. NSWCCD-SSES point of contact is (Senior Inspector), Code (Number), commercial telephone (Number), DSN (Number) e-mail address is: (Address).

COPY TO (W/ENCL):

CNAP/CNAL N43 (as applicable)
USS (Name Hull Number)
COPY TO (W/O ENCL):
NSWCCD-SSES (C922)

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APPENDIX D_3

SAMPLE OTHER CATAPULT ACCUMULATOR INSPECTION REPORT COVER LETTER

From: Commanding Officer, Regional Maintenance Center
To: Commanding Officer, USS (Ship's name and Hull No.)

Subj: (Special, etc.) Inspection of Catapult(s) Number(s)

Ref: (a) COMUSFLTFORCOMINST 4790.3, Joint Fleet Maintenance Manual
(b) NAVSEA S9587-B1-MMA-010, Catapult Steam Support System CV/CVN Class Ships; Description, Operation and Maintenance

Encl: (1) Catapult Inspection Report of Catapult(s) Number(s)
(2) Catapult Operational Test sheets (Figure 5-5 of Ref (b))

1. (Parent Command) Steam Generating Plant Inspector(s) (Inspector's Name) inspected Catapult(s) Number(s) in USS (Ship's Name and Hull No.) on (date) while (ship's location).

2. Discrepancies, which require corrective action, are outlined in enclosures (Number of Enclosures).

3. Catapult operational test results are outlined in (Number of Enclosure).

4. Advance copies of enclosure(s) have been delivered to the Ship's Commanding Officer.

5. (Command) point of contact is (Senior Inspector), Code (Number), commercial telephone (Number), DSN (Number) e-mail address is: (Address).

COPY TO (W/ENCL):

CNAP/CNAL N43 (as applicable)
USS (Name Hull Number)
COPY TO (W/O ENCL):
NSWCCD-SSES (C922)

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APPENDIX E

SAMPLE CATAPULT ACCUMULATOR INSPECTION RBO/SEVERELY DEGRADED DEFICIENCIES MESSAGE

FM Commander, Regional Maintenance Center//
TO USS (Ship Name and Hull Number)//
INFO COMNAVAIRPAC SAN DIEGO CA/COMNAVAIRLANT NORFOLK VA (as applicable)//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
PEO CARRIERS WASHINGTON DC//
(REPAIR ACTIVITY)//(Code)//
COMNAVSEASYSCOM WASHINGTON DC//
BT
UNCLASS//N09537//
MSGID/GENADMIN/(REGIONAL MAINTENANCE CENTER/CODE) //
SUBJ/(Type) INSPECTION REPAIR BEFORE OPERATE (RBO) DEFICIENCIES OF NUMBER ( )
CATAPULT ABOARD USS (Ship Name Hull Number)//
REF/A/DOC/COMUSFLTFORCOMINST 4790.3//
REF/B/DOC/OPNAVINST 4790.4//
NARR/REF A IS JOINT FLEET MAINTENANCE MANUAL VOLUME IV CHAPTER 17 AND PROVIDES GUIDANCE FOR CATAPULT INSPECTIONS. REF B IS 3-M MANUAL AND PROVIDES GUIDANCE FOR CSMP DOCUMENTATION.//
POC/(Senior Inspector) (UIC)/LOC: (City, State)/TEL:(Number)/TEL:DSN (Number)//
RMKS/1. CATAPULT NUMBER (s) ROUTINE/STRENGTH AND INTEGRITY (AS APPROPRIATE) INSPECTION CONDUCTED (DATE) BY (INSPECTORS NAME) WHILE (SHIPS LOCATION). RBO DEFICIENCIES AND PROPOSED CORRECTIVE ACTION ARE REPORTED IAW REF A AS FOLLOWS:
(SCIRMIS ITEM NO, DEFICIENCY, REPAIR, ETC)
A.
B.
C.
2. CATAPULT NUMBER() SHALL NOT BE OPERATED UNTIL ALL ABOVE LISTED DEFICIENCIES ARE CORRECTED AND A REINSPECTION IS CONDUCTED IAW REF A.
3. SEVERLY DEGRADED DEFICIENCIES AND PROPOSED CORRECTIVE ACTION ARE REPORTED IAW REF A AS FOLLOWS:
A.
B.
C.
4. SEVERELY DEGRADED DEFICIENCIES ARE REQUIRED TO BE CORRECTED PRIOR TO CATAPULT CHARGING OR MUST BE SUBMITTED FOR MAJOR DEPARTURE FROM SPECIFICATION (DFS).
5. IAW REF A DEFICIENCIES COMPLETED SHALL BE REPORTED EVERY 30 DAYS USING THE GUIDANCE PROVIDED IN REF A APPENDIX F.//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX F

SAMPLE 30 DAY UPDATE MESSAGE

FM USS (SHIP'S NAME AND HULL NO)//
TO (RMC)//
INFO COMNAVAIRPAC SAN DIEGO CA/COMNAVAIRLANT NORFOLK VA (as applicable)//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
COMNAVSEASYSCOM WASHINGTON DC//
TYCOM//
BT
MSGID/GENADMIN/USS (SHIPS NAME AND HULL NO)//
SUBJ/ USS (SHIP'S NAME AND HULL NO.) NR ( ) CATAPULT ACCUMULATOR INSPECTION.//
REF/A/DOC/SCIRMIS REPORT FROM (RMC AND DATE)//
REF/B/DOC/COMUSFLTFORCOMINST 4790.3//
REF/C/DOC/OPNAVINST 4790.4//
NARR/REF A IS SCIRMIS REPORT FROM COMMANDER (RMC). REF B IS
COMUSFLTFORCOMINST 4790.3 JOINT FLEET MAINTENANCE MANUAL AND PROVIDES
GUIDANCE FOR CATAPULT INSPECTIONS. REF C IS OPNAVINST 4790.4 3-M
MAINTENANCE MANUAL AND PROVIDES DIRECTION FOR CSMP DOCUMENTATION.//
RMKS/ NR ( ) CATAPULT)(s) ROUTINE INSPECTION WAS CONDUCTED
(DATE) BY (SGPI INSPECTOR NAME) ITEMS CORRECTED ARE REPORTED IAW REF B AS
FOLLOWS.
1. (CATAPULT NUMBER)
2. SCIRMIS ITEM (I.E., A41/01) JOB SUBMITTED JSN (NUMBER).//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX G

SAMPLE CATAPULT ACCUMULATOR RESCISSION MESSAGE

FM RMC//
TO USS (SHIPS NAME AND HULL NO)//
INFO/COMNAVAIRPAC SAN DIEGO CA/COMNAVAIRLANT NORFOLK VA (as applicable)//
USS (SHIPS NAME AND HULL NO.//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
PEO CARRIERS WASHINGTON DC//
COMNAVSEASYSCOM WASHINGTON DC//
BT
//SUBJ/USS (SHIPS NAME AND HULL NUMBER) NUMBER ( )CATAPULTS/REPAIR
BEFORE OPERATE (RBO) RESCISSION// REF/A/ (ORIGINATING RBO MESSAGE DTG)//
NARR/REF A ADDRESSES RBO DEFICIENCIES FOUND DURING STEAM CATAPULT
INSPECTIONS CONDUCTED ON (Date)//
RMKS/1. REF A RESTRICTIONS RESCINDED BASED UPON RE-INSPECTION.
2. FOR FURTHER INFO, CONTACT UNCLASSIFIED E-MAIL (Senior Inspector).//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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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 72 month interval, or as listed below:

a. Whenever requested by the submarine.

b. Prior to initial builder's trials for new construction ships, prior to initial sea trials for ships in Chief of Naval Operations (CNO) Maintenance Availabilities, and prior to initial sea trials for ships in Interim Dry Docking.

c. A partial salvage inspection will be completed for all items worked during an availability (i.e., hatches, salvage air valves, etc.).

d. (SSBN Only) Once in conjunction with every other docking refit, not to exceed 72 months.

e. (SSGN Only) Every fourth maintenance modernization period, not to exceed 72 months.

f. 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
1. Salvage Drawings:					
a. Verify salvage drawings:	Navy Modernization Process Management and Operations Manual NAVSEA SL720-AA-MAN-030				
(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or					
(2) Latest revision is identified in ship's plan index.					
(3) Have correct distribution.	Ship Dwg. Consolidated Index Number 594 or 845				
(4) Are identified as Selected Record Drawings					
2. High/Low Salvage Connections:					
a. Verify deck touch plate markings are installed and per plan.	Ship's Plans				
b. Check that each valve is free to operate with the inspecting command's salvage wrench.	Notes 1 and 2				

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
c. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.	Note 1				
d. External salvage system caps:					
(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.	Note 3				
(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.	Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)				
(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.					
e. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.					
3. Internal Air Salvage:					
a. Test satisfactory operation of all internal salvage air valves.	Note 4				
b. Verify all compartment pressure gages are in calibration as indicated on calibration label.					
4. Bulkhead Flappers:					
a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.					
5. Hull Access Hatches, Watertight Doors and Torpedo Loading Hatches: Inspection performed by local PMT.					
a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.	MIP 1671/921, MRCs 7CLR and 7CLS				

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
6. External Gagging Devices:					
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. _____	Notes 2, 5, and 6				
b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.	Notes 6 and 7				
7. Air Bank Dew Points:					
a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.	MIP 5542/921 MRC 7CHE				

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		
1. Submarine Rescue Chamber (SRC)/Submarine Rescue Diving and Recompression System (SRDRS) Fittings:	Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594						
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).	Ship's Plans Note 8						
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.	Ship's Plans Note 8						
c. AN/BQN-13.							
(1) Inspect AN/BQN-13 Beacon to ensure that:							
(a) Cable is free of abrasions, cuts or damage.							
(b) Cable plug and encapsulation are free of defects.							
(c) Unit has no physical damage.							
(d) Transducer is free of oil leaks, bubbles and paint.							
(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).	MIP SO-104/902						
(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.	Ship's COSAL Note 9						

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		
2. Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:	Note 10						
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 H0QN. 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.	MIP 1671/921MR C H0QN						
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).							
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).							
d. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.							
(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).	Ship's Drawing MIP 1671/921 MRCs E4PH, E4PK						
(a) Verify inventory of all parts.							
(b) Verify periodic pressure testing of hoses.							
(c) Verify proper operation of sensing line and trunk gage.							

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		
(d) Verify assembly of intensifier and gearbox to upper hatch operator.							
(e) Verify installation of upper hatch operator compensator.							
(f) Demonstrate satisfactory operational check of intensifier pump and gears.							
e. Demonstrate satisfactory operation and examine the condition of the following equipment:							
(1) Vent valves (trunk and compartment).							
(2) Blow valves (trunk and compartment).							
(3) Flood and drain valves (including remote operation mechanisms and strainer installations).							
(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.	MIP 5940/905, MRC 7DKE						
(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.							
(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.							
(7) 31MC installed above waterline.							
(8) Verify accomplishment of PMS to clear sea pressure sensing lines.	MIP 5641/921 MRC F3XS, F3XT						
f. Verify the following equipment installed:							
(1) Diver's knife.	Note 11						
(2) Ballpeen hammer.	Note 11						
(3) Persuader (crows foot).							

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		
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.)	Installed						
h. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.	NSTM S9086-RK-STM-010 Chapter 505						
i. Verify gages are in calibration as indicated on calibration label.							
j. Verify upper watertight hatch cavity drain valve operation is satisfactory.							
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.)	Ship's Plans						
3. Emergency Communications Equipment:							
a. Inventory allowance of the following equipment and confirm proper stowage as indicated:	Ship Configuration and Logistics Support Information System (SCLSIS) & COSAL						
(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).	AEL 7-00000A434						
b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.							
(1) SEPIRB.	MIP 4413/015						
4. Life Saving and Safety Equipment:							
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).	Ship's COSAL Note 12						

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. Escape Training:							
a. Verify that all hands are trained in SEIE escape.							
6. DISSUB 7-Day Survival:	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. Atmosphere Control:							
(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		
(a) CO_2 absorbent canisters.	AELs 2-3300230 or 2-3300232 series for LiOH product.						
Amount onboard for DISSUB							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB:_____	NON-DISSUB; (e.g., for CO-H_2 After-filter & DQA						
Required _____	Note 15						
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____							
(b) DISSUB LiOH Deployment Kits.	AEL 2-330023035 or 2-330023205 for LiOH Deploy Kits						
Amount onboard _____							
FWD: _____							
Aft: _____	Note 16						
Required: _____							
Comment on condition _____							
(c) O_2 candles.	AEL 1-230013100						
Amount onboard for DISSUB:							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB: _____	NON-DISSUB - e.g., for O_2 generator or Low Pressure Electrolyzer (LPE) backup.						
Required: _____	Note 17						
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____							

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		
(d) O_2 candle furnace.	Ship's COSAL						
Candle furnaces onboard:							
FWD: _____							
Aft: _____							
Required: _____	Note 18						
Comment on condition (include location - FWD and/or aft compartments). _____							
(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).	Ship's COSAL MIP 5519/600 MRC G8CL						
(2) Verify CO_2 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.	MIP 5151/001 MRC B6CW						
(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.							
c. <u>Atmosphere Monitoring</u>:							
(1) Inventory quantity onboard and inspection condition of the following:							
(a) DISSUB O_2/CO_2 Gas Monitors (Analox).	AEL: 2-870003101 Stored in same locker as Crash Bag						
Amount onboard (include location) _____							
Required: (minimum) <u>1 FWD, 1 aft compartment</u>							
(2) Verify Analox PMS has been completed within required periodicity.	MIP 5940/002 MRC 9TFF						
(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.	NSN 6135-01-538-3507 (4 FWD, 4 aft)						
7. <u>Launchers</u>:							
a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.							

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.

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-H_2 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
1. Salvage Drawings:					
a. Verify salvage drawings:	Navy Modernization Process Management and Operations Manual NAVSEA SL720-AA-MAN-030				
(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or					
(2) Latest revision is identified in ship's plan index.					
(3) Have correct distribution.	Ship Dwg. Consolidated Index Number 513 or 845				
(4) Are identified as Selected Record Drawings.					
2. High/Low Salvage Connections:					
a. Verify deck touch plate markings are installed and per plan.	Ship's Plans				
b. Check that each valve is free to operate with the inspecting command's salvage wrench.	Notes 1 and 2				

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

INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
c. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.	Note 1				
d. External salvage system caps:					
(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.	Note 3				
(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.	Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)				
(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.					
e. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.					
3. Internal Air Salvage:					
a. Test satisfactory operation of all internal salvage air valves.	Note 4				
b. Verify all compartment pressure gages are in calibration as indicated on calibration label.					
4. Bulkhead Flappers:					
a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.					
5. Hull Access Hatches, Watertight Doors and Torpedo Loading Hatches: Inspection performed by local PMT.					
a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.	MIP 1671/905, MRCs 7BYE and 7BBB				
6. External Gagging Devices:					

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

INSPECTION TEAM (SSN 688 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
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. _____	Notes 2 and 5				
b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.	Note 6				
7. Air Bank Dew Points:					
a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.	MIP 5542/911 MRC 7BDB				

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

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

INSPECTION ITEM (SSN 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
1. Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System (SRDRS) Fittings.	Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594						
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.	Ship's Plans Note 7						
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.	Ship's Plans Note 7						
c. AN/BQN-13.							
(1) Inspect AN/BQN-13 Beacon to ensure that:							
(a) Cable is free of abrasions, cuts or damage.							
(b) Cable plug and encapsulation are free of defects.							
(c) Unit has no physical damage.							
(d) Transducer is free of oil leaks, bubbles and paint.							
(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).	MIP SO-104/902						
(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.	Ship's COSAL Note 8						

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		
2. Escape Trunks:							
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 7CLF. 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.	MIP 1671/905MRC 7CLF						
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).							
c. Demonstrate the escape upper hatches have the minimum specified pop-up.							
d. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.							
e. Demonstrate satisfactory operation and examine the condition of the following equipment:							
(1) Vent valves (trunk and compartment).							
(2) Blow valves (trunk and compartment).							
(3) Flood and drain valves (including remote operation mechanisms and strainer installations).							
(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 water tight caps installed.	MIP 5940/905 MRC 7DKE						

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		
(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.							
(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064).							
(7) 31MC installed above waterline.							
(8) Verify accomplishment of PMS to clear sea pressure sensing lines.	MIP 5641/9R2 MRC 9MAY and 9MAZ						
f. Verify the following equipment installed:							
(1) Diver's knife.	Note 9						
(2) Ball peen hammer.	Note 9						
(3) Persuader (crows foot).							
g. Check Flood Line Orifice Size (1.25" for SSN 688 Class with S/A 4142 installed.)	Installed						
h. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.	NSTM S9086-RK-STM-010 Chapter 505						
i. Verify gages are in calibration as indicated on calibration label.							
j. Verify upper watertight hatch cavity drain valve operation is satisfactory.							
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.)	Ship's Plans						
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).							

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		
3. Emergency Communications Equipment:							
a. Inventory allowance of the following equipment and confirm proper stowage as indicated:	Ship Configuration and Logistics Support Information System (SCLSIS) & COSAL						
(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).	7-00000A434						
b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.							
(1) SEPIRB.	MIP 4413/015						
4. Life Saving and Safety Equipment:							
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).	Ship's COSAL Note 10						
(1) Auto-Inflatable life preservers.	MIP 5832/SUB						
(2) Inherently Buoyant life preservers.	MIP 5832/030						
(3) Man overboard bag.	Note 11 MIP 5832/021						
(4) Qualified swimmer designated for man overboard.	Note 12MILPERS MAN Art. 1414-010 Series						
(5) Safety harness (belts).	MIP 6231/001 MRC 2EA0						
(6) Safety track.	Note 13 MIP 6111/R06						
(7) Distress marker lights.	MIP 5832/010						
(8) Life lines and stanchions.	MIP 6121/SUB						
(9) SEIE Suits.	MIP 5940/005						

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		
(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 638-4							
5. Escape Training:							
a. Verify that all hands are trained in SEIE escape.							
6. DISSUB 7-Day Survival:	Note 7						
a. Atmosphere Control:							
(1) Inventory quantity onboard and inspect condition of the following:							
(a) CO_2 absorbent canisters.	AELs 2-3300230 or 2-3300232 series for LiOH product.						
Amount onboard for DISSUB:							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB: _____	NON-DISSUB; (e.g., for CO-H_2 After-filter & DQA)						
Required _____	Note 14						
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____							
(b) DISSUB LiOH Deployment Kits.	Per AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.						
Amount onboard							
FWD: _____							
Aft: _____							
Required: _____	Note 15						
Comment on condition _____							

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		
(c) O_2 candles.	AEL 1-230013100						
Amount onboard for DISSUB:							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB: _____	NON-DISSUB - (e.g., for O_2 generator backup)						
Required: _____	Note 16						
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____							
(d) O_2 candle furnace.	Ship's COSAL						
Candle furnaces onboard:							
FWD: _____							
Aft: _____							
Required: _____	Note 17						
Comment on condition (include location - FWD and/or aft compartments). _____							
(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).	Ship's COSAL MIP 5519/600 MRC G8CL						
(2) Verify CO_2 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.	MIP 5151/001 MRC B6CW						
(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.							
b. <u>Atmosphere Monitoring:</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 688 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(a) DISSUB O_2/CO_2 Gas Monitors (Analox).	AEL 2-870003101 Stored in same locker as Crash Bag						
Amount onboard (including location) _____							
Required: (minimum) <u>1 FWD, 1 aft compartment</u>							
(2) Verify Analox PMS has been completed within required periodicity.	MIP 5940/002 MRC 9TFF						
(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.	NSN 6135-01-538-3507 (4 FWD, 4 aft)						
7. <u>Launchers:</u>							
a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.							
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 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.

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
1. Salvage Drawings:					
a. Verify salvage drawings:	Navy Modernization Process Management and Operations Manual NAVSEA SL720-AA-MAN-030				
(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or					
(2) Latest revision is identified in ship's plan index.					
(3) Have correct distribution.	Ship Dwg. Consolidated Index Number 513 or 845				
(4) Are identified as Selected Record Drawings					
2. High/Low Salvage Connections:					
a. Verify deck touch plate markings are installed and per plan.	Ship's Plans				
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.	Note 1				

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

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INSPECTION TEAM (SSBN/SSGN 726 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
6. External Gagging Devices:					
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. _____	Notes 3, 6, and 7				
b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.	Notes 7 and 8				
7. Air Bank Dew Points:					
a. Verify air samples from all air banks and verify High Pressure Air Compressors are in specification and in periodicity.	MIP 5542/904 MRC 7DCR				

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

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

INSPECTION ITEM (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
1. Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System(SRDRS) Fittings.	Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594								
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).	Ship's Plans Note 9								
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.	Ship's Plans Note 9								
2. Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:	Note 10								
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.	MS 1670-081-011								

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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		
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).									
c. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.									
(1) Demonstrate satisfactory installation of Improved Powered Hatch Operator with intensifier and compensator as one mode of hatch operation of Logistics Escape Trunks.	MIP 1671/900 or 1671/901 MRC E4PH								
(a) Verify inventory of all parts.	Ship's Drawing								
(b) Verify periodic pressure testing of hoses.	MIP 1671/900 or 1671/901 MRC E4PK								
(c) Verify proper operation of sensing line and trunk gage.									
(d) Verify assembly of intensifier and gearbox to upper hatch operator.									
(e) Verify installation of upper hatch operator compensator.									
(f) Demonstrate satisfactory operational check of intensifier pump and gears.									
d. Demonstrate satisfactory operation and examine the condition of the following equipment:									
(1) Vent valves (trunk and compartment).									
(2) Blow valves (trunk and compartment).									
(3) Flood and drain valves (including remote operation mechanisms and strainer installations).									

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 (SSBN/SSGN 726 CLASS)	Reference Note	Fwd		Mid		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat	Sat	Unsat		
(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.	MIP 5940/905 MRC 7DKE								
(5) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.									
(6) 31MC installed above waterline.									
(7) Verify accomplishment of PMS to clear sea pressure sensing lines.	MIP 5641/9R3 or 5641/9R6 MRCs 9MAW, 9MAX								
e. Verify the following equipment installed:									
(1) Diver's knife.	Note 11								
(2) Ball peen hammer.	Note 11								
(3) Persuader (crows foot).									
f. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.	NSTM S9086-RK-STM-010 Chapter 505								
g. Verify gages are in calibration as indicated on calibration label.									
h. Verify upper watertight hatch cavity drain valve operation is satisfactory.									
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.)	Ship's Plans								

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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. Emergency Communications Equipment:									
a. Inventory allowance of the following equipment and confirm proper stowage as indicated:	Ship Configuration and Logistics Support Information System (SCLSIS) & Consolidated Shipboard Allowance List (COSAL)								
(1) SEPIRB Model T-1630/SRT (2 FWD, 2 mid, 2 aft with Launch Hardware each compartment).	AEL 7-00000A434								
b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.									
(1) SEPIRB.	MIP 4413/015								
(2) AN/BQQ-6 Emergency Communications and Distress Beacon Groups.	MIP SO-405/902 or MIP SO-404/901								
c. Inventory allowance of spare batteries for AN/BQQ-6. Ensure shelf life of batteries has not been exceeded.	Ship's COSAL Note 12								
(1) Check that the AN/BQQ-6 Emergency Communications Group receptacle is marked "61/62/63 Receptacle/Emergency Communications for AN/BQQ-6."									
4. Life Saving and Safety Equipment:									
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).	Ship's COSAL Note 13								
(1) Auto-Inflatable life preservers.	MIP 5832/SUB								
(2) Inherently Buoyant life preservers.	MIP 5832/030								

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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>:	Note 9								
a. Portable desalinators (2 FWD, 2 mid & 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:									

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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		
(a) CO_2 absorbent canisters.	AELs 2-3300230 or 2-3300232 series for LiOH product.								
Amount onboard for DISSUB:									
FWD: _____									
Mid: _____									
Aft: _____									
Amount onboard for NON-DISSUB: _____	NON-DISSUB; (e.g., for CO-H_2 After-filter & DQA								
Required: _____	Note 17								
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____									
(b) DISSUB LiOH Deployment Kits.	AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.								
Amount onboard:									
FWD: _____									
Mid: _____									
Aft: _____									
Required: _____	Note 18								
Comment on condition _____									

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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		
(c) O_2 candles.	AEL 1-230013100								
Amount onboard for DISSUB:									
FWD: _____									
Mid: _____									
Aft: _____									
Amount onboard for NON-DISSUB: _____	NON-DISSUB - (e.g., for O_2 generator or Low Pressure Electrolyzer (LPE)).								
Required: _____									
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation. _____	Note 19								
(d) O_2 candle furnace.	Ship's COSAL								
Candle furnaces onboard:									
FWD: _____									
Mid: _____									
Aft: _____									
Required: _____	Note 20								
Comment on condition (include location - FWD, mid and/or aft compartments). _____									
(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).	Ship's COSAL MIP 5519/600 MRC G8CL								
(2) Verify CO_2 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.	MIP 5151/001 MRC B6CW								
(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.									
c. Atmosphere Monitoring:									
(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		
(a) DISSUB O_2/CO_2 Gas Monitors (Analox). Amount onboard (including location) _____ Required: (minimum) 1 FWD, 1 mid, 1 aft compartment	AEL 2-870003101 Stored in same locker as Crash Bag								
(2) Verify Analox PMS has been completed within required periodicity.	MIP 5940/002 MRC 9TFF								
(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.	NSN 6135-01-538-3507 (4 FWD, 4 mid, 4 aft)								
7. Launchers:									
a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.									
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
(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. Compliment 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.

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-H_2 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
1. Salvage Drawings:					
a. Verify salvage drawings:	Navy Modernization Process Management and Operations Manual NAVSEA SL720-AA-MAN-030				
(1) Have been updated during ship's new construction period/last CNO Maintenance Availability or					
(2) Latest revision is identified in ship's plan index.					
(3) Have correct distribution.	Ship Dwg. Consolidated Index Number 594 or 845				
(4) Are identified as Selected Record Drawings					
2. High/Low Salvage Connections					
a. Verify deck touch plate markings are installed and per plan.	Ship's Plans				
b. Check that each valve is free to operate with the inspecting command's salvage wrench.	Notes 1 and 2				

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

INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
c. Perform a "J" pressure and a low pressure 100 psi seat tightness test from the sea side. No leakage is allowed.	Notes 1 and 16				
d. External salvage system caps:					
(1) Verify the ship's salvage system arrangement plan contains a note that Roylyn type fittings are installed.	Note 3				
(2) Remove cap assembly, test connect/disconnect with the inspecting command's female fitting.	Kaiser Aero Space & Electronics Dwg. 9495 (Formally Roylyn Inc.)				
(3) Inspect all Roylyn caps. Ensure cap operates properly and is free of paint and/or debris. Reinstall cap with safety wire, where applicable.					
e. Verify strainers are properly installed on all compartment low salvage lines and are clear of debris.					
3. Internal Air Salvage:					
a. Test satisfactory operation of all internal salvage air valves.	Note 4				
b. Verify all compartment pressure gages are in calibration as indicated on calibration label.					
4. Bulkhead Flappers:					
a. Test satisfactory local and remote (as applicable) operation of all ventilation system bulkhead flappers.					
5. Hull Access Hatches, Watertight Doors and Torpedo Loading Hatches: Inspection performed by local PMT.					
a. Perform/witness maintenance required by Planned Maintenance System (PMS) Maintenance Index Page (MIP) to complete salvage inspection and reference the PMT annual inspection.	MIP 1671/974, MRCs 7CZF, 7CZG and 7CZH				
6. External Gagging Devices:					

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

INSPECTION TEAM (SSN 774 CLASS)	Reference Note	Sat	Unsat	Submarine Inspector Signature	Inspection Team Member Signature
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.	Notes 2, 5, and 6				
b. Witness resetting of each gagging device and demonstrate satisfactory operation of the valves by normal means.	Notes 6 and 7				
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.	For SOF hulls: MIP 5542/974 MRC 7CVM (Banks 1 and 2) MRC 7CVN (Banks 3 and 4) For non-SOF hulls: MIP 5542/975 MRC 7AAC				

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

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

INSPECTION ITEM (SSN 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
1. Submarine Rescue Chamber (SRC) and/or Submarine Rescue Diving Recompression System (SRDRS) Fittings:	Naval Ships' Technical Manual (NSTM) S9086-T9-STM-010 Chapter 594						
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.	Ship's Plans Note 8						
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.	Ship's Plans Note 8						
c. AN/BQN-13.							
(1) Inspect AN/BQN-13 Beacon to ensure that:							
(a) Cable is free of abrasions, cuts or damage.							
(b) Cable plug and encapsulation are free of defects.							
(c) Unit has no physical damage.							
(d) Transducer is free of oil leaks, bubbles and paint.							
(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).	MIP SO-104/902						
(3) Inventory allowance of spare batteries for AN/BQN-13. Ensure shelf life of batteries has not been exceeded.	Ship's COSAL Note 9						

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
2. Escape Trunks, Logistics Escape Trunks and Forward Lockout Trunks:	Note 10						
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.	MIP 1671/974, MRC G7YM						
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).							
c. Demonstrate that each access hatch can be opened with 5th percentile swing force operability criteria for surfaced emergency egress.							
d. Demonstrate satisfactory operation of the escape hatch closing mechanisms in accordance with the installed instruction plates and equipment.							
(1) Demonstrate satisfactory installation of Improved Powered Hatch Operator with intensifier and compensator as one mode of hatch operation of Logistics Escape Trunks.	MIP 1671/974 MRC E4PH						
(a) Verify inventory of all parts.	Ship's Drawing						
(b) Verify periodic pressure testing of hoses.	MIP 1671/974 MRC E4PK						
(c) Verify proper operation of sensing line and trunk gage.							
(d) Verify assembly of intensifier and gearbox to upper hatch operator.							

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(e) Verify installation of upper hatch operator compensator.							
(f) Demonstrate satisfactory operational check of intensifier pump and gears.							
e. Demonstrate satisfactory operation and examine the condition of the following equipment:							
(1) Vent valves (trunk and compartment).							
(2) Blow valves (trunk and compartment).							
(3) Flood and drain valves (including remote operation mechanisms and strainer installations).							
(4) Conduct Hood Inflation System/Stole Charging Valve operational check to confirm valves operate properly. Verify watertight caps installed.	MIP 5940/905MRC 7DKE						
(5) Pressure proof lights checked to ensure correct globe sealing, and verified that globe is free from cracks.							
(6) Electric lantern screened lenses and pressure relief hole sealed with plastic (MIL-I-3064) and mounted above waterline.							
(7) 31MC installed above waterline.							
(8) Verify accomplishment of PMS to clear sea pressure sensing lines.	MIP 5641/974 MRCs E2PT and E2PU						
f. Verify the following equipment installed:							
(1) Diver's knife.	Note 11						
(2) Ballpeen hammer.	Note 11						
(3) Persuader (crows foot).							
g. Check Flood Line Orifice Size (orifice size is 1.37" for initial trials only).	Installed						

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
h. Verify valve handwheels are properly color coded and labeled in accordance with Ship's Drawing Index, Ship's placards and Posted Information Plates.	NSTM S9086-RK-STM-010 Chapter 505						
i. Verify gages are in calibration as indicated on calibration label.							
j. Verify upper watertight hatch cavity drain valve operation is satisfactory.							
k. Witness satisfactory rigging and operation of lockout trunk portable skirt, verify ability to remove the bubble skirt with the upper hatch shut within 5 minutes without the use of tools.	Ship's Plans						
l. Verify installation of lockout trunk high and low plugs, and demonstrate satisfactory plug operation.							
m. Witness satisfactory operation of lockout trunk partition removal and reinstallation.							
n. Air Sampling Valves F65 in LOT - See Figure 454-1 F62 in LET - See Figure 454-3	S9SSN-ZQ-SSM-FR0 Chapter 4-6-7						
(1) Valve Inspection. Remove the protective cap and the threaded pipe cap from the Air Sampling Valve. Verify that the needle valve is shut and that the internal portion is clean and free of debris.							
(2) Cap Inspection. (Controlled assembly required.) Reinstall the threaded pipe cap using the following controlled reassembly procedure:							
(a) Inspect the threaded cap to ensure the cap is clean, free of nicks, gouges or other defects which may cause damage to the Air Sampling Valve.							
(b) Reinstall Air Sampling Valve threaded cap to ensure proper fit.							
(c) Inspect the O-ring that seals the protective cap. Ensure that the O-ring is clean, free of cuts, cracks, hardening or irregularities.							

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(d) Reinstall the protective cap ensuring proper fit.							
3. Emergency Communications Equipment:							
a. Inventory allowance of the following equipment and confirm proper stowage as indicated:	Ship Configuration and Logistics Support Information System (SCLSIS) & COSAL						
(1) SEPIRB Model T-1630/SRT (2 FWD, 2 aft with Launch Hardware each compartment).	AEL 7-00000A434						
b. Verify from ship's records that all applicable PMS has been performed and witness satisfactory performance of indicated MRCs.							
(1) SEPIRB.	MIP 4413/015						
4. Life Saving and Safety Equipment:							
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).	Ship's COSAL Note 12						
(1) Auto-Inflatable life preservers.	MIP 5832/SUB						
(2) Inherently Buoyant life preservers.	MIP 5832/030						
(3) Man overboard bag.	Note 13 MIP 5832/021						
(4) Qualified swimmer designated for man overboard.	Note 14MILPERS MAN Art. 1414-010 Series						
(5) Safety harness (belts).	MIP 6231/001 MRC 2EA0						
(6) Safety track.	Note 15 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						

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(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						
5. Escape Training:							
a. Verify that all hands are trained in SEIE escape.							
6. DISSUB 7-Day Survival:	Note 8						
a. Atmosphere Control:							
(1) Inventory quantity onboard and inspect condition of the following:							
(a) CO_2 absorbent canisters.	AELs 2-3300230 or 2-3300232 series for LiOH product.						
Amount onboard for DISSUB:							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB: _____	NON-DISSUB; (e.g., for CO-H_2 After-filter & DQA)						
Required: _____	Note 17						
Comment on condition and ship's record _____							
(b) DISSUB LiOH Deployment Kits.	AEL 2-330023035 or 2-330023205 for LiOH Deploy kits.						
Amount onboard:							
FWD: _____							
Aft: _____							
Required: _____	Note 18						
Comment on condition _____							

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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(c) O_2 candles.	AEL 1-230013100						
Amount onboard for DISSUB:							
FWD: _____							
Aft: _____							
Amount onboard for NON-DISSUB: _____	NON-DISSUB; (e.g., for Low Pressure Electrolyzer (LPE)).						
Required: _____	Note 19						
Comment on condition and ship's record for DISSUB/NON-DISSUB segregation: _____							
(d) O_2 candle furnace.							
Candle furnaces onboard:							
FWD: _____							
Aft: _____							
Required: _____	Note 20						
Comment on condition (include location - FWD and/or aft compartments). _____							
(e) Emergency Air Breathing masks (test random 5% for proper operation per applicable MRC).	Ship's COSAL MIP 5519/600 MRC G8CL						
(2) Verify CO_2 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.	MIP 5151/001 MRC B6CW						
(3) Inspect ten percent per compartment of emergency air breathing manifold in-line filters and filter housing for presence of corrosion.							
c. Atmosphere Monitoring:							
(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 774 CLASS)	Reference Note	Fwd		Aft		Submarine Inspector Signature	Inspection Team Member Signature
		Sat	Unsat	Sat	Unsat		
(a) DISSUB O_2/CO_2 Gas Monitors (Analox).	AEL 2-870003101 Stored in same locker as Crash Bag						
Amount onboard (including location) _____							
Required: (minimum) <u>1 FWD, 1 aft compartment</u>							
(2) Verify Analox PMS has been completed within required periodicity	MIP 5940/002 MRC 9TFF						
(3) Inventory allowance of spare batteries for Analox. Ensure shelf life of batteries has not been exceeded.	NSN 6135-01-538-3507 (4 FWD, 4 aft)						
7. <u>Launchers:</u>							
a. Demonstrate satisfactory operation of each launcher manually and hydropneumatically as applicable.							
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 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. 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.

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-H_2 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 CO_2 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	High and Low Salvage Connections.	Date: _____
		External Salvage Valves have been overhauled & seat tightness tested.	Tested by: _____ (Overhauling Activity)
(b)	Encl (1), Part I, para. 3.b., Part II, para. 2.i.	Gages 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.	External Gagging Devices. Valves will be lined up & reset by:	_____ Qualified Eng. Petty Officer
(d)	Encl (1), Part II, para. 1.	SRC/SRDRS. 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.	Emergency Communications Equipment 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.	Life Saving & Safety Equipment PMS 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.	Escape Training. 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.	DISSUB 7-Day Survival 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
		The allowance is:	_____ Number or N/A
		c. Atmosphere Monitoring DISSUB O_2/CO_2 Gas Monitors (Analox - Required: 1 FWD and 1 aft):	_____ Amount
(j)	Encl (1), Part II, para. 7.	Signal Ejector/Launcher 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:

Nomenclature	Paragraph	Reason

_____
Commanding Officer
(or By Direction Authority)

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APPENDIX F

SAMPLE REPORT OF SALVAGE INSPECTION FORWARDING LETTER

From: Senior Inspecting Officer
To: Commanding Officer, USS (Ship's Name and Hull No.)

Subj: REPORT OF 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) Submarine Salvage Inspection Check Off List

1. A (new construction/post CNO Maintenance Availability/Interim Dry-Docking) Salvage Inspection of USS (Ship's Name and Hull No.) was conducted on (Date) using the procedures of reference (a).

2. The following provides amplifying information concerning the (exceptions/discrepancies) identified in enclosure (1). (all exceptions will be discussed)

_____

(Signed)

Copy to: (as appropriate)
COMSUBGRU
COMSUBRON
SUBMEPP (1814)
NAVSHIPYD
SUPSHIP
NAVSEA Program Manager

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VOLUME IV

CHAPTER 19

RETENTION OF MATERIAL DEFICIENCY REPORTS AND RECORDS OF EQUIPMENT CHARACTERISTICS AND TESTS

REFERENCES.

(a) NAVSEA S9086-G9-STM-000 - NSTM Chapter 231 (Propulsion and SSTG Steam Turbines)
(b) NAVSEA S9086-HK-STM-010 - NSTM Chapter 241 (Propulsion Reduction Gears, Couplings, Clutches and Associated Components)
(c) NAVSEA S9086-HN-STM-010 - NSTM Chapter 244 (Propulsion Bearings and Seals)

LISTING OF APPENDICES.

A Bearing Log (Submarines Only)

19.1 PURPOSE. This chapter provides a listing of the inspection reports and equipment records, including the retention requirements, which must be maintained by each ship.

19.2 INSPECTION REPORTS. A copy of each of the following inspection reports will be retained until superseded by a subsequent report:

a. Board of Inspection and Survey Inspection Reports.

b. Hull Surveys.

c. Salvage Inspections.

d. Docking Reports (CNO Maintenance Availability to CNO Maintenance Availability).

e. Turbine Lifting and Repair Reports.

f. Technical Assistance Reports by System Commands, Naval Sea Systems Command Technical Representatives, etc.

g. Boiler Inspection Reports (retained until equipment is transferred or vessel is stricken. May be discarded if old data is incorporated in a new report).

h. Battery Inspection Reports.

i. Diesel Engine Inspection Reports.

j. Main and Air Ejector Condenser Eddy Current (Probalog) Reports.

19.3 RETENTION OF RECORDS OF EQUIPMENT CHARACTERISTICS AND TESTS. The following records will be maintained onboard until superseded:

a. Anti Submarine Warfare Test Program Reports.

b. Structureborne, Airborne and Waterborne Noise Reports.

c. (Submarine Force surface units only) Radar, Radio and Acoustic Radiation Patterns.

d. Equipment Calibration and Alignment Graphs and Charts.

e. Antenna and Superstructure Arrangement Photographs.

f. Record of Shipboard Tests.

g. Lube Oil and Trend Analysis Reports.

h. Battery Record Book (test discharges, etc.).

i. Diesel Trend Analysis Records.

j. (Submarines only) Remote Temperature Element (RTE) Alarm Setpoint, Bearing Maximum Operating Temperature, Proximity to RTE Alarm, Installed Bearing Clearance, Actual Bearing Clearance, Bearing Replacement Clearance, Stamped Depth/Thrust Constant, Depth Micrometer Reading, and calculated bearing Wear for Main Thrust Bearings, Main bearings and Journals (required by reference (a) 231-7.2.1) for:

(1) Main Propulsion Shafting.

(2) Main and Auxiliary Engines.

(3) Main Propulsion Motors and Generators.

(4) Ship Service Turbine Generators.

(5) Reduction Gear (RTE Alarm Setpoint and Bearing Maximum Operating Temperature only).

Appendix A will be used to record data.

k. Readings and Clearances for Main Bearings and Journals:

(1) Rudder and Diving Planes.

(2) Diesel Generator Bearings.

l. Navigational Light Certification.

m. Equilibrium Diagram.

n. Panama Canal Tonnage Certification.

o. Aviation Helicopter Certification.

p. Weight Handling Equipment Certification.

q. Cavitation Curves.

r. Machinery/Vibration Survey Results.

s. (SSN/SSBN/SSGNs only) Resistance Test Records shall be maintained for the following equipment in the Electrical Work Centers PMS Space Manual:

(1) Ship’s Service Turbine Generators.

(2) Ship’s Service Motor Generators.

(3) 400 Hz Motor Generators.

(4) Emergency Diesel Generators.

(5) Emergency Propulsion Motors.

(6) Secondary Propulsion Motors.

(7) Trim/Drain Pump Motors.

(8) Main and Shaft Lube Oil Pump DC Motors.

(9) High Pressure Brine Pump Motors.

(10) Low Pressure Blower Motors.

APPENDIX A
BEARING LOG (SUBMARINES ONLY)

BEARING LOG

Bearing:_____ Ship:_____

Data Taker		Assembly Documentation			Measured Wear			RTE Alarms			Approval		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	Data Taker (Print Name)	Data Taker (Print Rate)	Data Taker Signature	Max Allowable Wear (Wmax)	Stamped Depth Constant (DC)	Depth Mic Reading (MR)	Measured Wear (=7-6) (W) (=MR-DC)	RTE Alarm Setpoint (ASP)	Max Operating Temperature (from logs) (Tmax)	Safety Margin (=9-10) (20ºF min) (ASM) (=ASP-Tmax)	MLPO (initials)	MPA (initials)	ENG (initials)

Notes:

1. For thrust bearings, record the measured thrust clearance in column 7 and maximum thrust specification in column 5.
2. RTE Setpoints are: 270ºF for Main propulsion turbine and SSTG thrust bearings.
   250ºF for Main propulsion turbine and SSTG journal bearings.
   For remaining propulsion plant bearings, 30ºF higher than the maximum observed during Sea Trials or the applicable HM&E Test Procedure (i.e., SUBMEPP Test Procedure or annual MRC to verify Setpoints).

Date	Comments Comments: Date each entry. Note the serial number (if any) of this bearing, date of any bearing replacement, nonstandard dimensions, applicable Liaison Action Requests, Departure From Specification if approved, unusual conditions of journal or bearing (if opened), any additional/abnormal readings taken, recent temperatures for this bearing, temperature of lube oil cooler outlet used to set RTE alarm, or any other notes that may be helpful in the future.

Page ____ of ____

BEARING LOG INSTRUCTIONS

Fill out for each Main Engine, Reduction Gear, Line Shaft, and SSTG Bearing.
A logbook should have a section for each piece of equipment (Port/Stbd SSTG, Port/Stbd Main Engine, Reduction Gear, and Line Shaft). To fill out the log, complete the following entries:

1. **Name of ship and hull #**: i.e., USS SEAWOLF, SSN21
2. **Bearing Name/location**: i.e., #1 Propulsion turbine forward journal bearing.
3. **Name and date**: Print the data takers name and the date data was recorded.
4. **Data Taker Signature**: Signature of data taker.
5. **Max Allowable Bearing Wear (Wmax)**: The maximum increase in depth micrometer measurement above the stamped depth constant.
6. **Stamped Depth/Thrust Constant (DC) or Bearing Constant**: The depth micrometer reading taken when this bearing was installed, aligned and bolted down. It is found stamped on the bearing bracket near the depth micrometer hole. Thrust constants are normally not stamped. These must be obtained from builders new construction completed test procedures on microfiche or repair activity work documents when replaced.
7. **Depth Micrometer Reading (MR)**: Depth measurement taken between machined surface of bearing bracket and top of rotor journal.
8. **Measured Wear (W)**: Measured bearing wear. Calculated as W = MR-DC. (MR = Depth micrometer reading, DC = Stamped depth constant.) If the measured bearing wear (W) is greater than the maximum allowable wear (Wmax) or wear limit per applicable PMS MRC, then the bearing must be disassembled, inspected and repaired/replaced.
9. **RTE Alarm Setpoint (ASP)**: As determined by reference (a) (231-3.10.3.4.3, 231-3.10.3.4.4, and Table 231-3-2) and ships operating logs or by approved shipyard/repair activity test procedure meeting the requirements of the Naval Ships' Technical Manual (NSTM) or SUBMEPP test procedure.
10. **Bearing Full Load Maximum Operating Temperature (Tmax)**: The maximum operating temperature noted on the bearing during Post Construction/Overhaul Sea Trial testing in accordance with SUBMEPP/Shipyard test procedure or the latest performance of RTE testing per appropriate NSTM or PMS MRC. The temperature should be compared to observed temperatures during normal ships operations for abnormalities.
11. **Alarm Safety Margin (ASM)**: Calculated as ASM = ASP - Tmax (ASP = Alarm Setpoint, Tmax = Maximum normal operating temperature). If the alarm setpoint does not meet the requirements of NSTM references (a), (b) or (c), as applicable, reset the alarms in accordance with the NSTM or SUBMEPP test procedure or PMS MRC, as required, following the guidance of the NSTM.
12. **Comments**: Date each entry. Note the serial number (if any) of this bearing, date of any bearing replacement, nonstandard dimensions, applicable Liaison Action Requests, Departure From Specification if approved, unusual conditions of journal or bearing (if opened), any additional/abnormal readings taken, installed (assembled clearances) and maximum clearances if the bearing is installed by Ship's Force, recent temperatures for this bearing, temperature of lube oil cooler outlet used to set RTE alarm, or any other notes that may be helpful in the future and applicable PMS MRC. Installed assembly documentation is not required to be retained in this log if bearing removal and installation was performed by an IMA, IMF, Regional Maintenance Facility or a Shipyard since data is maintained by those installations and can be obtained by the ship, if required, via ISIC. Ship's are required to obtain initial depth micrometer readings to ensure stamped depth constant is updated any time a bearing is rolled out.

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VOLUME IV

CHAPTER 20

DIVER LIFE SUPPORT SYSTEMS, SUBMARINE RESCUE CHAMBER AND DRY DECK SHELTER MAINTENANCE AND CERTIFICATION

REFERENCES.

(a) NAVSEA SS521-AA-MAN-010 - U.S. Navy Diving and Manned Hyperbaric Systems Safety Certification Manual
(b) NAVSEA SS800-AG-MAN-010/P-9290 - System Certification Procedures and Criteria Manual for Deep Submergence Systems
(c) OPNAVINST 3150.27 - Navy Diving Program
(d) NAVSEA SS750-AA-MMA-010 - Submarine Rescue Chamber (SRC), Modernized 850 Ft
(e) NAVSEA S9592-B3-MAN-010 - Dry Deck Shelter Systems Scope of Certification Notebook Volume I

LISTING OF APPENDICES.

A System Certification Requirements
B Submarine Rescue Chamber Scope of Certification Items

20.1 PURPOSE. To provide guidance for the proper administration of a uniform maintenance program in support of the certification requirements for Diver Life Support Systems (DLSS), Submarine Rescue Chambers (SRC), Dry Deck Shelters (DDS), VIRGINIA Class Lock-Out Trunks, SSGN Lock-Out Chambers.

20.2 DIVER LIFE SUPPORT SYSTEM MAINTENANCE AND CERTIFICATION.

20.2.1 General. The DLSS maintenance program is split into two distinct categories. The first category consists of portable, surface ship afloat and shore-based surface supplied dive systems, recompression chamber systems and saturation dive systems which are certified by Naval Facilities Engineering Command (NAVFAC) Code 07F and Naval Sea Systems Command (NAVSEA) 00C4 in accordance with reference (a). The second category consists of submarine and Deep Submergence System based DLSS such as the DDS, VIRGINIA Class Lock-Out Trunks and SSGN Lock-Out Chambers which are certified in accordance with reference (b) by NAVSEA 07Q.

20.2.2 Objective. The objective of the certification process is to verify that all dive systems provide acceptable levels of personnel safety throughout the specified operating range when used with approved operating and maintenance procedures. This chapter provides procedures by which repairs, maintenance, and alterations can be accomplished to those systems within the Scope Of Certification (SOC) and in compliance with reference (a).

20.2.3 United States Navy Diving and Manned Hyperbaric Systems Safety Certification. The requirements, procedures, and guidance for the administration of the certification program for all portable, surface ship afloat and shore-based DLSS shall be in accordance with references (a), (c) and (d). Reference (a) provides a single document which:

a. Identifies the administrative and technical requirements leading to the initial dive system material and system certification.

b. Documents the requirements for maintaining satisfactory material and operability conditions to support continued Unrestricted Operation to design depth.

c. Identifies the responsibilities for implementing and executing the certification program policies and procedures.

d. Provides procedures for requesting waivers to approved operating and maintenance procedures, and for departures from approved system design.

20.2.4 System Certification.

a. System certification is required for all U.S. Navy diving systems in accordance with reference (c). System certification is a procedure for ensuring the adequacy of the dive system to safely operate over its intended mission range. System certification is accomplished through technical reviews and periodic on-site inspections. Quality Assurance (QA) procedures are used to provide support for System certification through documented maintenance and repair procedures, on-site surveys and material audits.

b. System certification is required for all dive systems used by the U.S. Navy, except SCUBA. System certification procedures and criteria shall be in accordance with reference (a) or (b), depending on the type of system. Appendix A of this chapter provides a listing of system certification requirements for diving systems and equipment.

c. The SOC contains a list of all primary, secondary and emergency systems that are required to ensure diver safety. The SOC also includes documentation such as system drawings, operating and emergency procedures, maintenance procedures, and various quality assurance documents required to repair and maintain the DLSS.

20.2.5 Maintenance Guidelines.

a. Appendix I of reference (a) contains the technical and administrative QA requirements for maintenance of SOC components, performed by Forces Afloat, and shall be used when planning all maintenance.

b. Technical specifications shall be complied with at all times. For example, when new fasteners are being installed in a system and the applicable plan requires monel fasteners, then substituting stainless steel or any other material type fasteners is not authorized. Temporary repairs with substituted material shall be documented through an approved Departure From Specification (DFS) in accordance with Appendix I of reference (a), and promptly restored to plan specifications.

c. The following areas of the QA Program are applicable to all dive systems:

(1) In-process control of fabrication and/or repair.

(2) Procedure preparation.

(3) Testing, including retesting.

(4) Calibration.

(5) DFS.

(6) Waivers and deviations.

(7) Audits and deficiency corrective action.

(8) QA forms and records.

20.2.6 Formal System Surveys.

a. As the System Certification Authority (SCA) for afloat and portable DLSS, NAVSEA (Code 00C4) shall issue a DLSS certification letter specifying the parameters under which the system shall be operated and maintained. For permanently installed shore-based DLSS, NAVFAC, Code 07F performs this function. The certification letter is renewed periodically after NAVSEA has conducted a formal survey of the system, including; a review of operating and emergency procedures, maintenance records, Re-Entry Control procedures and documentation, Planned Maintenance System (PMS) records, system plans, and on station observation of diving and recompression chamber evolutions. Upon completion of this survey, the NAVSEA/NAVFAC SCA representative will document all identified deficiencies on System Certification Survey Cards (SCSC). These deficiencies require completed corrective action prior to:

(1) Category IA Manned use.

(2) Category IB System certification.

(3) Category IC Date indicated to sustain certification.

(4) Category ID Must be accomplished on a specified component prior to its use, but the overall system retains its certification.

(5) Category II (Desirable) Deficiencies may be corrected at applicant's option.

b. Corrected Category IA, IB, IC, and ID SCSCs shall be forwarded to NAVSEA Code 00C4, via formal correspondence, with a copy to the Type Commander (TYCOM). The corrected SCSC must be accompanied by the appropriate supporting documentation for clearing the deficiency. The DLSS certification letter will not be issued until all Category IA and Category IB SCSCs are cleared. Diving in pursuit of certification, which includes any manned use of the diving or recompression chamber systems, will not take place until all Category IA cards are cleared, and authorization is received from NAVSEA Code 00C4, or NAVFAC Code 07F. Operational utilization of these systems will not take place until all Category IA and Category IB SCSCs have been cleared, and NAVSEA/NAVFAC has issued a Certificate of Certification. Upon the recommendation of NAVSEA and the TYCOM, the CNO may issue an Operational Waiver to permit diving a system beyond its certification limits in support of high priority operations, if all Category IA cards have been cleared and the outstanding Category IB deficiencies will not compromise personnel or system operational safety. To preclude decertification of a DLSS, all diving commands will conduct and document periodic internal audits. Additionally, the Immediate Superiors In Command (ISIC) will conduct regular monitoring audits and Diving Operational Readiness Assessments of all diving activities under their cognizance, using the attributes contained in Volume V, Part I, Chapter 9 of this manual, and Chapter 2 of this volume. Temporary repairs shall be documented through an approved DFS in accordance with reference (a), Appendix I.

20.2.7 Certification Maintenance Requirements. Requirements for sustaining certification of surface supported diving and recompression chambers are as follows:

a. Maintain written maintenance, inspection, repair, and replacement records for all SOC items. Re-Entry Control procedures must be followed.

b. Report any material casualty to equipment within the SOC to the SCA concurrent with the ISIC and TYCOM.

c. Obtain SCA approval prior to modifying any system or equipment within the SOC. If the systems are permanently installed on board a U.S. Navy vessel, TYCOM approval is required prior to forwarding the request to the SCA.

d. Maintain a log of all chamber pressurizations including chamber treatments and oxygen and pressure tolerance testing. Report any chamber pressurization beyond 165 feet to the TYCOM and the SCA. Include the circumstances which necessitated such pressurization. This excludes saturation, deep dive and experimental chambers such as the Naval Experimental Diving Unit Ocean Support Facility and Naval Diving and Salvage Training Center Pressure Vessel Assemblies.

e. Immediately report any diving operations conducted to a depth in excess of the depths authorized in the applicable DLSS certification letter, by message, to the TYCOM and NAVSEA or NAVFAC, with an information copy to the cognizant ISIC. This message will include the circumstances which resulted in exceeding authorized SOC depth.

20.2.8 Action. To maintain the DLSSs in satisfactory material condition and to provide assurance that they will be fully operational, the following is required:

a. Perform all planned maintenance in accordance with the applicable Maintenance Index Page (MIP)/Maintenance Requirement Cards (MRC). Information contained in applicable equipment technical manuals will be used in conjunction with existing MRCs for accomplishment of PMS.

b. Accomplish corrective maintenance in a manner which returns the components to the specifications shown by the applicable drawing. Material used in completing any maintenance action shall be as specified in the NAVSEA/NAVFAC approved system/component drawings, technical manuals or other approved documents. Material shall be certified in accordance with Appendix K of reference (a).

NOTE: IF THE VENDOR OR MANUFACTURER SPECIFIED IN THE NAVSEA/NAVFAC DRAWING OR DOCUMENT CANNOT PROVIDE THE REQUIRED SPECIFIC COMPONENT, THEN USE OF A SUBSTITUTE COMPONENT OR MANUFACTURER MUST BE APPROVED BY NAVSEA/NAVFAC, VIA THE TYCOM, USING A DFS. A DFS IS ALSO REQUIRED WHEN MATERIAL OTHER THAN THAT SPECIFIED IN APPROVED DRAWINGS OR DOCUMENTS IS USED.

c. Document all work performed on SOC items using the applicable forms and procedures provided in Appendix I of reference (a). This applies regardless of whether the work is a planned or corrective maintenance action. Documentation will, as a minimum, include the following:

(1) Authorization of Re-entry request.

(2) Reason for work.

(3) Description of work accomplished, including specific boundaries breached, manufacturing operations performed and retest requirements.

(4) System isolation, test boundaries and specific isolations.

(5) Information concerning when, where, why and by whom the work was accomplished.

(6) Objective Quality Evidence, including new material acceptance and in-process testing and results.

(7) Quality assurance validation.

(8) Compliance with applicable specifications, drawings, procedures and instructions.

d. Maintain all work documents as official records in accordance with Section I-7.3 of reference (a). The Documents will be available for inspection by the SCA and QA auditors during this period.

e. Obtain NAVSEA or NAVFAC Program Manager and SCA approval prior to accomplishing any alteration or modifications to DLSSs. Unauthorized alterations or modifications will automatically revoke NAVSEA certification. In the case of a system which has been refurbished, but not yet certified, unauthorized alterations or modifications could negate previous steps accomplished by the certification process. Alterations or modifications proposed by Forces Afloat will be prepared and forwarded to NAVSEA or NAVFAC via formal correspondence.

f. When emergency situations occur during DLSS operations that require immediate corrective action and are beyond the scope of a corrective maintenance action, a message shall be sent to the TYCOM, info NAVSEA/NAVFAC, advising of the situation.

g. Semiannual requalification dives, required to maintain diver qualification, shall be scheduled and completed as required. This serves to exercise the various components as well as to maintain the proficiency of the divers and support personnel.

20.2.9 Commanding Officer/Officer In Charge Responsibilities.

a. Maintain certification of the DLSS through satisfactory maintenance and material management and accomplishment of all required certification dives.

b. Ensure all deficiencies identified during a recertification inspection are corrected in an expeditious manner. Category IA and IB deficiencies must be corrected prior to manned use of the DLSS. Category IC deficiencies must be corrected prior to the date on the SCSC. If a deficiency cannot be corrected by the date required on the SCSC, a formal request for an extension of the SCSC Corrective Action date shall be submitted to SCA, with a copy of the request sent to the TYCOM (where applicable).

c. Maintain diver proficiency, verify completeness of required equipment, and readiness of the DLSS to meet operational requirements.

d. Establish and maintain a QA program and Re-Entry Control procedures in accordance with reference (a).

20.3 SUBMARINE RESCUE CHAMBER MAINTENANCE AND CERTIFICATION.

20.3.1 Certification.

a. To meet the intent of references (c), (d), and Volume V, Part III of this manual, and to allow manned operations of SRCs to their designed depth capability, NAVSEA has established a formal certification program. Reference (b) and Appendix B of this chapter provide a listing of items and components NAVSEA has identified as being within the SOC program. Included is the refurbishment of SRCs and the upgrading of the supporting technical documentation. To maintain the SRCs, a formal maintenance program is required to be implemented by Forces Afloat.

b. SRC maintenance is based on the prevention or correction of system and equipment degradation caused by the effects of exposure and normal use. The maintenance instructions of reference (d) do not cover major repair items such as, structural work on the pressure hull, replacement of seawater piping or penetrations. Work of this magnitude is not routine and should not be performed without NAVSEA concurrence and technical instructions issued to correct the specific problem.

c. Continued certification of the SRC is based on satisfactory maintenance and compliance with the dive requirements identified in paragraph 20.3.2.h of this chapter. Compliance with these requirements and with the material condition of the SRC will be verified during periodic NAVSEA inspections. The results of these inspections are promulgated by a NAVSEA letter of certification which will identify the requirements to maintain certification and, if required, forward System Certification Cards identifying deficiencies and corrective actions necessary for continued certification.

20.3.2 Action. To maintain SRCs in satisfactory material condition and to provide assurance they will be fully operational in the event of a submarine casualty, the following is required:

a. Meet the requirements of the NAVSEA certification letter.

b. Perform all planned maintenance in accordance with the applicable MIP/MRCs. Information contained in Chapter 4 of reference (b) will be used in conjunction with existing MRCs for accomplishment of planned maintenance.

c. Accomplish corrective maintenance in a manner which returns the components to the specifications shown by the applicable drawing. Material used during any maintenance action shall be as specified in the NAVSEA approved system/component drawings or other approved technical documents. Material shall be certified in accordance with Volume V, Part I, Chapter 6 of this manual.

NOTE: IF THE VENDOR OR MANUFACTURER SPECIFIED IN THE NAVSEA DRAWING OR DOCUMENT CANNOT PROVIDE A SPECIFIC COMPONENT, THEN USE OF A SUBSTITUTE COMPONENT OR MANUFACTURER MUST BE APPROVED BY NAVSEA, VIA THE TYCOM, USING A DFS. A DFS IS ALSO REQUIRED WHEN MATERIAL OTHER THAN THAT SPECIFIED IN APPROVED DRAWINGS OR DOCUMENTS IS USED.

d. Document all work performed on SOC items using the applicable forms and procedures provided in Volume V, Part III of this manual. This applies regardless of whether the work is a planned or corrective maintenance action. Documentation will, as a minimum, include the following:

(1) Name of the person performing the work.

(2) Date the work was performed.

(3) Reason for accomplishing the work.

(4) Applicable drawing number or reference document.

(5) Brief description of the work performed.

(6) Description of the testing performed and test results.

(7) Signature of the officer/Chief Petty Officer responsible for assuring quality of work.

e. Maintain all work documents as official records for a three year period following completion of SRC refurbishment or in accordance with Volume V of this manual, whichever is longer. The documents will be available for inspection by the SCA and QA auditor during this period.

f. Obtain NAVSEA approval prior to accomplishing any alteration or modifications to SRCs. The accomplishment of unauthorized alterations or modifications will automatically revoke NAVSEA certification. In the case where an SRC has been refurbished, but not yet certified, unauthorized alterations or modifications could negate previous steps accomplished by the certification process. Alterations or modifications proposed by Forces Afloat will be prepared and forwarded to NAVSEA in accordance with Volume VI, Chapter 3 of this manual.

g. When emergency situations occur during SRC operations that require immediate corrective action and are beyond the scope of a corrective maintenance action, send a message to the TYCOM, info NAVSEA, advising of the situation.

h. All SRC operations will be conducted using the procedures provided in chapter 3 of reference (d).

i. All SRC specific equipment, specialized tool kits for SSN 688/SSN 21/SSBN/SSGN 726 Class submarines, and equipment required to support SRC operations will be maintained in an operationally ready condition.

j. Commanding Officers/Officers In Charge are responsible for maintaining the certification of the SRC through satisfactory maintenance and material management of the SRC and accomplishment of all required certification dives. Additionally, they shall ensure all deficiencies identified during a recertification inspection are corrected in an expeditious manner. If a deficiency cannot be corrected by the date required, a request for an extension of the dive date shall be submitted to NAVSEA via the TYCOM.

20.4 DRY DECK SHELTER MAINTENANCE AND CERTIFICATION.

20.4.1 Certification.

a. To meet the intent of references (b), (e), and Volume V, Part III of this manual, and to allow manned operations of DDSs to their designed depth capability, NAVSEA has established a formal certification program.

b. Maintenance is based on the prevention or correction of degradation caused by the effects of exposure and normal use of the DDS.

c. Continued certification of the DDS is based on satisfactory maintenance. Compliance with the maintenance and material requirements of the DDS is verified during periodic NAVSEA inspections. The results of these inspections are promulgated by a NAVSEA letter of certification which identifies the requirements for maintaining certification and, if required, will forward System Certification Cards which identify deficiencies and the corrective actions required to maintain certification.

20.4.2 Action. To maintain the DDS in satisfactory material condition and to provide assurance they will be fully operational in the event of a national tasking, the following is required:

a. Meet all of the requirements of the NAVSEA certification letter.

b. Accomplish corrective maintenance in a manner which returns the components to the specifications shown by the applicable drawing. Material used during any maintenance shall be as specified in NAVSEA approved system/component drawings, technical manuals or other approved technical documents. Material shall be certified in accordance with Volume V, Part III, Chapter 6 of this manual.

NOTE: IF THE VENDOR OR MANUFACTURER SPECIFIED IN THE NAVSEA DRAWING OR DOCUMENT CANNOT PROVIDE A SPECIFIC COMPONENT, THEN USE OF A SUBSTITUTE COMPONENT OR MANUFACTURER MUST BE APPROVED BY NAVSEA, VIA THE TYCOM, USING A DFS. A DFS IS ALSO REQUIRED WHEN MATERIAL OTHER THAN THAT SPECIFIED IN APPROVED DRAWINGS OR DOCUMENTS IS USED.

c. Document all work performed on SOC items using the applicable forms and procedures provided in Volume V, Part III of this manual. This applies regardless of whether the work is a planned or corrective maintenance action. Documentation will, as a minimum, include the following:

(1) Name of the person performing the work.

(2) Date the work was performed.

(3) Reason for accomplishing the work.

(4) Applicable drawing number or reference document.

(5) Brief description of the work performed.

(6) Description of the testing performed and test results.

(7) Signature of the officer/Chief Petty Officer responsible for assuring quality of work.

d. Maintain all work documents as official records for a three year period following completion of DDS refurbishment or in accordance with Volume V of this manual, whichever is longer. The documents will be available for inspection by the SCA and QA auditors during this period. The parent DDS Sustaining Activity shall maintain custody over these work documents.

e. Certification of the DDS is the responsibility of the parent DDS Sustaining Activity. It is the responsibility of both the team and the host unit to maintain certification when the DDS is installed on the host unit. Specifics of material and certification maintenance are covered in the applicable Memoranda of Agreement.

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APPENDIX A

SYSTEM CERTIFICATION REQUIREMENTS

Equipment Type	Service Approved	Authorized For Navy Use	Certify
Deep Dive Systems			X
Hyperbaric Research Facilities			X
Recompression Chamber System	Note 1		X
Diving Bells	Note 2		X
Shipboard Surface Supported Diving Air Systems			X
Underwater Breathing Apparatus Used with Deep Dive Systems	X		X
Mixed Gas and O^2 Scuba	X		X
Open Circuit Air Scuba		X	
Lightweight Surface Supplied Outfits (Air, HeO^2)	X		Note 3
Deep Sea (Hard Hat) Outfits (Air, HeO^2)	X		Note 3
Diver Life Vests	X		
Diver Operated Tools	Note 4	Note 4	
Diver Held Sonar, Navigation, etc.		X	
Diver Communications		X	
Wet Suits	Note 4	Note 4	
Variable Volume (Dry) Suits		X	
Air Compressors, Filters, etc.		X	Note 5
Diving Accessories (Mask, Fins, Watches, Knives, Compass, Depth Gauges, Weight Belts, etc.)	Note 4	Note 4	

Notes:

1. Service approval shall be obtained for transportable recompression chamber systems procured for fleet use.
2. Service approval shall be obtained for diving bells procured for fleet use.
3. Certification shall be obtained for each type of outfit. Individual outfits need not be individually certified.
4. Requirements are determined by NAVSEA and are based on the potential for hazard to divers, procurement quantities, and Logistic Support considerations.
5. When compressor/diving air systems are permanently installed as components of a diving or recompression system, they shall be included in the SOC. The Commanding Officer/Officer In Charge must ensure that compressors and diving equipment are properly installed and maintained in accordance with reference (a).

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APPENDIX B

SUBMARINE RESCUE CHAMBER SCOPE OF CERTIFICATION ITEMS

1. Pressure Hull.
2. Ballast Tank.
3. Appurtenances.
    a. Deadlights.
    b. Hatches.
    c. Hull Inserts.
    d. Padeyes.
4. Seawater Ballast System.
5. Jettison System - Downhaul Cable Cutter.
6. Life Support System - Air Supply and Exhaust System (to certification boundary at ship's SRC air manifold connection).
7. Non-Compensated Equipment Subject to Implosion - Lower Compartment Lights.
8. Downhaul Winch.
9. Communications Systems.
    a. Sound Powered Telephone.
    b. Underwater Telephone.
10. Depth Detectors.
    a. Depth Gage.
    b. Compartment Pressure Gage.
    c. Secondary Depth Detecting (Support Ship Fathometer, Umbilical Pay-out Markings).
11. Accessibility to Vital Equipment.
12. Chamber Stability and Buoyancy.
13. Electric Power Systems.
    a. Normal Power System (to certification boundary at ship's SRC power supply fuse panel).
    b. Battle Lanterns.
14. Operating and emergency procedures (Reference (d)).
15. Lifting Pendant.

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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).

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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.

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CHAPTER 23

GAS TURBINE ENGINE INSPECTION FOR SURFACE FORCE SHIPS

REFERENCES.

(a) OPNAVINST 9220.3 - Propulsion and Auxiliary Plant Inspection and Inspector Certification Program
(b) NSWCCD-SSES 9332-GGTB 11 - General Gas Turbine Bulletin Number 11 (Gas Turbine Fleet Representatives)
(c) NAVSEA S9086-HC-STM-000 - NSTM Chapter 234 (Marine Gas Turbines)
(d) NSWCCD-SSES 9352-GGTB 0 - General Gas Turbine Bulletin Number 0 (Technical Directive Zero Index)
(e) NSWCCD-SSES 933-GGTB 3 - General Gas Turbine Bulletin Number 3 (Marine Gas Turbine Logbook and Service Records)
(f) OPNAVINST 3120.32 - Standard Organization and Regulations of the U.S. Navy

23.1 PURPOSE. The Marine Gas Turbine Inspector (MGTI) program is intended to provide for the timely identification of discrepancies prior to Planned Major Maintenance Availabilities, deployments, when mandated by operating hour requirements and to provide technical assistance to operational units when so directed by the Type Commander (TYCOM). This chapter provides the guidance for Marine Gas Turbine inspection requirements, including preparation, procedures, criteria and reporting and is applicable to all gas turbines on fleet surface, amphibious and auxiliary platforms and craft.

23.1.1 Discussion. It has long been the Navy's practice for Ship's Force to accomplish as many repairs as possible at the organizational or intermediate levels. This maintenance philosophy requires trained and experienced personnel, capable of identifying problems so that planned and corrective measures can be recommended, planned for and accomplished in a timely manner. To address the need for experienced personnel the MGTI program has been developed. Reference (a) provides the details for the MGTI program.

23.2 MARINE GAS TURBINE INSPECTOR.

23.2.1 Certification. MGTI inspector certification and recertification requirements outlined in reference (a) are amplified as follows:

a. MGTI's function as the Naval Sea Systems Command (NAVSEA) Technical Representatives. All their technical decisions and recommendations are made in concert with and fully supported by their appropriate Regional Maintenance Center (RMC).

b. Upon verification of competency, Naval Surface Warfare Center, Carderock Division – Ship System Engineering Station (NSWCCD-SSES) will issue a 36 month certification. Certification will remain valid provided the MGTI conducts at least two (any combination) of the following: Gas Turbine Readiness Reviews (GTRR), Assessments, pre-deployment inspection, pre-Planned Major Maintenance Availability inspection and attends one MGTI seminar during the previous 12 months.

c. MGTI certifications will be extended in 18 month intervals. Requests for extension shall be submitted to NSWCCD-SSES with info to NAVSEA 05Z via the TYCOM. By endorsement, the Commanding Officer will certify that the MGTI meets the requirements of paragraph 23.2.1.b of this chapter. A MGTI whose certification has lapsed or been suspended will be required to recertify, under procedures established by NSWCCD-SSES, on a case-by-case basis.

d. Commanding Officers will ensure MGTIs are afforded the opportunity to attend MGTI seminars and maintain certification. Commanding Officers are also encouraged to nominate to the TYCOM motivated and capable technicians for certification as MGTIs as outlined in reference (a).

e. A MGTI assigned as ship's company cannot perform inspections as described in section 23.3 of this chapter on that ship. (No inspector will be permitted to inspect himself.)

23.2.2 Authorized Functions and Responsibilities.

23.2.2.1 Naval Sea Systems Command. NAVSEA shall provide technical authority oversight over all marine gas turbines and associated equipment. The designated NAVSEA Technical Warrant Holder shall:

a. Assure safe and reliable system operation.

b. Set and enforce all technical requirements.

c. Approve all major Departures from Specifications (DFS).

23.2.2.2 Naval Surface Warfare Center, Carderock Division. NSWCCD shall:

a. Provide support to NAVSEA for the MGTI programs. Ensure that the required technical documentation to support the MGTI Inspector programs is maintained current.

b. Establish and monitor the requirements and standards for routine and industrial inspections of marine gas turbine systems.

c. Develop, implement and maintain a program to train and certify MGTIs.

d. Ensure that inspections of newly constructed ships and ships undergoing major overhaul and/or conversion are conducted in accordance with this instruction.

e. Conduct periodic technical audits of the MGTI Training Course.

f. Provide management of technical data, gas turbine history and the associated repair management information database system.

g. Conduct the semi annual MGTI seminars.

h. Maintain a roster of all certified MGTIs by name, rating, duty station, date of certification and expiration date of certification. Revoke inspector certification and initiate action to decertify inspectors who fail to comply with requirements of reference (a).

i. Ensure that the requirements for MGTI certification, recertification and certification extensions are met prior to final approval.

j. Provide technical oversight and management of the MGTI and NSWCCD Life Cycle Engineering Manager programs:

(1) Establish and enforce requirements for MGTI certification and recertification.

(2) Ensure periodic MGTI seminars are conducted.

(3) Ensure periodic technical audits of all Integrated Logistics Support documentation and Training.

(4) Maintain the Gas Turbine Management Information System WEBLOG.

(5) Routinely evaluate and ensure state of the art inspection, maintenance and repair tools and techniques are used.

23.2.2.3 Fleet Commander. The Fleet Commander shall:

a. Identify and designate those fleet activities which have inspection responsibilities and maintain a base of certified MGTIs within those activities.

b. Ensure the availability of “school ships” to support MGTI Inspector training.

c. Host the semi-annual MGTI seminars on an alternating coast basis.

23.2.2.4 Regional Maintenance Center. The RMC shall:

a. Provide certified MGTIs to perform inspection.

b. Review the guidelines and inspection requirements for all gas turbine inspections required by this instruction and ensure that each inspection report is recorded and updated into the Gas Turbine Management Information System.

c. Schedule and coordinate inspections of all marine gas turbine systems required by this instruction with the appropriate technical activities to avoid the unnecessary opening of gas turbines.

d. Provide a qualified MGTI when requested by the ship, Immediate Superior In Command (ISIC) or TYCOM.

23.2.2.5 Regional Maintenance Center Commanding Officers. RMC Commanding Officers shall:

a. Coordinate inspections in cognizant maintenance areas.

b. Maintain an up-to-date status of required marine gas turbine system inspections which shall include the latest inspection for all ships assigned to RMCs in their respective area of responsibility.

23.2.2.6 Immediate Superior In Command. The ISIC shall:

a. Monitor the follow-up action required to correct noted discrepancies by randomly sampling the ship's deferred maintenance action file and most recent gas turbine inspection report.

b. Assist Commanding Officers in arranging for the corrective action of items beyond the capability of Ship's Force, when requested.

23.2.2.7 Ship Commanding Officer/Officer In Charge/Maintenance Team. Ship Commanding Officers/Officers In Charge/Maintenance Team shall:

a. Request gas turbine inspections.

b. Prepare for scheduled inspections to include required operational testing.

c. Review inspection results and initiate corrective action for those items within Ship's Force capability. Initiate requests for the correction of items beyond Ship's Force capability. If any of the discrepancies cannot be corrected within 72 hours following completion of the inspection, or if said discrepancies will impact the ship's operational schedule, initiate a Casualty Report for the affected gas turbine(s).

d. Assess the impact (if any) of corrective action on operating schedules and advise the operational commanders. Decide (with repair activities) the optimum timing of repair actions to minimize impact on operating schedules.

e. Submit reports.

f. Schedule gas turbine inspections as required by appropriate Planned Maintenance System (PMS)/Class Maintenance Plan item.

23.2.2.8 Marine Gas Turbine Inspectors. MGTIs are authorized and responsible for, but not limited to, performing the following:

a. Perform periodic intermediate level inspections per Gas Turbine Bulletins (GTB) and Ancillary Equipment Bulletins.

b. Perform GTRR, Assessments, post casualty investigations, pre-deployment inspections and pre-Planned Major Maintenance Availability inspections.

c. Provide troubleshooting assistance to ships and Fleet Maintenance Activities (FMA).

d. Oversee in-place gas turbine repairs if currently qualified for the specific repair.

e. Oversee Gas Turbine Technical Directive installations.

f. Monitor compliance with configuration status accounting and technical directive reporting requirements.

g. Make engine changeout recommendations to NSWCCD-SSES via the RMCs.

h. Act as team leader (if currently qualified for specific repairs) for in-place gas turbine repairs and gas turbine changeout if attendant FMA does not have a team leader qualified for the specific repair.

i. MGTIs are part of the technical authority chain-of-command and are accountable to the NAVSEA Technical Warrant Holder for the performance of their inspection duties.

NOTE: THE SHIP'S FORCE MGTI CAN ONLY ACCOMPLISH SPECIAL INSPECTIONS AND OPERATIONAL ASSESSMENTS ON THEIR OWN SHIP. THE SHIP'S FORCE MGTI WILL ASSIST THE RMC MGTI DURING ROUTINE AND AVAILABILITY RELATED INSPECTIONS. THE SHIP'S FORCE MGTI MAY NOT INDEPENDENTLY CONDUCT ROUTINE, STRENGTH AND INTEGRITY INSPECTIONS ON THEIR OWN SHIP.

23.3 GAS TURBINE INSPECTIONS AND REQUIREMENTS.

23.3.1 Applicability.

a. All gas turbine engines on surface, amphibious or auxiliary platforms or craft of the force will be inspected as prescribed in this section.

b. Frequency of inspections of gas turbine installations by a certified MGTI will be scheduled by the Commanding Officer and conducted in accordance with references (a), (b) and (c), established PMS and GTB Inspection requirements as listed in reference (d). ISIC/TYCOM guidance may be solicited to avoid scheduling conflicts.

23.3.2 Pre-Planned Major Maintenance Availability.

a. Prior to planned Depot level maintenance availabilities, a routine inspection should be performed on all ship's gas turbine engines to determine maintenance or overhaul requirements. Where possible TYCOM/ISIC should ensure there is adequate time set aside in the ships employment schedule to support these inspections.

b. Results of this inspection will be entered into the ship's Current Ship's Maintenance Project (CSMP) and will enable the ship to submit work requests for work accomplishment by FMAs/industrial activities during Planned Major Maintenance Availabilities.

23.3.3 Pre-Deployment.

a. Gas turbine engines shall be inspected by a certified MGTI prior to deployment. A deployment is defined as scheduled operational commitments of 90 days or greater away from a ship's homeport.

b. Discrepancies resulting from this inspection will be entered into the ship's CSMP. Noted discrepancies provide the basis for but do not limit the work to be accomplished by Ship's Force and/or FMAs prior to deployment. A follow-up inspection may be scheduled 30 to 60 days before deployment or as operational commitments dictate to verify the status of repairs. The requirement to conduct a follow-up inspection will be determined by the MGTI. Follow-up inspections will be conducted when possible by the same MGTI who conducted the initial inspection.

23.3.4 Gas Turbine Bulletin Inspections.

a. GTB Inspections are determined by engine operating hours and require scheduling 60 days prior to the inspection. Operating hours updated monthly in the Marine Gas Turbine Information System WEBLOG via reference (e), are the engine hours used to determine inspections.

b. Reference (d) lists all Technical Directives and their revisions/amendments.

c. When GTB inspections are required coincidence with pre-availabilities or pre-deployments, they should be coordinated with pre-availability or pre-deployment inspections to minimize duplicate effort and optimize inspections.

d. Any ship not able to complete required GTB Inspections within the required periodicity will request a DFS from the TYCOM.

23.3.5 Casualties. Ship's Force shall conduct the initial investigation after a casualty in accordance with current directives. If Ship's Force is unable to identify the cause of the casualty or repairs required, a certified MGTI or an RMC Technical Representative shall be requested to verify the nature of the casualty, investigate for cause and make recommendations for repairs. This may be a partial inspection covering failed areas only. However, the MGTI must ensure the inspection is sufficient in scope to determine the full extent of damage and necessary repairs.

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/repaired 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).

VOLUME IV

CHAPTER 24

WOOD HULLED SHIPS AND CRAFT

REFERENCES.

(a) NAVSEA S9086-DA-STM-000 - NSTM Chapter 100 (Hull Structures)
(b) NAVSEA S9086-VG-STM-010 - NSTM Chapter 634 (Deck Coverings)
(c) MIL-S-24340 - Polyurethane (Polyether Base) Deck Sealing Compound
(d) NAVSEA STD DWG 805-921806 - Installation of Planking on Deck Plating
(e) NAVSEA S9086-VD-STM-010 - NSTM Chapter 631 (Preservation of Ships In-Service - General)

24.1 PURPOSE. This chapter contains procedures for the inspection, repair and maintenance of wood decks and structures on wood hulled ships and craft.

24.2 WOOD DECAY.

24.2.1 Primary Causes. Wood decay is caused by a fungus growth which breaks down the cell structure within the wood. This fungus thrives in fresh water but its growth is significantly retarded by salt water. Wood decay generally occurs in those spaces which are poorly ventilated and where fresh water has gained access. Poor drainage, allowing fresh water to stand, even in small amounts, is particularly hazardous. The primary causes of wood decay found in ships using wood for hulls, decking and structures are identified below.

a. Insufficient ventilation and air circulation especially in spaces plagued by dampness and high humidity (i.e., chill room platforms, and areas around fresh water tanks).

b. Obstructed drain pipes, scuppers, limbers, and drain holes.

c. Uncaulked or poorly maintained deck seams, especially around plywood decking and deckhouse areas.

d. Washing down with fresh water.

e. Depressions in the deck from sanding which allows fresh water to stand.

f. Leaking plumbing especially in heads, water closets, and food preparation areas.

24.2.2 Recognition. Decay in the deck and hull structure is often concealed and hard to detect. It is usually not recognizable by visible fungus except in joints between surfaces. Decay may be suspected if paint coating is discolored or the wood surface is cupped. The affected wood has a pronounced stringy, fibrous appearance. Thoroughly decayed wood is brittle which, when dry, breaks easily across the grain with a distinct brash fracture and may crumble into powder. Black stains spreading along the grain from ferrous metal fastenings are usually a result of chemical reactions instead of from decay fungi. Testing procedures for suspected decay areas are detailed in reference (a).

24.2.3 Preventive Measures. Detailed preventive measures are described in reference (a). General preventive measures for the reduction of wood decay are identified in the following paragraphs, and should be accomplished by Ship's Force.

a. Correct/remove all interference with complete water run off.

b. Repair fresh water leaks in plumbing drains and fresh water supply systems.

c. Maintain ventilation system in proper operation. Ensure ventilation system filters are kept clean, maintained clear of all foreign material, and ventilation terminals remain open.

d. Carefully caulk and maintain deck seams, especially around plywood decking, deckhouse, hull fittings and foundation areas.

e. In fair weather, open hatches and deck plates to supplement the air circulation.

f. Remove wet dunnage or shoring in below deck spaces and permit to dry.

g. Avoid washing down with fresh water. Use only salt water due to its preservation values.

h. Wash down the ship/craft with salt water following periods of inclement weather to eliminate fresh water and restore salt washed away by the rainfall.

i. Avoid heavy build up of paint.

j. Check MCM bilges and accessible voids for standing fluids once each watch. Identify and correct any leaks and promptly remove any fluids. MCMs are designed to operate with dry bilges. Prolonged contact with fluids will result in wood swell, which can lead to external glass reinforced plastic delamination, planking damage, and machinery misalignment.

24.2.4 Corrective Measures.

a. Treat new wood, used during new construction or in repaired areas, with a copper naphthenate preservative. This product is produced in a clear and colorless form or in a bright green color. The green preservative has a higher level of copper and is considered to be the more durable and efficient of the two preservatives. If the treated wood is to be varnished, finished with light-colored paints or left bare, use the clear preservative since the green color will bleed through varnishes and light-colored paints.

b. Build up a heavy concentration of the preservative with a series of three or more heavy applications using a brush, spray or immersing the wood in a preservative filled tank. On-going protection requires periodic application of the preservative to bare wood structures at about five-year intervals. Wood treated on this basis will last indefinitely.

c. Early identification of decayed areas will allow damaged wood to be treated with an anti-decay product that will harden up the soft wood and prevent the further spread of decay. The product, available commercially, is a two-part mixture with deep penetrating properties that fills wood pores with a capillary action.

d. Before a wood structure is so badly decayed that its replacement is necessary, a possible long lasting repair is made by drilling a series of 1/4" to 3/8" diameter holes in and around the affected areas and gravity feeding the anti-decay mixture in sufficient quantity to allow total penetration of the damaged area. A guide for proper application of this product is provided with each repair kit. Avoid removing or disturbing bad wood during repairs, since the original wood, whether good or bad, serves as a container for the product and preserves the shape and size of the affected member. Initial curing of the product takes place about one hour after application. Total curing takes place after one week, at which time the treated wood resembles petrified wood and the growth of rot in the treated area is effectively stopped. Repairs should be accomplished by Ship's Force during regular maintenance periods.

24.3 DECK AND HULL MAINTENANCE.

24.3.1 Inspection Requirements. With reasonable care, wood hulled ships can give many years of economical service. Make frequent inspections to detect any leaks beneath the covering board, around the deckhouse areas and seams in the deck planking. Reference (a) lists general maintenance requirements for wood hulled ships.

24.3.2 Maintenance Policies. Specific maintenance policies and repair practices are described in the following paragraphs.

a. As a general policy, because of the ever present risk of decay developing beneath any wood coating, leave wood strip planked decks uncoated and unpainted.

b. Limit the cleaning of wood decks to scrubbing with mild detergents and salt water. Never use fresh water for wash-downs since it encourages growth of decay producing fungi. Do not use strong detergents, acids, and bleaches for deck cleaning. Do not sand decks.

c. Set up a routine of daily wetting down of wood strip planked decks with salt water. This wetting down causes strip deck planking to remain swollen and creates a tighter fit between planks. Wetting down is especially necessary during warm weather periods when the sun's heat will quickly dry out the deck planking. Do not allow water to accumulate in deck recesses for any length of time.

d. Cover all plywood decks with a coating in accordance with the application and deck preparation procedures of reference (b).

e. Planking renewal will be approved by the TYCOM only on the basis of a technical survey that has positively shown specific need and complete justification for such renewal. Often used general terms such as "Rotten and Worn" are not considered sufficient justification. The technical basis for planking renewal shall be formed in the following manner:

(1) Drill test bore holes in weather deck areas to find planking thickness in specific areas where plank wear is suspected. If the planking is not worn beyond the limits set forth in reference (b), the planking will not be renewed unless other extenuating and justifiable circumstances dictate, and replacement is authorized by the TYCOM.

(2) Take boring plug samples of planking suspected of being decayed. Notify the TYCOM of inspection results.

(3) Once planking has reached the maximum wear limits (found by bore test), the TYCOM will determine the need to replank or apply a deck coating.

f. So far as practicable, repair deck leaks by recaulking deck seams.

g. When deck planking wear limits have been reached, and other factors such as extensive deck leaks suggest use of a deck covering, a coating of polyurethane deck overlay may be used. Non-skid material must be Naval Sea Systems Command approved material compatible with the deck overlay as defined in reference (b).

h. Reset metallic planking fasteners when fastener heads are level with, or protrude above, deck level. Where the planking level is within 1/4" or less of fastener head, filling with seam filler vice wooden plugging is authorized. Where bung plugs are installed, they shall be set in black polyurethane seam filler per the requirements of reference (c).

i. Ships currently having polysulfide or polyurethane coated strip deck planking in good condition shall continue to use the applied covering. Make minor repairs to this polyurethane coating as necessary using either a polysulfide or polyurethane repair kit. When the polysulfide covering is no longer economically repairable, replace it with a polyurethane type coating. Repairing cracks and holes in impervious deck coatings shall be accomplished as soon as practical. Failure to do so will lead to deck rot and costly repairs.

24.3.3 Deck Covering Repairs. Interior and exterior deck covering material is prescribed by Military Specifications and will be installed only as approved by the TYCOM. Repair previously installed deck coverings as necessary. Reference (b) prescribes approved materials and preparation procedures for wooden decks.

24.3.4 Caulking Techniques. Removal of old caulking from leaking seams and recaulking is the standard method for repairing deck leaks. Fill the caulked seams with a black polyurethane seam filler, per the requirements of reference (c). Before filling, caulk the seams with sufficient cotton. Seam out gaging (beveling) as specified in reference (d). Detailed instructions concerning equipment used, the preparation of seams, the method of application and primers to be used are described in reference (b).

24.3.5 Weather Deck/Planked Deck Repair.

a. Remove all loose or decayed cotton or oakum caulking after removing all seam filler. In areas where caulking is found to be in good condition, set this material deeper into the seam opening, ensuring it is driven in solidly to make room for additional caulking.

b. Small, tight seams will require a new single thread of cotton. The size of the seam in width and depth determines the amount of cotton or oakum required. Install sufficient cotton and/or oakum so that the level of the top of the caulking is 1/4" to 3/8" below the surface of the decking. This will allow room for the seam filler.

c. Unless marine glue (pitch) is used as a seam filler, seal the surface of the caulked cotton or oakum with a special seam primer that is compatible with the seam filler. Do not use a rubber type seam filler over oakum.

d. Prime or fill newly caulked seams at the end of each day's caulking to keep moisture out of the caulking material and to protect the dry surface of the deck plank seams.

e. Rubber type seam fillers that are installed in seams with a caulking gun must also be hand worked into the seam with a putty knife. This is necessary to eliminate air pockets and voids in the seam. Hand working of the seam filler must be in one single direction to avoid air pockets.

24.3.6 Underwater Planking Repairs.

a. The forward and after rabbet shall receive a thorough inspection. The rabbet seam in the stern area is covered with an anchor chafe plate and is not available for inspection or repair unless the anchor chafe plate is removed. Slack or rotten caulking allows for infestation of marine burrowers and decay which, in the case of the rabbet seams forward, goes undetected.

b. Inspect and test caulked plank seams covered with bottom sheathing for soundness whenever areas are exposed due to the removal of sheathing. In most cases the seams have been covered for many years and have not been available for periodic maintenance. These seams, although covered with sheathing, do eventually waste away or become slack. The seams at the planking butts are more susceptible to slackening and erosion due to movement at the joints. Under normal conditions, it is necessary to recaulk these joints every 10 to 15 years.

c. If the outer strand of oakum caulking appears to be satisfactory, then the seam may be repaired by setting the existing caulking deep into the seam and adding more strands of oakum to fill the seam depth. If the old caulking is wasted away or decayed, clean out the seam and remove all caulking and residue to make room for the new material.

d. Before filling the newly caulked seam with a seam compound, paint the oakum and seam with anti-fouling paint. Painting the seam protects the oakum from marine burrowers and primes the wood in the way of the seam filler. Painting the oakum produces a hard surface finish which also makes a water barrier necessary for the protection of the oakum.

24.4 SURFACE PREPARATION AND PAINTING.

24.4.1 General Techniques. The greatest single factor affecting the performance of any paint system is the method and care used in the preparation of the surface to be coated. The preservation of wooden ships presents some unique problems not encountered in other types of ships. Reference (e) provides guidance for surface preparation materials and methods of application, techniques, and general safety precautions for painting.

24.4.2 Preparation and Painting Policies. Specific TYCOM policies pertaining to the preparation and paint application are identified in the following paragraphs:

a. The use of torches to blister the existing paint coating for removal is authorized; however, care shall be taken to guard against damage to other items or equipment in the vicinity. Avoid application of heat on or near items such as electric wiring, plastics, gaskets, and all flammable materials. Use only enough heat as required to blister the paint. Excessive heat chars the wood fibers and removal of the charred wood results in an uneven surface. Remove all interferences that can reasonably be removed before applying heat. This includes all label plates, brackets, clips, etc.

b. Scraping tools used to remove blistered paint must be kept sharp to be effective. Do all scraping in the direction of the wood grain to prevent shredding of wood fibers and gouging of the bare wood surface. This phase of paint removal is important in preparing the surface for sanding.

c. All areas stripped as previously described are now ready for sanding before priming. Hand sanding, with wooden blocks where practicable, using the correct grit paper, is the prescribed final step. Careful dusting before paint application is absolutely necessary to achieve a good primer bond, or bond between subsequent paint coats.

(1) Power disc sanders are not authorized for use in surface preparation. Improper use of the disc sander is the biggest cause of uneven surfaces and damage.

(2) Belt sanders and vibrating sanders are authorized for use in preparing the hull freeboard for priming and top-coating.

24.5 WOODEN HULL BOTTOM SHEATHING. For bottom sheathing to be effective and to provide protection to the underlying hull planking, the sheathing must fit the shape of the vessel's contoured bottom, be securely fastened, and be faired to the level of adjoining pieces of sheathing. The sheathing shall be installed per the requirements of reference (a).

a. Sheathing the bottoms of wood vessels serves to protect the hull from burrowers, especially if the vessels are to endure long periods between dry-dockings.

b. For vessels that are active and are dry-docked annually, the use of sheathing is not required.

24.6 WOODEN SEA CHEST FOUNDATIONS.

a. To prevent overheating of the wood filler blocks and wood cap blocks in sea chests, the wood must be insulated from the metal fittings. Use of delron sleeves or bushings around the body of the through-hull fitting and around the bolt fastenings is one approved method.

b. A Cathodic Corrosion Control system using an impressed current through anodes installed on boat bottoms isolates the anode fittings with the use of delron bushings and by the application of a mastic material applied over bare wood in a 36" diameter area around the anode.

c. Replace wood fillers and caps that are badly decayed. If repairs cannot be made immediately, then treat the bad wood with a preservative or decay inhibitor to slow up the rate of deterioration until the bad wood can be replaced. When new fillers in the form of blocks and caps are fabricated, they should be treated with preservative prior to installation and after the wood has been finally shaped and fitted.

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CHAPTER 25

GAS FREE ENGINEERING INSPECTIONS

REFERENCES.

(a) NAVSEA S6470-AA-SAF-010 - Gas Free Engineering Manual
(b) NAVSEA S9086-CH-STM-030 - NSTM 074 V3 (Gas Free Engineering)
(c) OSHA 29 CFR 1915 - Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
(d) OPNAVINST 5100.23 - Navy Occupational Safety and Health (NAVOSH) Program Manual

LISTING OF APPENDICES.

A Gas Free Engineering Program Assessment Sheet

25.1 PURPOSE. To define Fleet Gas Free Engineering (GFE) inspection policy and oversight policy.

25.2 SCOPE. This chapter is applicable to all Gas Free service provided by all personnel (military and civilian) assigned to a Naval Maintenance Facility (NMF) or Navy ship/submarine.

25.3 DISCUSSION. The correct application of GFE programs is varied and may be confusing to individuals unfamiliar with references (a) through (d). Table 25-1 cross references requirements.

Table 25-1

	NAVSEA Gas Free Engineering Manual	NSTM 074 V3	OSHA 29 CFR 1915	OPNAVINST 5100.23F - Para 2702D
Ship or Submarine located at an NMF (Notes 1 & 5)	X	X		
Ship/Submarine pierside, not at an NMF (Note 4 & 5)	X	X		
Ship/Submarine Underway		X		
Tender working on Ship/Submarine not at a NMF (Note 6)		X		
Tender working on Tender not at an NMF (Note 6)		X		
Tender working on other Surface Ship not at an NMF		X		
Non-Department of Defense (DoD) Contractors (including foreign contractors) (Note 2 or 7)		X - Note 2	X - Note 7	
Fleet Shore Activities which are not an NMF but conduct ship repair (Note 3)				X

Notes:

1. NMF is defined as Regional Maintenance Center (RMC), Regional Support Group, Ship Repair Facility, Department of the Navy Shipyards.

2. Contractor work onboard naval vessels outside U.S. territorial waters: Provisions in reference (b) allow the shipboard Gas Free Engineer to provide GFE services to contractor personnel when the ship is located outside U.S. territorial waters. These provisions are intended solely as a last resort to accomplish mission and time critical work and are not intended to relieve contractors of the obligation to provide their own certified GFE services whenever and wherever possible. Until this distinction can be formally addressed, the contracting

office shall notify Ship's Force whenever a contractor cannot provide their own GFE services. Ship's Force will then seek applicable Type Commander/Echelon III N43 approval on a case-by-case basis prior to providing GFE services to contractor personnel (both foreign and U.S. nationals) outside U.S. territorial waters.

3. Example: An Assault Craft, conducting landing craft repair work at its shore repair activity.

4. When an RMC is conducting work on a naval vessel that is located pierside, NMF personnel shall follow reference (a) requirements.

5. a. Ship's Force should follow reference (b) requirements or may obtain NMF GFE/National Fire Protection Agency (NFPA) marine chemist services, if necessary, when pierside for Ship's Force entry into confined and enclosed spaces for inspections, preventive maintenance, and access to stowage.

   b. Ship's Force should follow reference (b) requirements or obtain NMF GFE/NFPA marine chemist services, if necessary, when pierside for hot work certifications for Ship's Force work in confined and enclosed spaces, except as noted in paragraph c. of this note. Ship's Force will not provide hot work certification following reference (b) requirements to conduct work where DoD civilians or contractors are working in the same space or may be affected by work conducted by Ship's Force. The afloat Gas Free Engineer shall coordinate hot work aboard ship with NMF Gas Free Engineers and/or NFPA marine chemists aboard ship in advance of specific Ship's Force evolutions to ensure awareness and coordination of Ship's Force work. The afloat Gas Free Engineer shall follow NMF Gas Free Engineer and NFPA marine chemist guidance as appropriate.

   c. Ship's Force, when pierside, shall not certify hot work operations within, on or immediately adjacent (through heat transfer, spark or hot slag contact) to:

      (1) Spaces that contain or last contained combustible or flammable liquids or gases.

      (2) Fuel tanks that contain or last contained fuel.

      (3) Pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or last contained fuel.

   d. Ship's Force, when pierside, shall obtain support services for hot work operations listed in paragraph c. of this note through the local supporting NMF. When pierside in a private shipyard, optional GFE services for operations in paragraphs a. and b. of this note and required GFE services for operations in paragraph c. of this note will be obtained from an NFPA marine chemist by Ship's Force through the governing contract with the private shipyard. If such support services are not provided for in the contract, Ship's Force shall obtain required GFE services through the local supporting NMF.

   e. When in a port location without services from NMF GFE or NFPA marine chemist, the afloat Gas Free Engineer will seek approval to conduct certification for emergent hot work operations referenced in paragraph c. of this note from the applicable Type Commander/echelon III N43. Ship's Force afloat Gas Free Engineer shall not provide GFE services to DoD or contractor civilian personnel under these circumstances.

   f. With permission of the local supporting NMF, if conditions remain unchanged from the environment described on the confined space entry tag, afloat Gas Free Engineer may maintain certificates initially issued by NMF Gas Free Engineer or NFPA certified marine chemist referenced in paragraphs a., b. and d. of this note. If conditions change, immediately evacuate space and obtain recertification by originating NMF Gas Free Engineer or NFPA marine chemist.

   g. Submarine personnel shall obtain GFE services from the local supporting NMF while pierside.

6. Tenders shall follow reference (b) for all repair work, on the tender itself or ships/submarines, except when the work is conducted while the vessel (tender/ship/submarine) is at an NMF at which point reference (a) becomes the governing instruction. Locations where in port GFE services are not available ensure that entry into, or hot work in or on fuel tanks, spaces in which fuel tank vents terminate, piping or equipment servicing such spaces or other confined spaces known to contain flammable fuels or fuel vapors is permitted only if approved by the Commanding Officer (CO) for each occasion as specified in paragraph 074-19.4.b of reference (b). Treat tanks as Immediately Dangerous to Life or Health and follow procedures in paragraph 074-19.14 of reference (b).

7. Non-DoD (contractor) personnel: contractor personnel conducting ship repair work on ships located inside U.S. territorial waters are required to follow reference (c) requirements whether the ship is in a government or privately owned ship repair facility. RMCs shall ensure all contracts include reference (c) requirements and ensure contractor compliance.

25.4 OVERSIGHT. To ensure compliance with reference (b), the afloat GFE program on surface ships, aircraft carriers and submarines shall be evaluated using the following requirements:

a. The CO shall require the safety officer to evaluate the GFE program at least annually as outlined in reference (b). The safety officer, Damage Control Assistant, and submarine Medical Department Representative shall use Appendix A, Gas Free Engineering Program Assessment Sheet, to conduct the annual evaluation. A copy of this report will be sent to the Type Commander (TYCOM) Safety Officer.

b. The TYCOM Safety Officer shall perform an annual evaluation of the afloat GFE program and provide a report to the Fleet N43 during the first quarter of the calendar year.

(1) TYCOM as part of the annual evaluation, shall collect and analyze data from assessment results from Safety Center Surveys, Board of Inspection and Survey (INSURV) material inspections, Afloat Training Group (ATG) program assessments, crew certification and Immediate Superior In Command (ISIC) assessments.

(2) TYCOM shall also spot check afloat GFE programs using Appendix A to include in the annual self evaluation.

c. Submarine ISICs, INSURV, ATG, and TYCOM may use Appendix A to support scheduled assessments of afloat GFE programs. Table 25-2 outlines applicable sections to be assessed. Each assessing agent will have the option of expanding their assessment to other sections, if they deem necessary, based on any developing deficiency trends during the assessment. The assessing agent may elect to accept satisfactory results of another recent assessment, if it was performed within the last 3 to 6 months. Section 9 of Appendix A is the performance section that can be observed as a stand-alone event or in conjunction with planned unit drills.

Table 25-2

Periodicity	Assessing Agent	Section
Basic Phase of the Fleet Response Training Plan	ATG	Section 1, 2, 3, 5, 6, 9
Material Inspection (36 Months)	INSURV	Section 1, 2, 3, 5, 6, 9
Follow up based on assessment results	TYCOM/ISIC	All Sections

d. Suggested changes or updates can be made to the TYCOM Safety Officer.

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APPENDIX A

GAS FREE ENGINEERING PROGRAM

ASSESSMENT SHEET

Purpose: This assessment tool is comprehensive because it reviews the GFE administrative requirements, training records, equipment usage, GFE personnel performance and gas free evolutions.

Directions: This evaluation will take approximately 4 to 6 hours to complete. Review the assessment sheet in its entirety before starting. To ensure a complete and thorough assessment, applicable reference material, training records, 3-M documentation, equipment and coordinated drill observation with Ships Force personnel should be pre-arranged prior to starting the evaluation.

- If a line item requirement is met, annotate "yes" in the appropriate block.
- If a line item is not met, annotate "no" in the appropriate block.
- If a line item does not apply on the check sheet, depending on ship configuration, place not applicable (N/A) in the appropriate block.

REFERENCES.

(a) S9086-CH-STM-030/CH-074V3 - Gas Free Engineering

(b) COMNAVSUBFORINST 6000.2C - Standard Submarine Medical Procedures Manual

(c) AEL 2-880044260 - Applied Equipment List

(d) MIP 6641/007 - Detection Equipment (for submarines)

(e) MIP 6641/030 - Detection Equipment (for surface ships)

(f) MIP 5519/015 - Supplied Air Respirator (for surface ships)

(g) COMNAVSURFORINST 3502.1 - Surface Force Training Manual

Ships Name: _____Date: _____

Reference (a)	Section 1: GFE Personnel	Surface Ship	Aircraft Carrier	Submarine
(074-18.6)	Does the command have at least 1 person trained and qualified as the Afloat Gas Free Engineer?			
(074-18.8) and (074-18.11)	Review members service record. Is the designation letter signed by the CO? Is a copy of the letter in the GFE notebook?			
	What is the date of the certification/recertification letter? Date: _____			
(074-18.9)	Is the Gas Free Engineer a graduate of one of the following courses: K-495-0051, A-4G-0020, or Navy Undersea Medical Institute?			

Reference (a)	Section 1: GFE Personnel (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-18.8)	Did the Gas Free Engineer receive 40 hours On the Job Training (OJT) under the supervision of an official Afloat Maritime Gas Free Engineer or Navy Undersea Medical Institute?			
	Is the 40 hours of OJT documented?			
(074-18.8)	If the unit did not have a qualified Gas Free Engineer on board, did the CO waive (in writing) the 40 hour OJT requirement?			
	If 40 hour OJT is waived, did the Gas Free Engineer graduate from a Gas Free Engineer Course of Instruction within the last 36 months?			
(074-18.8, 074-18.9 and 074-18.11)	Does the command have an Assistant Gas Free Engineer? If so, is the Gas Free Engineer Assistant an E-6 or above and have satisfactorily completed one of the formal Gas Free Engineer training courses?			
	Review members service record. Is the designation letter signed by the CO to perform GFE functions? A copy in the GFE notebook?			
	What is the date of the certification/recertification letter? Date: _____			
(074-18.8 and 18.9)	Does the command have GFE Petty Officers (GFEPO)?			
	Is the GFEPO an E-4 or above and satisfactorily completed the formal Gas Free Engineer and Gas Free Engineering Petty Officer for Surface (Afloat) Operations Course K-495-0051?			
	Did the GFEPO complete NAVEDTRA 43704 (series) watchstation 316, under the supervision of the shipboard Gas Free Engineer?			

Reference (a)	Section 1: GFE Personnel (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-18.8 and 18.9) (Cont'd)	Does the GFEPO(s) have a designation letter signed by the CO to perform gas free engineering functions? (Review service record) A copy in the GFE notebook?			
(074-18.6)	Are there enough GFEPOs to include at a minimum, one GFEPO per ship's import/at sea fire party?			
Reference (a)	**Section 2: Recertification of Gas Free Engineering Personnel (GFEP)**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-18.10 and 074-18.11)	Were GFEP recertified annually? Is a copy of certification/recertification in the GFE notebook? Proof of certification/recertification during Medical Readiness Inspection in accordance with reference (b).			
(074-18.10)	Did GFEP demonstrate that they have satisfactorily engaged in gas free engineering evolutions during the year? **(At least 10 certificates)**			
(074-18.10)	If GFEP were not actively engaged in gas free engineering (as defined above) did they complete a minimum of five gas free evolutions OJT under the direct supervision of a certified Gas Free Engineer?			
(074-18.10) **Review how this was documented and if the method used was adequate and not over simplified just to recertify GFEP.**	If the OJT recertification methods were not feasible, did GFEP recertify based on a practical and oral or written examination, both of which sufficiently demonstrate capability?			
(074-18.10)	Did all GFEP complete refresher training in emergency rescue procedures prior to recertification? **Review training records.**			

Reference (a)	Section 2: Recertification of Gas Free Engineering Personnel (GFEP) (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-18.10) (Cont'd)	Was the periodicity of CPR refresher training in accordance with the requirements of the American Heart or American Red Cross Associations? **Review members CPR record/card.**			
Reference (a)	**Section 3: GFE Annual Program Evaluation**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-18.10)	Does the Safety Officer evaluate the Gas Free Engineering program annually?			
(074-18.10)	Did the evaluation include recertification of GFEP?			
(074-18.10)	Did the Safety Officer evaluate the CPR program for compliance and effectiveness?			
(074-18.10)	Does the Gas Free Engineer and Safety Officer maintain a record of annual evaluation results?			
Review annual evaluations. Safety Officer and Afloat Gas Free Engineer shall have copies of these evaluations.	Did the evaluation identify deficiencies of the program? If so, was a plan of action developed to rectify the deficiencies?			
Reference (a)	**Section 4: Gas Free Certification**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-18.15)	Is a gas free certificate issued for all confined space inspections or testing?			
(074-18.16)	Are the certifications maintained for a period no less than 12 months?			
(074-18.16) Appendix C of 074	Is the Gas Free Engineering notebook being maintained?			

Reference (a)	Section 4: Gas Free Certification (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(Section 20) Appendix D of 074 **If hot work was performed during the gas free evolution, validate through site visits and/or review a random sampling of certificates maintained by the Gas Free Engineer to assess hot work compliance.**	Is the gas free certification accurately filled out? Does the certification contain the following information at a minimum: - Date and time of test - Date and time of certificate expiration - Date and time of retesting and update of certificate - Signature of GFEP performing tests or retests, as applicable. - Name of the command - Location and identification of the space - The type of operation for which the certificate is requested such as hot work, spray painting, etc. - Category of conditions found to exist (e.g., "Safe for Personnel - Not Safe for Hot Work") - Requirements for conditions or operations within the space - Special conditions, as appropriate - Results of the test performed			
(074-20.5)	Are there any abnormalities of testing results? Have follow-up actions been taken on the results?			
(074-20.2, 074-20.3 and 074-20.4)	Are GFEP issuing certificates for work they are authorized to? Did the GFE/GFEA delegate testing to GFEPOs? Were all the requirements for delegating met?			
(074-18.12.B)	While inport did S/F use a NMF Gas Free Engineer or NFPA Marine Chemist to certify hot work operations within, on or immediately adjacent to (review GFE certificates): (1) Spaces that contain or last contained combustible or flammable liquids or gases. (2) Fuel tanks that contain or last contained fuel. (3) Pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or last contained fuel.			

Reference (a)	Section 4: Gas Free Certification (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-18.12.B) (Cont'd)	Did S/F seek support services from local NMF for hot work operations on these spaces?			
(074-18.12.C)	Did the afloat Gas Free Engineer consult with NMF Gas Free Engineers and/or NFPA marine chemists where DoD civilians/contractors are working in the same space or may be affected by work conducted by Ship's Force?			
(074-19.14)	Has the command ever entered into Immediate Danger to Life and Health space? If so, was it under emergency conditions?			
	Did the CO authorize the opening and entry into Immediate Danger to Life and Health spaces?			
(074-19.5)	Did personnel working in a confined space have an observer or an attendant outside the space?			
	Did outside attendants maintain communication with personnel entering or working inside confined spaces?			
Reference (a)	**Section 5: Command Training**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-18.9)	Have all hands received gas free engineering program familiarization upon reporting aboard and annually thereafter?			
(074-18.9)	Are training records maintained by the division officer or in R-ADM? MDR?			
Appendix B	Does the lesson plan cover the key elements of Appendix B for command personnel on the GFE program?			
(074-25.7) **Review drill packages**	Does the Gas Free Engineer/Gas Free Engineer Assistant provide confined space rescue training to personnel participating in confined space rescue at least semi-annually?			

Reference (a)	Section 6: Gas Free Engineering Equipment	Surface Ship	Aircraft Carrier	Submarine
Reference (c) (Refer to ships Damage Control Repair Station Applied Equipment List (AEL) and equipment AEL for total number of kits required.)	Is the gas free equipment quantity in accordance with ships/subs AEL? (Compare the Damage Control Repair Station shortage list against inventory list.) Document shortage in remarks section.			
Submarine: Refer to equipment AEL	Does the shortfall list have current requisition numbers assigned?			
(074-27.14.b) Spot check calibration gas canisters/cylinders	Is the calibration gas within the expiration date?			
Spot check chemical detection tubes.	Are there any expired chemical detection tubes?			
Detection Equipment (reference (d)) for submarines and reference (e) for surface ships.)	Review PMS 13 week file. Was the S-1/S-11 (surface ship) or Q-25 (submarine) performed? Any documented discrepancies?			
SAR/SCBA (reference (f))	Review PMS 13 week file. Has the M-1R, S-3R and A-2R been performed within periodicity and when required? Any documented discrepancies?			
Review SAR/SCBA ASA DC Material Check Sheet (reference (g))	Is the ASA check sheet filled out and is there evidence of a quarterly review by DCA/LCPO? Are there any UNSAT marks, if so, is there any corrective action(s) documented (i.e., CSMP entry, 8 o'clock report entries)?			
Reference COMUSFLTFORCOMINST 4790.3	**Section 7: JFMM Requirements for Inport GFE Operations**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
Reference (a) Or COMUSFLTFORCOMINST 4790.3 (Volume IV Chapter 25)	Did SF conduct GFE services for contractor personnel when the unit was outside U.S. territorial waters? Was this specified in the contract? Did the unit obtain TYCOM/Echelon III N43 approval prior to conducting GFE services?			

Reference COMUSFLTFORCOMINST 4790.3	Section 7: JFMM Requirements for Inport GFE Operations (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
Reference (a) Or COMUSFLTFORCOMINST 4790.3 (Volume IV Chapter 25) (Cont'd)	When in a port location without services from NMF Gas Free Engineer or NFPA marine chemist, did the afloat Gas Free Engineer seek approval to conduct certification for emergent hot work operations from the Type Commander/echelon III N43?			
	Did submarine personnel obtain GFE services from the local supporting NMF while pierside?			
	Did the tender, in a port where GFE services are not available, ensure that entry into, or hot work in or on fuel tanks, spaces in which fuel tank vents terminate, piping or equipment servicing such spaces or other confined spaces known to contain flammable fuels or fuel vapors was approved by the Commanding Officer?			
Reference (a)	**Section 8: Hot Work Annex**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-22.3) Cleaning/ventilating for Hot Work (Field observation or certificate review)	Check for confined spaces where hot work is being performed, was the space tested, inspected, emptied of flammable cargo, cleaned and ventilated and certified Safe for Hot Work?			
	Are hot work sites always inspected for combustible or flammable materials before hot work is authorized?			
	If combustible materials cannot be removed from a hot work site, what is done?			
	What method of venting is used to prevent explosions?			

Reference (a)	Section 8: Hot Work Annex (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-22.4) Fire Watch (Field observation or certificate review)	Was there a fire watch? Was the fire watch equipped with extinguishing equipment? Did the fire watch have the right personal protective equipment? Was the fire watch properly staged to extinguish a fire if it was to occur? Was there adequate number of fire watches?			
(074-22.6) Boundary Spaces (Field observation or certificate review)	Prior to hot work, how are potential adjacent space hazards controlled?			
(074-22.6.2) Pipes, Tubes, Coils (Field observation or certificate review)	Are pipes, tubes, coils or similar items which service, enter or exit a confined flushed, blown, purged or otherwise cleaned and certified Safe for Hot Work before the performance of hot work on such items?			
	Are valves to pipes, tubes or similar items closed, pipes blanked off and tagged out?			
(074-22.6.3) Hot work on Closed Containers or Structures (Field observation or certificate review)	Are hollow structures, drums, containers, jacketed vessels or similar items cleaned, flushed, purged, inerted, filled with water or otherwise made safe prior to hot work?			
	Are the items inspected, cleaned, tested and certified before performing hot work?			
	Before hot work, are items which are closed and subject to pressure build-up vented from any application of heat?			

Reference (a)	Section 8: Hot Work Annex (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074-22.6.3) Hot work on Closed Containers or Structures (Field observation or certificate review) (Cont'd)	Is the method of venting selected to prevent ignition or explosion during the venting process?			
(074-24.3)	Are the requirements for Gas Inerting operations met? Are the requirements of 074-24.3.1 followed when vent holes must be drilled?			
Reference (a)	**Section 9: Gas Free Engineering Performance (This can be assessed as a stand alone event or in conjunction with planned drills.)**	**Surface Ship**	**Aircraft Carrier**	**Submarine**
(074-27.9.1) Pre-Check of the Four Gas Analyzer	Was the four gas analyzer's battery charged and all the components inspected before use?			
	Was the sampling probe visually inspected to verify that the water barrier, filter, and O-ring in place?			
(074-27.13) Four Gas Analyzer Calibration	Before calibration, is the Four Gas Analyzer zeroed in a fresh air environment?			
	Were the four gas analyzers calibrated before each day's use?			
(074.L.4) Dreager Pump	Was the rapid opening time test performed?			
	Was the 30 minute leak test performed for model 21/31 or 15 minutes for Accuro? Was the counter zerod?			
(Section 25) Emergency Rescue Procedures (This will require a review of the section to determine if requirements were met.)	Were the procedures followed as outlined in Section 25? Annotate specific discrepancies in Remarks section.			

Reference (a)	Section 9: Gas Free Engineering Performance (This can be assessed as a stand alone event or in conjunction with planned drills.) (Cont'd)	Surface Ship	Aircraft Carrier	Submarine
(074.19.11 Testing Procedures	Was initial testing performed from outside the space by drop test or by insertion of sample probe or hoses?			
	Were the following tests conducted in the below order (may be some simultaneously depending on the instrument used)? 1. Oxygen 2. Combustible vapors/gases 3. Toxic gases			

Remarks

Assessor: _____Date: _____

VOLUME IV

CHAPTER 26

BOARD OF INSPECTION AND SURVEY INSPECTIONS POLICY

REFERENCES.

(a) OPNAVINST 4730.5 - Trials and Material Inspection (MI) of Ships Conducted by the Board of Inspection and Survey
(b) OPNAVINST 4770.5 - General Policy for the Inactivation, Retirement and Disposition of United States Naval Vessels
(c) NAVSEAINST 4790.8/OPNAVINST 4790.4 - Ships' Maintenance and Material Management (3-M) Manual
(d) NWP 1-03.1 - Naval Warfare Publication Operational Report
(e) OPNAVINST 4700.8 - Trials, Acceptance, Commissioning, Fitting Out, Shakedown, and Post Shakedown Availability of U.S. Naval Ships Undergoing Construction or Conversion
(f) INSURVINST 4730.2 - Trials and Material Inspections of Submarines
(g) INSURVINST 4730.1 - Material Inspections (MI) of Surface Ships
(h) INSURVINST 4730.11 - Preparation of Deficiency Forms
(i) INSURVINST 4730.8 - Reports of Trials, Material Inspections and Survey Conducted by INSURV
(j) INSURVINST 4730.3 - Trials of Surface Ships

LISTING OF APPENDICES.

A INSURV Plan of Action and Milestones

26.1 PURPOSE. To define the responsibilities and provide guidance for the preparation and conduct of a Board of Inspection and Survey (INSURV) Inspection.

26.1.1 Scope. The policies and actions required by this chapter are applicable to all ships of the U.S. Navy.

26.1.2 Background. INSURV was established by Title 10, U.S. Code, Section 7304, as a board of Naval Officers to make recommendations to the Secretary of the Navy as to which vessels, if any, should be stricken from the Naval register. Additionally, per reference (a), INSURV has been tasked with providing assurance to the Chief of Naval Operations (CNO) regarding the ship's material readiness and command's self-assessment effectiveness.

26.1.3 Discussion.

a. INSURV is charged with conducting four basic types of inspections.

NOTE: COMBINED TRIALS AND GUARANTEE MATERIAL INSPECTIONS (MI) ARE CONDUCTED ON SUBMARINES ONLY. ACCEPTANCE TRIALS AND FINAL CONTRACT TRIALS ARE CONDUCTED ON ALL OTHER SHIPS.

(1) Combined Trials/Acceptance Trials for new construction or conversion ships. Details are discussed in Volume I, Chapter 4 of this manual.

(2) Guarantee Material Inspection/Final Contract Trials for new construction or conversion ships. Details are discussed in Volume I, Chapter 4 of this manual.

(3) MIs are conducted on U.S. Navy commissioned ships and submarines as discussed in this chapter and reference (a).

(4) Surveys for ships scheduled for decommissioning, Retention/Mobilization or as a Foreign Military Sale. Refer to reference (b) for additional information.

b. Detailed procedures for reporting MI deficiencies in the Maintenance and Material Management (3-M) system are contained in reference (c).

c. Milestones for inspections are shown in Appendix A of this chapter.

26.1.4 Policy.

a. As designated in reference (a), material inspections are to provide assurance to Commanding Officers and higher authority that mechanisms to identify, document and resolve material deficiencies are adequate. To this end the ship will establish a program to complete administrative and organizational preparations for the INSURV inspection commencing approximately 12 months prior to the scheduled inspection. Ships shall utilize the guidance shown in Appendix A of this chapter.

b. Adequate preparation for an INSURV inspection does not imply that all deficiencies must be corrected. The goal is to present a ship that is fully aware of all existing deficiencies. All deficiencies must be properly documented and those which are considered to be mission degrading must be reported by Casualty Report (CASREP) in accordance with reference (d). Administrative preparations, in addition to deficiency documentation, must be complete and comprehensive.

26.2 RESPONSIBILITIES.

26.2.1 Type Commander. The Type Commander (TYCOM) shall:

a. Act as the cognizant authority for the conduct of INSURV inspections for all ships of the force (including new construction ships and submarines) and maintain a schedule of inspections due.

b. Nominate ships and submarines for inspections and surveys by INSURV. Promulgate schedules of inspections to be conducted by INSURV on ships of the force.

c. Schedule accomplishment of Class Maintenance Plan maintenance assessments in accordance with Volume VI, Chapter 42 of this manual.

d. Review Safety Survey results and corrective action status report provided by the ship's Commanding Officer.

e. Track and work to resolve historical issues with systems, equipment and processes identified by INSURV.

f. Coordinate with the Immediate Superior In Command (ISIC) to disseminate the best practices and lessons learned.

26.2.2 Immediate Superior In Command. The ISIC shall (TYCOM responsible if ISIC is not assigned):

a. For Surface Force Ships only, if the ISIC is deployed, the ISIC will request the numbered fleet commander assign non-deployed local Squadron to assist with inspection preparations.

b. Monitor Ship's Force preparation for the inspection.

c. Send reports per Appendix A. Surface Ships ISIC will conduct an inspection readiness assessment prior to submitting. Develop and disseminate a standardized Schedule of Events for assigned ships.

d. Ensure preparation for the sequence of accomplishing inspection underway demonstrations is conducted in advance of inspection.

e. Ensure post inspection reporting procedures are followed.

f. Attend post-INSURV inspection critiques.

g. Ensure supporting subordinate commands are prepared for the scheduled INSURV.

h. Ensure that the ship is prepared to discuss Current Ship's Maintenance Project (CSMP) deficiencies which have not been corrected, and those items which have been removed from the CSMP and passed to history.

i. Monitor the reporting and correction of inspection deficiencies through the CSMP.

26.2.3 Ship Commanding Officer. The Commanding Officer shall:

a. Ensure that the ship is prepared for the inspection.

b. Promulgate a ship wide Plan of Action and Milestones (POAM) in preparation for INSURV.

c. Be prepared to discuss with the senior member of the board any item from the previous INSURV Inspection which is still on the CSMP, all items which were determined to be not correctable and designated "pass to history", or those for which reporting had been deferred by the TYCOM, including supporting rationale and reference material.

d. Designate an officer as INSURV Coordinator and a Chief Petty Officer, preferably the 3-M Coordinator, as his assistant.

e. Assign a senior coordinator for each INSURV functional area as defined in paragraph 26.4.2.b of this chapter.

f. (Surface Force Ships Only) Submit a letter of concern to INSURV/TYCOM/ISIC.

26.2.4 INSURV Coordinator. The INSURV Coordinator shall:

a. Brief all Department Heads on the review of the CSMP, confirm existing Job Control Numbers as valid, and report any existing deficiencies which are not in the CSMP.

b. Review the Automated Work Request (AWR)/CSMP package with the TYCOM/ISIC Maintenance Document Control Office to ensure quality (e.g., readability, proper printing and page-break by Work Center).

c. Segregate the AWR originals by INSURV departmental designations for turnover to the INSURV team.

d. Provide the original of the complete CSMP Report to the INSURV team.

e. Retain a copy of the AWRs and the CSMP for use during the inspection.

f. Distribute copies of the AWRs to Department Heads and Work Centers.

g. Collect and track all INSURV deficiencies identified during the inspection.

h. Coordinate Work Center updating of the CSMP and the processing of updated OPNAV 4790/2Ks or AWRs.

26.2.5 Regional Maintenance Centers. In support of the tasking and funding, the Regional Maintenance Centers (RMC) will:

a. Provide RMC support coordination for INSURV in each home port.

b. Upon TYCOM direction, provide a weekly or, if required, daily update for critical path inspection repairs.

c. Provide or obtain subject matter experts with the experience and system knowledge for assessment to accomplish INSURV approved procedures based on the tasking, schedule and funding provided by INSURV.

d. Provide documented subject matter experts findings to, and formatted for, INSURV.

e. Utilize subject matter experts resources in the most cost effective manner to support the tasking.

f. Develop annual INSURV budget estimate based on projected INSURV schedule. Mid-Atlantic Regional Maintenance Center INSURV Support Coordinator will correlate individual estimates for transmittal to INSURV.

26.3 INSPECTION SCHEDULING.

26.3.1 Combined Trial/Acceptance Trial Inspections. The scheduling of these trials for new construction or conversion ships will be coordinated by the TYCOM and Program Executive Officer (PEO) Submarines in accordance with Volume I, Chapter 4 of this manual and reference (e).

26.3.2 Guarantee Material Inspection/Final Contract Trials. The scheduling of the Guarantee Material Inspection or Final Contract Trials will be coordinated by the PEO Ships or PEO Aircraft Carriers in accordance with Volume I, Chapter 4 of this manual and reference (e).

26.3.3 Material Inspections. Scheduling the INSURV MI at a consistent time in the Fleet Response Training Plan will provide invaluable independent assessments of how well our maintenance processes perform.

a. An INSURV MI will be included in a unit's five-year plan. The desired outcome is for INSURV's MIs to be conducted at a consistent time within the Fleet Response Training Plan, and in a manner not to interfere with carrier strike group or amphibious readiness group operations. In achieving this end state, TYCOMs will avoid scheduling INSURV MIs in the time frame between the numbered fleet commander deployment certification event (e.g., Composite Training Unit Exercise, Joint Warrior, etc.) and the end of post-deployment stand down.

   (1) Surface Force Ships. The MI will optimally be conducted after the Unit Level Training phase and prior to the start of the Integrated Level Training phase, after every other deployment, not to exceed 54 months. With these scheduling considerations, the overall average time between examinations for surface ships will be about 48-54 months.

   (2) Aircraft Carriers. The optimal time to conduct MIs is 60 to 90 days following the completion of the CNO maintenance availability. Avoid conducting MIs after the air wing is embarked for carrier qualification. With these scheduling considerations, the overall average time between examinations for carriers will be about 48-54 months, not to exceed 60 months.

   (3) Submarines. INSURV MIs are integrated into the submarine engineered operating cycle per reference (f). MIs should be scheduled post major availability and at mid-cycle. With these scheduling considerations, the overall average time between examinations for submarines will be about 65-70 months, not to exceed 84 months.

b. Conduct of INSURV MIs outside of these time frames requires approval from Commander US Fleet Forces Command/PACFLT (N43). Material inspections of surface ships and aircraft carriers that cannot be conducted within 60 months, and submarines that cannot be conducted within either 84 months or within 180 days of completion of a major CNO availability planned for greater than 180 days in duration require a formal waiver of periodicity requirements from CNO per reference (a).

c. Scheduling the INSURV inspection at a consistent time in the Fleet Response Training Plan will provide invaluable independent audits of our maintenance processes. Coordinating these inspections with TYCOM assessment events reduces the burden on our Sailors and saves money.

d. Assessment planning shall be in accordance with Volume VI, Chapter 42, paragraph 42.5.4 of this manual.

26.4 PREPARATION FOR INSURV INSPECTION.

26.4.1 Active Preparation. Ships routinely must maintain their CSMP in accurate condition and continuously monitor and accurately report their own material readiness posture per reference (d). However, due to outside agency assessments/audits/inspections/certifications the scheduling of an inspection should occur at an optimum time when full material condition awareness is maximized. Active preparation for the INSURV inspection will commence upon receipt of the TYCOM approved proposed INSURV inspection schedule. The TYCOM will notify the Commanding Officer (via the ISIC if applicable) of the proposed dates with specific guidance for the preparation and execution of the inspection. Direct and early liaison with the INSURV is essential to ensure agenda approval, facilitate travel arrangements, berthing and other similar items. Ships shall make use of the information and data available at the INSURV website (http://www.public.navy.mil/fitfor/insurv) to better understand and prepare for an inspection. Ships are strongly encouraged to liaison with INSURV regarding current material problem areas that may exist within the fleet and to actively resolve them as appropriate within their own command.

26.4.2 Ship's Internal Organization. The ship will establish an internal organization for the INSURV. While the details of such an organization will vary from ship to ship, two key elements must be addressed:

a. Specific personnel assignments shall be made to ensure that all necessary logistic and support arrangements for the INSURV are adequately covered (e.g., transportation, berthing, laundry, clerical assistance).

b. INSURV inspects by functional areas, which may not exactly correspond to the standard ship's organization. For purposes of the inspection, the ship will assign one-to-one correspondence for each inspector, with a senior coordinator for each INSURV functional area. Assigned individuals should be thoroughly familiar with each CSMP deficiency, show the inspector exactly where the deficiency is, be able to explain why it has not been corrected and answer questions about related items in the same category, etc. Knowledgeable ship's representatives are essential for a successful inspection.

26.4.3 Updating the Current Ship's Maintenance Project.

a. The CSMP must be reviewed, updated and purged of all completed maintenance actions. All outstanding corrective maintenance should be documented as a deferral. This evolution is important since the CSMP is the primary source of deficiencies that will be presented to INSURV. A vital part of the review is to ensure that deficiencies are properly assessed and documented.

b. Any deficiencies noted during the pre-inspection audit will be entered in the CSMP and reissued for final INSURV documentation.

26.5 BOARD OF INSPECTION AND SURVEY INSPECTION CONDUCT AND DOCUMENTATION.

26.5.1 Inspection Conduct. The inspection will be conducted as specified in reference (g) for surface ships and reference (f) for submarines.

a. Flight operations (if applicable) and other ship evolutions will not be scheduled during the conduct of the inspection, except when scheduled in direct support of the inspection or when specifically requested by INSURV.

b. A proposed "open and inspect" list will be submitted to the ship's assigned senior coordinator for each INSURV functional area no later than the start of the underway portion of the inspection. The senior INSURV member may modify the "open and inspect" list at any time.

26.5.2 Deficiency Documentation.

a. Preparation of INSURV deficiency forms will be in accordance with references (c), (h) and this instruction.

b. INSURV will provide the ship with a copy of new deficiencies found during the inspection.

c. The final forms generated by INSURV will be screened by the TYCOM following the inspection. Whenever an item is considered not cost-effective to correct or is inconsistent with reference (c), the TYCOM will authorize passing the item to the history file.

d. Deficiencies corrected while INSURV is on board are still required to be properly documented.

26.6 POST BOARD OF INSPECTION AND SURVEY INSPECTION ACTIONS.

26.6.1 Deficiency Processing and Resolution.

a. INSURV deficiencies will be reported by entering them into the ship's CSMP within 30 days following completion of the inspection (90 days for Naval Air Force ships).

b. Upon completion of the INSURV inspection, Ship's Force shall take the following actions:

(1) With TYCOM assistance, screen all INSURV deficiencies. Identify those which are mission degrading or safety items.

(2) Initiate prompt action on all mission degrading and safety items. All Part I "Mission Degrading" items and any additional items that are deemed to significantly degrade the ability of the ship to carry out its assigned mission shall be documented by an appropriate CASREP in accordance with reference (d).

(3) Correct all deficiencies within the capability of Ship's Force as soon as possible. Deficiencies corrected within seven days shall be documented as completed maintenance actions. All other outstanding deficiencies originated by INSURV shall be incorporated into the CSMP as soon as possible but no later than 30 days following the inspection.

(4) Modify deficiencies previously identified and processed to include the assigned INSURV number and any modifications, in accordance with the requirements of reference (c).

(5) Comply with the requirements of reference (c) if instances occur where INSURV enters multiple deficiencies under a single INSURV number.

26.6.2 Post INSURV Inspection Reports. INSURV will issue a final report in accordance with reference (i). The report will contain a recommendation on the material condition of the ship in accordance with reference (a).

26.6.3 Unsatisfactory Finding. Upon a finding of "Unsatisfactory" by the Board of Inspection and Survey:

a. The ship shall submit by message to the ISIC/TYCOM, an analysis of the causes of the Part I deficiencies found during the INSURV inspection and a plan of corrective actions within one week after completion of the inspection. This plan should include estimated completion dates for the corrective actions that will be performed by the ship. For corrective actions that are deferred to a Fleet Maintenance Activity, the Naval Supervising Activity Lead Maintenance Activity shall provide to the ship and the TYCOM estimates or recommended dates for the corrective actions that will be performed by the Fleet Maintenance Activity.

b. The TYCOM will coordinate and direct all actions associated with restoring the ship to operational readiness for those Part I deficiencies judged unsatisfactory or incomplete by INSURV. The TYCOM shall submit to the appropriate chain of command a POAM to correct these Part I deficiencies and restore the ship to operational readiness. In addition, the TYCOM shall:

(1) Evaluate the ship's and ISIC preparations for the INSURV inspection.

(2) Review corrective actions and training plans submitted by the ship. Ensure these plans not only correct the specific deficiencies noted by INSURV, but that they also address the fundamental underlying causes of the deficiencies.

(3) Take action as required to assist in correcting the Part I deficiencies (e.g., scheduling, outside technical assistance, training, etc.).

(4) Re-examine those areas that were judged unsatisfactory or incomplete within 60 days of the completion of the INSURV inspection. Report the results to the appropriate chain of the command and to INSURV.

(5) Report by message to the appropriate Fleet Commander when the ship is adequately restored to operational readiness.

APPENDIX A

INSURV PLAN OF ACTION AND MILESTONES

MILESTONE	DUE	RESPONSIBLE ACTIVITY
Notify Ship of Scheduled INSURV	I-365 days	TYCOM
(Naval Surface Forces) Maintenance Team define and schedule assessments desired prior to INSURV	I-365 days	Ship/RMC
Develop Departmental/Ship's Plan of Action and Milestones (POAM) for INSURV Preparation	I-330 days	Ship
Begin Review and Update of Current Ship's Maintenance Project	I-180 days	Ship
(Naval Air Forces) Download applicable INSURV instructions and check sheets and distribute to Ship's Force	I-180 days	Ship
Review Previous Inspection Reports (INSURV, Initial Assessment/Underway Demonstration, etc.)	I-180 to I-90 days	ISIC/Ship
Update Ship's POAM verify on track	I-180 days	Ship
Identify Ship's INSURV Coordinator to INSURV	I-180 days	Ship
Develop program to conduct/practice INSURV material checks and identify/correct training deficiencies	I-180 days	Ship
Schedule INSURV pre-brief	I-120 days	Ship
Download applicable INSURV instructions and check sheets and distribute to Ship's Force	I-120 days	Ship
INSURV Package delivered to Ship	I-120 days	INSURV
(Naval Air Forces) Develop and send linked events request message from TYCOM to INSURV	I-120 days	TYCOM/Ship
Provide hull baseline tasking to RMC	I-90 days	INSURV
Update Ship's POAM verify on track	I-90 days	Ship
Conduct INSURV pre-brief	I-90 to I-60 days	INSURV/Ship
Conduct Pre-Trial Self Audit	I-60 days	(TYCOM/ISIC)/Ship
Update CSMP following Self Audit	I-60 to I-45 days	Ship

MILESTONE	DUE	RESPONSIBLE ACTIVITY
Send 45-DAY INSURV readiness status message to TYCOM. Message should describe the ship's level of preparedness for INSURV, significant issues and CASREPs, significant preparations and grooms, and the ISIC's determination of the ship's readiness for the inspection	I-45 days	ISIC/Ship
Utilizing INSURV proposed trial/inspection Summary of Events agenda listed in references (f) and (g) (reference (j) for new construction), submit trial/inspection Summary of Events agenda to INSURV/RMC	I-45 days	Ship
INSURV tasking requirements to RMC locked	I-45 days	INSURV/RMC
For all surface ships, complete and deliver CO letter of concerns to INSURV (copy to TYCOM)	I-45 days (Naval Surface Forces)I-30 days (For Naval Air Forces)	Ship
INSURV tasking requirements to RMC locked	I -45 days	INSURV/RMC
(Naval Air Forces) Develop and send readiness to conduct inspection message from TYCOM to INSURV including embarkation points, security clearance forwarding data, and other pertinent event notices such as time of check in for underway personnel.	I-30 days	TYCOM/Ship
Send update 14-DAY INSURV readiness status message to TYCOM N43. Message should describe the ship's level of preparedness for INSURV, significant issues and CASREPs, significant preparations and grooms, and the ISIC's determination of the ship's readiness for the inspection	I-14 days	ISIC
RMCs provide subject matter expert names to ship/INSURV	I-7 days	RMC
RMC ensure timely subject matter expert support	I-0	RMC
Submit CASREPs as appropriate; Enter all Mission Degrading and Safety Deficiencies into CSMP	I+1 day	Ship
Report the ship's return to port and any significant results to TYCOM N43	I+1 day	ISIC/TYCOM Rep

MILESTONE	DUE	RESPONSIBLE ACTIVITY
Report the time ship cleared for underway to TYCOM N43	I+2days	ISIC
Enter all Deficiencies into CSMP	I+30 days	Ship
Report status of INSURV Part I and Part I Safeties to RMCs and TYCOM	I+30 days	Ship/ISIC
Screen Remaining Deficiencies and assign Responsible Actions	I+45 days	ISIC/Ship
Submit Lessons Learned to TYCOM	I+45 days	ISIC
Submit Pass to History Items	I+120 days	Ship
Report status of all of Part I and Part I-S Safeties to RMCs and TYCOM until all deficiencies are completed	15 Jun and 15 Dec	Ship/ISIC

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VOLUME IV

CHAPTER 27

REBOILER INSPECTION

REFERENCES.

(a) NAVSEA S9534-AD-MMA-010 - Steam Reboiler Maintenance
(b) OPNAVINST 9220.3 - Propulsion and Auxiliary Plant Inspection and Inspector Certification Program
(c) NAVSEA STD DWG 514-8316912 - CVN 68 Reboiler Strength and Integrity Inspection
(d) NWP 1-03.1 - Naval Warfare Publication Operational Report
(e) OPNAVINST 5100.19 - Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat
(f) NAVSEA S9086-CH-STM-030 - NSTM Chapter 074 V3 (Gas Free Engineering)
(g) NAVSEAINST 9254.1 - Eddy Current Inspection of Condensers and Reboilers on Nuclear Vessels

LISTING OF APPENDICES.

A Sample Steam Reboiler Inspection Request
B Sample Inspection Confirmation Message
C Sample Steam Reboiler Inspection Report Cover Letter
D Sample Boiler Inspection RBO/Severely Degraded Deficiencies Message

27.1 PURPOSE. To establish policy and provide procedures and inspection requirements for Steam Reboilers and support systems, including:

a. Inspection scheduling.

b. Required preparations for inspections.

c. Inspection guidelines.

d. Reporting requirements.

27.1.1 Policy. Periodic standardized inspections are required of all Steam Reboiler and associated support systems including outlet and inlet steam piping, safety devices, feed water and drain systems, control and indicating systems associated with maintaining system pressure and water level controls. Specific inspection criteria, attributes and intervals are detailed in references (a) and (b). Inspections will be conducted by a certified Steam Generating Plant Inspector (SGPI), Naval Surface Warfare Center, Carderock Division (NSWCCD) inspector and Ship's Force in accordance with the requirements of references (a) and (b). Responsibilities for standardization of Steam Reboiler inspections will closely parallel those requirements and responsibilities of the boiler inspection program described in reference (b), as modified by references (a) and (c).

27.2 TYPES OF INSPECTIONS.

a. First six months operating.

b. Second six months operating.

c. Third six months operating.

d. Annually.

e. Eddy current inspections.

f. Routine.

g. Start of Availability Inspection (SAI).

h. Strength and Integrity.

i. Completion of Availability Inspection (CAI).

j. Special.

k. Industrial Support Visit (ISV).

l. Inactivation or Reactivation Inspection.

m. Post Shakedown Availability New Construction.

27.3 RESPONSIBILITIES.

27.3.1 Naval Sea Systems Command. Naval Sea Systems Command (NAVSEA) shall provide Technical Authority oversight for all Steam Reboilers and associated equipment. The designated NAVSEA Technical Warrant Holder shall:

a. Approve all major Departure From Specifications (DFS).

b. Provide technical oversight and management of the SGPI and NSWCCD Life Cycle Engineering Manager (LCEM).

c. Establish and enforce requirements for SGPI certification and recertification.

d. Ensure periodic SGPI seminars are conducted.

e. Maintain the Steam Reboiler Inspection and Repair Management Information System (RIRMIS).

f. Routinely evaluate and ensure state of the art inspection, maintenance and repair tools and techniques are used.

27.3.2 Naval Surface Warfare Center, Carderock Division.

a. Provide support to NAVSEA for the SGPI and NSWCCD-LCEM programs. Ensure that the required technical documentation to support the SGPI/NSWCCD-LCEM Inspector program is maintained current.

b. Establish and monitor the requirements and standards for routine and industrial inspections of Steam Reboilers.

c. Develop, implement and maintain a program to train and certify NSWCCD-LCEM inspectors in accordance with reference (b).

d. Ensure that inspection of newly constructed ships and ships undergoing major overhaul and/or conversion are conducted in accordance with this instruction.

e. Conduct periodic technical audits of the SGPI Training Course per reference (b).

f. Provide management of technical data, Reboiler history and the associated repair management information database.

g. Provide technical support to the SGPI seminars.

h. Maintain a roster of all certified SGPIs by name, rating, duty station, date of certification and expiration date of certification. Recommend inspector certification and initiate action to decertify inspectors who fail to comply with the requirements of reference (b).

i. Ensure that the requirements for SGPI certification, recertification and certification extensions are met prior to final approval.

j. Conduct SAI/ISV, Strength and Integrity Inspections, CAI and special inspections as specified in section 27.5 of this chapter and reference (b).

27.3.3 Type Commander.

a. Arrange for certified SGPIs to perform inspections in accordance with the requirements of references (a) and (b).

b. Schedule inspections of all Steam Reboilers and support systems required by reference (a). Coordinate the inspections with the appropriate technical activities to avoid unnecessary opening of Steam Reboilers.

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.

b. The ISV inspection will be performed by an NSWCCD inspector accompanied by a certified SGPI.

27.6.6 Completion of Availability Inspection. The CAI will be conducted prior to final close out of the Steam Reboiler.

a. The CAI inspection will be scheduled by the industrial activity or supervising authority as applicable.

b. The CAI will be performed by an NSWCCD inspector accompanied by a certified SGPI, preferably the SGPI who conducted the SAI.

27.6.7 Inactivation or Reactivation. The Inactivation/Reactivation inspection shall be conducted on all Steam Reboilers prior to the completion of the inactivation/reactivation.

a. The Inactivation/Reactivation inspection will be scheduled by the industrial activity, Supervising Authority and Inactive Ship Facility as applicable.

b. The Inactivation/Reactivation inspection will be performed by an NSWCCD inspector and the cognizant SGPI.

27.6.8 Special Inspection. An additional Steam Reboiler inspection when the TYCOM desires to assess the material condition of the Steam Reboilers.

27.6.9 Annual Inspection. An Annual inspection of the Reboiler (shell side) will be conducted, as directed by references (a) and (b), by Ship's Force.

27.6.10 Operational Assessments. An operational assessment shall be accomplished prior to and at the completion of all Chief of Naval Operations scheduled maintenance availabilities. These assessments are part of the Routine Strength and Integrity inspection requirements. These assessments will include both cold and hot plant in-port safety checks and an operational evaluation. Detailed assessment requirements are specified in MRC 5173/001.

27.7 REBOILER INSPECTION GUIDELINES AND REPORTS.

27.7.1 Guidelines.

a. Inspections conducted under paragraph 27.6.3 of this chapter normally encompasses the pressure vessel portion of the Steam Reboiler and associated piping connections as outlined by reference (c) and is conducted by NSWCCD-Ship System Engineering Station (SSES) inspectors accompanied by a certified SGPI. Other areas such as, Steam Reboiler controls and Steam Reboiler appurtenances, must be inspected as part of the Routine inspection prior to Steam Reboiler lite-off by a certified SGPI. Inspections to coincide with ECIs or tube renewals.

b. Routine inspections of Steam Reboilers will be conducted by certified SGPIs.

c. All Repair Before Operating (RBO) items shall be corrected and re-inspected by a certified SGPI or NSWCCD-LCEM inspector, and preferably by the same SGPI/NSWCCD-LCEM inspector who originally identified the discrepancy prior to operation of the Reboiler. RBO discrepancies include those for which continued unrestricted operation could endanger personnel. RBOs may not be departed via DFS. If there is not an immediate or near future danger to personnel, the discrepancy shall be assigned as SEVERELY DEGRADED with major operational restrictions.

d. Whenever Steam Reboilers are in a stand down status for routine maintenance or disassembly, an inspection should be conducted simultaneously. Prepare the Steam Reboiler as described in section 27.8 of this chapter for inspection of the Steam Reboiler shell watersides and Steam Reboiler controls and appurtenances.

e. All deficiencies should be corrected as soon as possible, consistent with good engineering practices.

27.7.2 Reports.

a. The SGPI shall provide an oral critique and preliminary report to the ship's Commanding Officer or his designated representative. The report will contain the findings of the inspection, with note of recurring discrepancies from previous inspections.

b. The Senior inspector will forward a copy of the RIRMIS report with cover letter per sample shown in Appendix C to the ship's Commanding Officer no later than ten days after completion of all discrepancies.

c. The SGPI shall report all RBO deficiencies discovered during the inspection to the TYCOM and ship's Commanding Officer by message, using the format in Appendix D, within 24 hours.

d. The SGPI shall report by message to the TYCOM the correction and re-inspection of all RBO deficiencies prior to lighting off an inspected Steam Reboiler.

e. The ship's Engineering Officer shall report corrected deficiencies, by message, to the TYCOM within 30 days of the completed inspection. A corrected RIRMIS report will be provided to the ship after the RIRMIS status codes are updated.

f. The ship's Commanding Officer shall notify the TYCOM when a scheduled Steam Reboiler inspection cannot be conducted by submitting a DFS request. State the reason why the inspection cannot be conducted and recommend a revised date.

27.8 STEAM REBOILER INSPECTION PREPARATION.

a. Demonstrate the performance of the controls to the SGPI assigned to conduct the inspection. Conduct this demonstration when engineering status can support.

b. Wire shut and danger tag all steam and water valves to the Steam Reboiler using the Steam Plant Manual and reference (a) as guidance.

c. Open manway, ventilate and gas free. Notify SGPI that watersides are available for inspection. The purpose of this inspection is to assess the effectiveness of the Steam Reboiler chemistry control procedures. Detailed waterside inspection will be conducted after completion of cleaning if determined by the inspector that a cleaning is necessary. Mechanically clean watersides to be inspected.

d. Install temporary plugs in all nozzles, to prevent foreign debris from entering piping systems.

27.9 STEAM REBOILER INSPECTION.

27.9.1 Steam Reboiler Inspection Forms. Steam Reboiler inspections will be conducted using the appropriate RIRMIS forms. Include specific comments on the state of preservation and material condition of the Steam Reboiler.

27.9.2 Steam Reboiler Inspection Areas. The following areas are closely inspected for possible RBO deficiencies. RBO deficiencies may include but are not limited to the following:

a. Inoperative/misadjusted safety devices.

b. Lube oil contamination of control systems.

c. Control equipment inoperable in their automatic mode or failed cold checks.

d. Steam Reboiler that does not pass design hydrostatic test.

e. Non-deferrable defects/indications in the pressure vessel boundary.

f. Ultra-sonic tests on pressure vessel piping that are below minimum requirements, or when visual inspection dictates replacement.

g. Tube leakage or unsatisfactory ECI results.

27.9.3 Completion of Inspection. An oral critique and a preliminary inspection report, including a summary of restrictive deficiencies, will follow the inspection. Paragraph 27.7.2 of this chapter identifies official reporting requirements.

27.10 STEAM REBOILER CONTROL SYSTEMS/ONLINE VERIFICATION GUIDELINES. Control systems which include steam pressure and water level controls have been designed and installed for the purpose of maintaining a steady pressure and volume of low pressure steam throughout the hotel steam piping system.

a. Ships shall use controls at all times while the reboiler is in operation. Manual operation shall be used when the reboiler is lit-off and while securing. When the Automatic Boiler Control system cannot be operated in automatic, this fact shall be reported by a Casualty Report message. Prior to operating the reboiler, all applicable testing shall be completed.

b. Maintenance and calibration of the Automatic Boiler Control systems shall be accomplished by qualified technicians in accordance with the direction provided in applicable PMS and the manufacturer's technical manual.

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APPENDIX A

SAMPLE STEAM REBOILER INSPECTION REQUEST

FM USS (SHIP'S NAME AND HULL NO)//
TO: RMC//
INFO//
COMNAVAIRPAC/COMNAVAIRLANT//
NSWCCD//
COMNAVSEASYCOM WASHINGTON DC//
PEO CARRIERS WASHINGTON DC//
BT
UNCLAS//
MSGID/GENADMIN/USS (SHIP'S NAME HULL NO)//
SUBJ/REQUEST FOR ROUTINE REBOILER INSPECTION//
REF/A/DOC/COMUSFLTFORCOMINST 4790.3//
AMPN/REF A IS THE JOINT FLEET MAINTENANCE MANUAL//
GENTEXT/REMARKS/1. PER REF A REQUEST RMC PROVIDE A CERTIFIED SGPI TO ACCOMPLISH ROUTINE REBOILER INSPECTION OF (NUMBER) REBOILER.
2. REQUEST PRIMARY INSPECTION START DATE OF (PROVIDE DATE) AND AN ALTERNATE START DATE OF (PROVIDE DATE).//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAIN LANGUAGE ADDRESS DIRECTORY (PLAD) IS UTILIZED.

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APPENDIX B

SAMPLE INSPECTION CONFIRMATION MESSAGE

FM RMC (COMMAND)//
TO USS (SHIP'S NAME HULL NUMBER)//
INFO COMNAVSURFFOR//
COMNAVAIRPAC/COMNAVAIRLANT//
ISIC//
COMNAVSEASYSCOM WASHINGTON DC//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
BT
MSGID/GENADMIN/
SUBJ/INSPECTION DATE CONFIRMATION//
REF/A/MSG/USS (SHIPS NAME HULL NUMBER)/DTG REQUEST//
REF/B/DOC/COMUSFLTFORINST 4790.3//
NARR/REF A IS REQUESTING REBOILER INSPECTION. REF B IS COMUSFLTFORCOMINST 4790.3 VOL IV, CHAP 27 DEFINING JOINT FLEET REBOILER INSPECTION CRITERIA AND PROCEDURES.//
POC/SENIOR SGPI/RATE/UIC/LOC:CITY /TEL:/DSN//
RMKS/1. IN RESPONSE TO REF A, AN (TYPE) REBOILER INSPECTION WILL BE CONDUCTED IAW REF B BEGINNING (DATE) ON NUMBER ( ) REBOILER. ONE OR MORE OF THE FOLLOWING CERTIFIED INSPECTORS ARE ASSIGNED TO CONDUCT THE INSPECTIONS:
INSPECTOR NAME/RATE//LAST 4//CLEARANCE.
2. POC E-MAIL ADDRESS IS: SENIOR SGPI//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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APPENDIX C

SAMPLE STEAM REBOILER INSPECTION REPORT COVER LETTER

From: Commander, (Regional Maintenance Center)
To: Commanding Officer, USS (Ship's name and Hull No.)

Subj: (Routine, etc.) Inspection of Catapult(s) Number(s)

Ref: (a) COMUSFLTFORCOMINST 4790.3, Joint Fleet Maintenance Manual

Encl: (1) RIRMIS Report (Number Steam Reboiler)

1. (Parent Command) Steam Generating Plant Inspector(s) (Inspector's Name) inspected Steam Reboiler(s) Number(s) in USS (Ships Name and Hull No) on (date) while (ship's location).

2. Discrepancies, which require corrective action, are outlined in enclosures (Number of Enclosures).

3. Advance copies of Enclosure(s) have been delivered to the Ship's Commanding Officer

4. (Command) point of contact is (Senior Inspector), Code (Number), commercial telephone, (Number), DSN (Number) e-mail address is: (Address)

COPY TO (W/ENCL):
COMNAVAIRPAC
COMNAVAIRLANT
USS (Name Hull Number)

COPY TO (W/O ENCL):
NSWCCD-SSES (C922)

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APPENDIX D

SAMPLE REBOILER INSPECTION

RBO/SEVERELY DEGRADED DEFICIENCIES MESSAGE

FM COMMANDING OFFICER, REGIONAL MAINTENANCE CENTER//
TO USS (SHIP'S NAME AND HULL NO.)//
INFO TYCOM//(AS APPROPRIATE)//
ISIC//(AS APPROPRIATE)//
COMNAVSEASYSCOM WASHINGTON DC//
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//
BT
UNCLAS//N09221//
MSGID/GENADMIN/COMMANDING OFFICER, REGIONAL MAINTENANCE CENTER//
SUBJ/USS (SHIP'S NAME AND HULL NO.) NR (1, 2) ROUTINE/STRENGTH AND INTEGRITY INSPECTION (AS APPROPRIATE)//
REF/A/DOC/COMUSFLTFORCOMINST 4790.3//
REF/B/DOC/NAVSEAINST 4790.8/OPNAVINST 4790.4//
NARR/REF A IS JOINT FLEET MAINTENANCE MANUAL VOL IV CH 27 AND PROVIDES GUIDANCE FOR REBOILER INSPECTIONS. REF B IS 3-M MANUAL AND PROVIDES GUIDANCE FOR CSMP DOCUMENTATION//
RMKS/1. REBOILER NUMBER (1, 2) ROUTINE/STRENGTH AND INTEGRITY (AS APPROPRIATE). INSPECTION CONDUCTED (DATE) BY (INSPECTOR'S NAME) WHILE (SHIP'S LOCATION). RBO DEFICIENCIES AND PROPOSED CORRECTIVE ACTIONS ARE REPORTED IAW REF A AS FOLLOWS:

A. (RIRMIS ITEM NO, DEFICIENCY, REPAIR, ETC.)
B.
C.

2. REBOILER NUMBER (1, 2) SHALL NOT BE STEAMED UNTIL ABOVE LISTED DEFICIENCIES ARE CORRECTED AND A REINSPECTION IS CONDUCTED IAW REF A.
3. SEVERELY DEGRADED DEFICIENCIES AND PROPOSED CORRECTIVE ACTION ARE REPORTED IAW REF A AS FOLLOWS:

A.
B.
C.

4. SEVERELY DEGRADED DEFICIENCIES ARE REQUIRED TO BE CORRECTED PRIOR TO STEAMING OR MUST BE SUBMITTED FOR MAJOR DEPARTURE FROM SPECIFICATION (DFS).
5. IAW REF A, DEFICIENCIES COMPLETED SHALL BE REPORTED EVERY 30 DAYS USING THE GUIDANCE PROVIDED IN VOLUME 4, CHAPTER 3, APPENDIX F. ALL DEFICIENCIES HAVE BEEN DOCUMENTED IN THE SHIPS CSMP FOR CORRECTIVE ACTION IAW REF B.//
BT

NOTE: ENSURE MESSAGES ARE IN ACCORDANCE WITH CURRENT MESSAGE FORMAT AND CURRENT PLAD IS UTILIZED.

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