

JOINT FLEET MAINTENANCE MANUAL
VOLUME V
QUALITY MAINTENANCE
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| AEL | Allowance Equipage List |
| AIT | Alteration Installation Team |
| APL | Allowance Parts List |
| AQAO | Assistant Quality Assurance Officer |
| ASW | Auxiliary Sea Water |
| AWP | Availability Work Package |
| CA | Coordinating Activity |
| CAD | Certifying Activity Designator |
| CD ROM | Compact Disc Read Only Memory |
| CET | Carrier Engineering Team |
| CI | Critical Cleanliness Inspection |
| CMH | Controlled Material Handler |
| CMPO | Controlled Material Petty Officer |
| COSAL | Coordinated Shipboard Allowance List |
| CRA | Chemistry and Radiological Controls Assistant |
| CSB | Certification Signature Block |
| CSMP | Current Ship's Maintenance Project |
| CWP | Controlled Work Package |
| DDGOS | Deep Diving General Overhaul Specifications |
| DFS | Departure from Specification |
| DL | Deficiency Log |
| DMAC | Diagnostic and Maintenance Computers |
| DMP | Depot Modernization Period |
| DSS | Deep Submergence System |
| DSW | Diesel Sea Water |
| ECD | Estimated Completion Date |
| eDFS | Electronic Departure from Specification |
| EDSRA | Extended Docking Selected Restricted Availability |
| EHF | Electrical Hull Fitting |
| EMBT | Emergency Main Ballast Tank |
| EOH | Engineered Overhaul |
| ERO | Engineered Refueling Overhaul |
| ET | Eddy Current Testing |
| FBR | Feedback Report |
| FBW SCS | Fly-By-Wire Ship Control System |
| FMA | Fleet Maintenance Activity |
| FRC | Federal Records Center |
| FWP | Formal Work Package |
| GSO | General Specifications for Overhaul of Surface Ships |
| HFP | Horizontal Fixed Pipe |
| ICAR | Immediate Corrective Action Report |
| ID | Identification |
| ISEA | In-Service Engineering Activity |
| ISIC | Immediate Superior in Command |

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| JCN | Job Control Number |
| JFMM | Joint Fleet Maintenance Manual |
| JID | Joint Identification Number |
| JSN | Job Sequence Number |
| LAR | Liaison Action Request |
| LI | Level I |
| LOEP | List of Effective Pages |
| LPO | Leading Petty Officer |
| LWC | Lead Work Center |
| MB | Megabyte |
| MCD | Material Control Division |
| MCR | Maintenance Certification Record |
| METCAL | Metrology and Calibration |
| MIC | Material Identification and Control |
| MIL-SPEC | Military Specification |
| MIL-STD | Military Standard |
| MOA | Memorandum of Agreement |
| MP | Maintenance Procedure |
| MRC | Maintenance Requirement Card |
| MS | Maintenance Standard |
| MSW | Main Sea Water |
| MT | Magnetic Particle Testing |
| NA or N/A | Not Applicable |
| NACE | National Association of Corrosion Engineers |
| NAVAIR | Naval Air Systems Command |
| NAVICP | Naval Inventory Control Point |
| NAVIMFAC | Naval Intermediate Maintenance Facility |
| NAVSEA | Naval Sea Systems Command |
| NAVSEA 08 | NAVSEA Nuclear Propulsion Directorate |
| NAVSEALOGCEN | Naval Sea Logistics Center |
| NAVSUP | Naval Supply Systems Command |
| NDT | Nondestructive Test |
| NEC | Navy Enlisted Classification |
| NIIN | National Item Identification Number |
| NNPI | Naval Nuclear Propulsion Information |
| NPS | Nominal Pipe Size |
| NRO | Nuclear Repair Officer |
| NRP | Nuclear Repair Part |
| NSDSA | Naval Systems Data Support Activity |
| NSF | Nuclear Support Facility |
| NSN | National Stock Number |
| NSTM | Naval Ships' Technical Manual |
| OOP | Out Of Position |
| OPNAV | Naval Operations |
| OQE | Objective Quality Evidence |
| OSIC | On Site Installation Coordinator |
| P&E | Planning and Estimating |
| PLAD | Plain Language Address Directory |
| PMS | Planned Maintenance System |
| POC | Point Of Contact |

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| SUBSAFE System (Cont'd) | d. SUBSAFE systems are shown in the SUBSAFE Certification Boundary Book. |
| Surveillance | Observations and analysis of actual work procedures and methods to verify compliance with technical requirements. |
| System | All components, piping, fittings, including electrical and mechanical items, which together form and contribute to the operation of an integrated functional arrangement. The "system" as used in this manual is not limited to piping only unless "piping" is specified. Any part which receives the fluid, controls, or is controlled by the fluid is included. |
| System Design Pressure (Non-Nuclear) | System design pressure is the pressure used in the calculation of piping and piping components minimum wall thickness and will not be less than the maximum system pressure (for general guidance, design pressure may be estimated within 2 to 3% by multiplying maximum operating pressure by 112%). |
| Target Material or Project Target Material | As defined in NAVSEA S9213-45-MAN-000 and SPCCINST 4440.376. All material issued with a "Project Target Ready-For-Issue" tag for use as Nuclear Level I is either X1, X2 or X4 SMIC coded. |
| Technical Data | Recorded information (regardless of the form or method of recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. The term includes recorded information of a scientific or technical nature that is included in computer databases. For these purposes, technical data includes the characteristic of a particular science, trade or profession. |
| Technical Repair Standard | See Maintenance Standard. Document which provides minimum requirements for the acceptable repair and refurbishment of submarine equipment and components and identifies planned and contingency material necessary to ensure satisfactory operation until the next planned maintenance action. |
| Technical Variance Documentation | Technical Variance Documentation is documentation used to document configuration changes made during an overhaul or refit that influence a maintenance, alteration and repair, but will not be incorporated in a revision to a drawing as accomplished on the ship (SSN 688 Class, SSBN/SSGN 726 Class, and S5W Reactor Plant). |
| Technical Work Document | The work procedure that will provide the craftsman with clear, concise and technically correct instructions to complete the maintenance task while conforming to technical specifications. Technical Work Documents consist of three general types: Maintenance Procedures, Formal Work Packages and Controlled Work Packages. |
| Test Depth | For the purpose of the proper method of measuring and specifying Test Depth, the following applies: Test Depth shall be measured to the bottom of the keel for all types of submarine operations. Builders trials and trials following major industrial activity availabilities greater than six months, shall be at a tolerance of plus zero (0), minus twenty (20) feet of Test Depth when specified. All other trials can be conducted at 95% to 100% of Test Depth to satisfy all the requirements specified for 100% Test Depth. |

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| Test-Drop | A pressure test used to determine the integrity of a system. It is performed upon satisfactory completion of the strength and porosity hydrostatic test and is accomplished by pressurizing the system to its system working pressure while it is arranged for normal operation. Pressure is applied using either air or an inert gas as applicable. The test is held and monitored for a specified period of time and the system tightness is determined by correcting the pressure drop for temperature change. |
| Test Equipment/Working Level Instruments | For purposes of this manual, test equipment will be interpreted as comprising all general purpose equipment (standard measuring instruments), special testing equipment, including such classes as checkout equipment, acceptance equipment, inspection equipment, gauges and associated accessories. |
| Test-Hydrostatic | A test where the system or a portion of the system is filled with fluid and pressurized above normal operating pressure to a specified hydrostatic test pressure and inspected for leaks and visible permanent deformation. |
| Test-Joint Completion | See Test-Mechanical Joint Tightness. |
| Test-Mechanical Joint Tightness | A pressure test where a portion of a system or the entire system is pressurized to its system nominal operating pressure or "J" test pressure to determine leak tightness after closing a mechanical joint where leak tightness is obtained by gaskets, seal welding or threads. |
| Test-Operational | (Non-Nuclear) <ul style="list-style-type: none"> a. A test of a system to nominal operating pressure using the system fluid, pumps and installed system gages vice test instrumentation to determine leak tightness; and/or b. A test of a system to assure that all items, components, controls and indications function as designed and in accordance with specifications. |
| Test-Pneumatic | A test where a portion of the system or the entire system is pressurized with gas and inspected for leaks. |
| Test Pressure Drawing | Drawings which have been developed from system diagrams for classes of submarines and contain strength and mechanical joint tightness pressures for all portions of piping systems. These pressures are displayed in "indicators" which contain two test pressure values as illustrated in the Submarine Non-Nuclear Piping Systems Test Manual, NAVSEA S9505-AF-MMA-010/PIPING SYSTEMS. |
| Test-Shop | A test performed on a section of piping or a system by an FMA work center when the subassembly piping or component is not installed in an onboard system. |
| Test-Soap | A method of determining the tightness of a system by applying a soap and water solution to the system joints while the system is being either pressure or vacuum tested. The test is held a sufficient length of time to permit a thorough examination for leaks. When vacuum testing the leak, the testing solution should be compatible with the system to preclude contamination and will be specified on the applicable Test Pressure Drawings. |
| Test-Strength and Porosity | A hydrostatic test conducted at a specified strength test or "H" pressure that is above nominal/system operating pressure. |

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| Torque | <p>The twisting force exerted multiplied by the distance through which the force acts. In the Navy, torque is usually measured in foot-pounds or inch-pounds.</p> <ol style="list-style-type: none"> a. Breakaway Torque. The torque required to start the self-locking fastener moving when the locking element is fully engaged and with no axial load. b. Final Torque. The required torque plus the running torque, when a self-locking fastener is being used. c. Required Torque. The torque in accordance with the design drawing or technical manual requirements, the torque from appropriate torque tables in Submarine Fastening Criteria (Non-Nuclear), Description, Design, and Maintenance, NAVSEA S9505-AM-GYD-010 or the torque in accordance with an applicable approved process instruction. d. Running Torque. The torque required to continue turning a self-locking fastener prior to contact with the seating surface. |
| Traceability | <p>A positive capability of finding all objective evidence, including receipt inspection data, for a particular piece of material given only the piece of material, marked in accordance with applicable material control standards.</p> |
| Unrestricted Operation Maintenance Requirement Card | <p>Unrestricted Operations Maintenance Requirement Card for continued unrestricted submarine operations to design test depth. Refer to the SUBSAFE Requirements Manual, NAVSEA 0924-062-0010.</p> |
| Upgrading | <p>The process of conducting the certification of open-purchased material to controlled material in accordance with the appropriate military and material control standard.</p> |
| Valve Repair/Restoration/Overhaul | <ol style="list-style-type: none"> a. Repair. Any work done to improve the material condition or operation of the valve correcting deficient conditions such that the component may be returned to service, but which, in total does not meet the full intent of the applicable restoration/overhaul technical standard, is considered a repair. b. Restoration/Overhaul. All valve parts replaced or restored to the requirements of the applicable technical standard (e.g., the full intent of the restoration/overhaul technical standard is invoked). |
| Verification | <p>Certification required to be performed by the craftsman.</p> |
| Welded Fabrication or Weldment | <p>The construction, alteration or repair of any welded assembly, or parts thereof, by welding and allied processes. Included are all operations such as pre-heat and post-heat treatments, forming, fairing and NDT that must be controlled to obtain weldments suitable for intended service.</p> |
| Work | <ol style="list-style-type: none"> a. Any action that actually or potentially changes (including disassembly for the purposes of inspection or repair) the approved configuration of any part, component or ship's system. b. Any action that removes or affects the ship's ability to operate ship's systems or components in accordance with ship's systems/operating manuals or reactor plant manuals. c. Any testing or inspections required to establish, maintain or reestablish certification. |

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| Work (Cont'd) | <p>d. Any design, engineering, planning or configuration management functions that involve the final review and/or approval of technical information.</p> <p>Examples of work include the following:</p> <ol style="list-style-type: none">1. Action which disassembles or removes any part, component or ship's system.2. Action specified in a Technical Work Document.3. Any action that removes or affects the ship's ability to operate ship's systems or components in accordance with ship's systems manuals, operating manuals or reactor plant manuals, excluding tagout in accordance with the Tagout Users Manual, including but not limited to:<ol style="list-style-type: none">(a) Component or system tests.(b) Intrusive inspections (such as breaking the plane of electrical panels requiring electrical safety).(c) Valve line ups that alter the normal system line up not governed by operating procedures.(d) Removing valve hand wheels, disconnecting of reach rods. |
| Work Center | <p>For FMAs, the individual shops within divisions of the Repair, Weapons Repair Departments, etc. (e.g., 38A, 91A, 72A, 25A). For ships, usually the divisions within a department (e.g., Machinery Division, Sonar Division).</p> |
| Working Standards (Calibration) | <p>These standards comprise a wide variety of equipment used throughout the laboratory in support of all measurements performed in the laboratory. These standards are used day-by-day in performing calibrations in the Fleet Electronic Calibration Laboratory or Mechanical Instrument Repair and Calibration Shop. Contrast, reference and transfer standards are used less frequently to support and assure the accuracy of working standards within the Fleet Electronic Calibration Laboratory, Mechanical Instrument Repair and Calibration Shop, Fleet Meter Calibration Laboratory or Field Calibration Activity.</p> |

VOLUME V
PART I
CHAPTER 1
ORGANIZATIONAL RESPONSIBILITIES

REFERENCES.

- (a) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (b) COMSUBLANT/COMSUBPACINST 3502.1 - Submarine Force Internal Monitoring and Critiques
- (c) NAVSEA SS800-AG-MAN-010/P-9290 - System Certification Procedures and Criteria Manual for Deep Submergence Systems
- (d) NAVEDTRA 43523 - Personnel Qualification Standard for Quality Maintenance Program
- (e) NAVSEAINST 4790.23 - Baseline Project Management Plan (BPMP)
- (f) COMSUBFORINST C5400.30 - Engineering Department Organization Manual
- (g) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (h) NAVSEA 0948-LP-045-7010 - Material Control Standard
- (i) NAVSEA S9086-CH-STM-020 - NSTM Chapter 074 V2 (Nondestructive Testing of Metals Qualification and Certification Requirements for Naval Personnel (Non-nuclear))
- (j) NAVSEA T9074-AS-GIB-010/271 - Requirements for Nondestructive Testing Methods
- (k) SECNAVINST 4855.3 - Product Data Reporting and Evaluation Program (PDREP)
- (l) NAVSEA S9074-AQ-GIB-010/248 - Welding and Brazing Procedures and Performance Qualification
- (m) NAVSEANOTE 5000 - Activities Authorized to Perform SUBSAFE, FBW-SCS and DSS-SOC Work
- (n) CNRMCIINST 4700.3 - Unplanned Events, Critiques and Trouble Reports
- (o) OPNAVINST 4790.15 - Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP)

LISTING OF APPENDICES.

- A Format for Submarine QA Pre-Underway Checklist

1.1 **PURPOSE.** To provide a list of responsibilities and duties of key personnel within the organizations that are involved in the Fleet Quality Assurance (QA) Program. Responsibilities and/or duties listed in this section are further amplified in other sections of this volume.

1.1.1 **Quality Assurance Organization.** The QA Program for the Fleet is organized into five levels of responsibility:

- a. Fleet.
- b. Type Commander (TYCOM).
- c. Immediate Superior in Command (ISIC).
- d. Ship Commanding Officer/Officer in Charge.
- e. Regional Maintenance Center (RMC) Commander/Fleet Maintenance Activity (FMA) Commanding Officer.

1.2 **FLEET RESPONSIBILITIES.**

1.2.1 **Fleet Commander (Fleet).** The Fleet is responsible to provide policy and direction for the implementation and operation of the QA program as follows:

- a. Promulgate the QA program through the guidelines and procedures of Volume V (Quality Maintenance) of the Joint Fleet Maintenance Manual.
- b. Promote effective and consistent use of Volume V (Quality Maintenance) of the Joint Fleet Maintenance Manual by TYCOMs.

- c. Ensure the scope of training through fleet schools provides the necessary skills for maintenance and management personnel to successfully support the QA program.
- d. Jointly authorize changes to this volume after evaluation and analysis of proposed changes by each TYCOM.
- e. Review TYCOM QA program by sponsoring an annual Quality Assurance Officer (QAO) Conference/Symposium, inviting TYCOM QAO and Naval Sea Systems Command (NAVSEA) technical authorities. The stated purpose should be to establish common trends, discussions of various QA concerns, improvements, and required actions.
- f. Ensure assessments of FMAs and RMCs occur in accordance with Volume IV, Chapter 2, paragraph 2.1.1 of this manual.

1.3 TYPE COMMANDER RESPONSIBILITIES.

1.3.1 Type Commander. TYCOMs are responsible for the following:

- a. (Submarines only) Obtain NAVSEA approval for exception to Re-Entry Control (REC) requirements.
- b. Administer a Departure from Specification (DFS) system to:
 - (1) Establish and maintain an auditable method of processing requests for approval of DFS.
 - (2) Review and evaluate DFS requests and obtain clarification of technical specifications from NAVSEA where appropriate.
 - (3) Approve or disapprove DFS requests.
 - (4) Obtain NAVSEA approval of DFS when required by the appropriate NAVSEA technical specification or manual.
 - (5) Keep NAVSEA informed of all major DFS requests.
 - (6) Provide a periodic status report of all outstanding major DFS to ISIC Material Officers for their action to ensure their records agree with TYCOMs and to pursue DFS clearance.
 - (7) Conduct liaison with NAVSEA on outstanding major DFS requiring NAVSEA action. Provide a periodic status report to NAVSEA of those DFS for which NAVSEA action is overdue.
 - (8) Ensure outstanding DFS for deploying/returning ships are passed between parent and deployed ISICs as required by paragraph 1.4.1.g.(6) of this chapter.
 - (9) (Surface Force Ships/Aircraft Carriers only) Maintain a file of all outstanding DFSs.
- c. Perform assessments of nuclear FMAs annually, not to exceed 18 months.
- d. (Submarines only) Perform assessments of ISICs annually not to exceed 18 months.
- e. Perform assessments of FMAs non-nuclear programs annually not to exceed 18 months.
- f. At the discretion of the TYCOM perform random, unannounced ISIC, FMA and ship QA assessments and monitor visits.
- g. Review and evaluate FMA and ISIC reports of corrective action taken on QA assessments to ensure compliance with this program.
- h. (Submarines only) Maintain a system to provide Submarine Safety (SUBSAFE) certification for submarines.
- i. Perform an annual self evaluation of the QA program and provide a copy to the Fleet QAO. For Submarine TYCOMs, the self assessment will also include SUBSAFE, Submarine Fly-By-Wire Ship Control System (FBW SCS) and Deep Submergence Systems programs and a copy of the assessment should be forwarded to NAVSEA.
- j. Evaluate and analyze proposed changes to this volume.

- l. (Submarines only) Perform annual SUBSAFE/SOC/FBW SCS awareness training for staff members (Submarine Squadrons and associated Naval Submarine Support Centers and Performance Monitoring Teams to include Weapons, Combat Systems and Material Departments with the associated Chain of Command) that routinely review SUBSAFE/SOC/FBW SCS objective quality evidence, make determinations on SUBSAFE/SOC/FBW SCS DFSs, perform other SUBSAFE/SOC/FBW SCS work oversight functions.
- m. (Submarines only) Conduct an oral interview of relieving Ship's Force QAO which covers the following topics as a minimum:
 - (1) URO Program Management including a review of the ship's current URO Schedules and Inventories and completion procedures.
 - (2) DFS Program Management including a review of all outstanding departures.
 - (3) QA Training and Qualification Program.
 - (4) QA Surveillance and Assessment Program including a review of the ship's last ISIC QA Assessment and corrective actions.
 - (5) CWP opening and closing review processes.
- n. Ensure fact-finding critiques are held to establish underlying causes and pursue corrective actions when **necessary. When major errors or problems occur during maintenance that affect Nuclear, Level I, FBW SCS/Submarine Flight Critical Components (SFCC), Deep Submergence System (DSS)/SOC or SUBSAFE work, a critique may be necessary. Examples include when significant problems or trends occur or those that did result or could result in incidents, significant unplanned rework, serious equipment damage, malfunction or personnel injury. Minor problems are isolated deficiencies with minimal overall impact and no significant consequences; these should normally be corrected on the spot and without expending much time and effort.**
 - (1) **(Submarines only) Contact the TYCOM immediately for issues which will result in a SUBSAFE/FBW SCS/DSS/SOC critique, SUBSAFE/FBW SCS/DSS/SOC trouble report, and/or SUBSAFE/FBW SCS/DSS/SOC fact-finding.**
 - (2) **(Submarines only) Additional guidance and direction for critiques is contained in reference (b).**
 - (3) **(Submarines only) Copies of critiques and incident reports for SUBSAFE/FBW SCS/DSS/SOC issues that result in a problem severity level of Level 1 (critical) will be sent to the TYCOM electronically.**
- o. (Submarines only) ISIC responsibilities. Maintain FBW SCS certification in accordance with reference (a). In relation to the planning and performance of post Upgrade/Alteration or Major Repair Work Sea Trials, for maintaining FBW SCS certification of previously certified submarine FBW SCS, the ISIC shall:
 - (1) Provide sufficient time for crew training during the Upgrade/Alteration or Major Repair Work period to permit Ship's Force to attain a level of knowledge and proficiency of the FBW SCS adequate to ensure proper operation and safety of the ship and its personnel during Sea Trials. ISIC shall also ensure crew has proper number of trained operators.
 - (2) Conduct FBW SCS Certification Audits of Upgrade/Alterations or Major Repair Work and issue report to the activity. Audits shall be conducted using the TYCOM provided FBW Certification Audit Checklist at a minimum. Provide a copy of the FBW SCS Certification Audit Report to the Supervising Authority, ship's Commanding Officer, TYCOMs, Fleet Commanders and NAVSEA.
 - (3) Following Upgrade/Alteration or Major Repair Work report, by message, crew readiness and prior to each underway until certified, verification from the ISEA/activity performing the work that all work performed by the ISEA/activity performing the work necessary for at-sea testing or Sea Trials has been completed, including resolution of ISIC FBW SCS Certification Audit Deficiencies recommendations and status of incomplete ISIC FBW SCS Certification Audit Category Deficiencies, and that the material condition of those parts of the ship installed,

- repaired, and/or tested by the ISEA/activity performing the work is satisfactory, certify to the TYCOM, with information copies to the CNO, the appropriate Fleet Commander and NAVSEA, that the FBW SCS material condition of those parts of the ship installed, repaired and/or tested by the ISEA/activity performing the work is satisfactory for Sea Trials in accordance with approved at-sea tests or Sea Trial agenda.
- (4) Following verification from the ISEA/activity performing the work of satisfactory completion of all at-sea testing or trials, completion of controlled dives, correction of all mandatory Sea Trial deficiencies, and resolution of all ISIC FBW SCS Certification Audit Category IA recommendations, certify to the TYCOM, with information copies to CNO, the appropriate Fleet Commander and NAVSEA, the FBW SCS material condition of those parts of the ship installed, repaired, and/or tested by the ISEA/activity performing the work is satisfactory, and recommend authorization for FBW SCS unrestricted use in support of submarine unrestricted operations, subject to ISIC verification that FBW SCS certification of areas outside ISEA/activity performing the work tasking has been sustained, or specifically identify any operating restrictions of the ship and/or system.
- p. (Submarines only) The ISIC will transmit a Submarine Material Transfer Message to the gaining ISIC for deploying/deployed submarines when the unit out chops to include the following:
- (1) Status of outstanding Casualty Reports.
 - (2) Status of outstanding Z0ZZ.
 - (3) Status of outstanding (SUBS).
 - (4) Status of active DFS actions.
 - (5) Status of Periodic Maintenance Requirements (Integrated Maintenance and Modernization Plans and UROs) for accomplishment.
 - (6) Status of Alterations for accomplishment.
 - (7) Status of Pre-Overhaul Tests/Pre-Availability Testing for ships within 12 months of a scheduled CNO availability.
 - (8) Current Operational Interval/Operational Cycle expiration dates.
 - (9) Status of Material Condition Assessment if in progress.
- q. (Submarines only) At the end of every scheduled FMA upkeep, verify all SUBSAFE deficiencies documented in the ship's Current Ship's Maintenance Project have been corrected or have an appropriate DFS.
- r. (Submarines only) Prior to submerged underway operations when submarines are in a port with an ISIC, or when a submarine is in an availability such as Continuous Maintenance Availability, Interim Drydocking, Emergent Availability or CNO Availability, the ISIC QAO shall complete a QA Pre-Underway Checklist. Appendix A of this chapter provides the minimum requirements for the QA Pre-Underway Checklist.

1.5 SHIP RESPONSIBILITIES.

1.5.1 Ship's Commanding Officer. Commanding Officer is responsible to:

- a. Designate a QAO in writing who will have sufficient time on board to maintain program continuity.
- b. Approve Technical Work Document (TWD) as required in Part I, Chapter 2, Appendix D, TWD Review and Approval matrix, of this volume.
- c. (Submarines only) Provide the ISIC a written report of ship's certification continuity prior to underway, as specified in Part I, Chapter 5, paragraph 5.6.8 of this volume.
- d. (Submarines only) Organize and implement a program to ensure performance of required maintenance to sustain the material condition necessary to support URO to authorized operating depth in accordance with the applicable class URO MRC manual and Volume VI of this manual.

- e. (Submarines only) Organize and implement a program to ensure performance of required maintenance to sustain the material condition necessary to support FBW unrestricted operations in accordance with reference (a).
- f. (Submarines only) Organize and implement a program to ensure performance of required maintenance to sustain the material condition necessary to support DSS-SOC certification (if required) in accordance with reference (c).
- g. (Submarines only) Approve and sign all recertification Reactor Plant Work Accomplishment Reports (RPWAR) and ensure these documents are forwarded to the Reactor Plant Planning Yard with copy to NAVSEA Nuclear Propulsion Directorate (08), TYCOM and ISIC.
- h. Certify all QA personnel qualifications (respective Department Head on Aircraft Carriers).
- i. Review and sign with the shipyard or other industrial activity, RMC/FMA and ISIC, an MOA on responsibilities and action of each party with respect to work accomplishment prior to start of SUBSAFE, nuclear, FBW SCS or Level I work in accordance with this manual.
- j. Approve DFSs in accordance with Part I, Chapter 8 of this volume.

1.5.2 Ship's Executive Officer. Executive Officer is responsible for the following:

- a. Monitoring the QAO's administration of the ship's QA Audit, surveillance, training and qualification programs.
- b. Providing senior command level authority to backup the QAO in the performance of the QAO's duties.
- c. Spot checking performance of QA training by attending/monitoring training periodically.
- d. Assigning an Assistant Quality Assurance Officer (AQAO) who is an E-6 or above to be an administrative assistant to the QAO.

1.5.3 Ship's Department Head. Department Heads are responsible to:

- a. Ensure area(s) in or adjacent to their work centers/divisions/spaces are designated for the stowage of controlled material in accordance with Part I, Chapter 6 of this volume.
- b. Review or approve Formal Work Package (FWP) and TWD as required in Part I, Chapter 2, Appendix D, TWD Review and Approval matrix, of this volume.
- c. Ensure personnel in their departments involved in performing, planning, approving or supervising shipboard maintenance on SUBSAFE, nuclear, FBW SCS and Level I systems participate in QA training.
- d. Verify the department maintains sufficient numbers of qualified Quality Assurance Inspectors (QAI) and Controlled Material Petty Officers (CMPO).
- e. Participate in oral examination of shipboard QAI and Quality Assurance Supervisor (QAS) assigned to their departments.
- f. Ensure personnel within their departments perform QA surveillance, qualification, training, etc. as defined in this volume.
- g. Review and approve information submitted to the FMA for identification of controlled work. This information must include a TWD serial number when required by Part I, Chapter 2 of this volume. This review will also ensure that the work request identifies specific categories applicable in each of the following situations as required by this volume:
 - (1) SUBSAFE.
 - (2) Level I.
 - (3) Submarine Antenna Engineering Directorate (SAED).
 - (4) Nuclear.
 - (5) Special cleanliness requirements.

- (6) Special testing requirements.
- (7) Special fabrication requirements.
- (8) DFS.
- (9) SOC.
- (10) SFCC.
- h. Ensure fact-finding critiques are held to establish underlying causes and pursue corrective actions when major errors, mistakes, or problems occur during maintenance that affect Nuclear, Level I, SFCC, DSS/SOC or SUBSAFE work, or result in serious damage to equipment or injury to personnel. Contact the ISIC immediately for issues which will result in a SUBSAFE/FBW SCS/DSS/SOC critique, SUBSAFE/FBW SCS/DSS/SOC trouble report, and/or SUBSAFE/FBW SCS/DSS/SOC fact-finding and send a copy of the report to the TYCOM.
- i. Review DFS for technical accuracy and sign.
- j. Spot check performance of QA training by attending/monitoring training at least quarterly.
- k. (Aircraft Carriers only) Certify QA qualifications for personnel assigned to their department by signing the applicable Personnel Qualification Standard cover sheet of reference (d).

1.5.4 Ship's Supply Officer. The Supply Officer is responsible to:

- a. Ensure procurement, receipt and stowage of Nuclear, SOC, SFCC, SAED - Submarine Antenna Quality Assured Material and Level I materials are in compliance with this volume, applicable material control standards and instructions.
- b. Designate and maintain areas for stowage of Level I (LI) and SOC stock program material, SFCC and Nuclear Repair Parts (NRP) in the custody of the supply department.
- c. File the Supervisor of Shipbuilding letter of certification for Level I, SFCC and NRP which are in the custody of the supply department.
- d. Turn over the material certification documentation (or copy of, when only partial issue of lot) for LI/SOC/SEAWOLF Class Component (SW)/VIRGINIA Class Component (VU) stock program material and NRP to the customer.
- e. Send LI/SOC stock program material, NRP, SW, VU and copies of material certification documents to FMA work centers when the ship is providing the material.
- f. Ensure copies of the material certification documents are forwarded to the requesting activity, when LI/SOC stock program material, SFCC and NRP items are removed from own ship's systems or from onboard repair parts.
- g. Return defective LI/SOC stock program material, SW, VU and NRP to the Navy supply system and submit defective material reports in accordance with supply department procedures.
- h. Ensure appropriate supply department personnel receive training on nuclear and non-nuclear controlled material certification, procurement, receipt inspection and LI/SOC stock program material, SW, VU and NRP stowage requirements.

1.5.5 Ship's Engineer Officer (Submarines only). The Engineer Officer is responsible to:

- a. Submit blank RPWAR forms to the FMA with each work request and CWP serial number, when FMA assistance is necessary for reactor plant SUBSAFE work. Ensure all work requests requiring special reactor plant SUBSAFE work controls are properly identified.
- b. Verify continuity of reactor plant SUBSAFE certification by controlling and documenting work and tests performed for each Re-Entry.
- c. Review and sign the necessary recertification information on the applicable RPWAR pages for repairs requiring RPWAR submission and forward the original to the Reactor Plant Planning Yard with a copy to NAVSEA 08, TYCOM and ISIC.

- d. Maintain current the reactor plant hull integrity records using the completed RPWAR, filed in an auditable manner with the latest revision of the NAVSEA drawing “Status of Reactor Plant Work Accomplishment Reports for (individual ship)”. Reproducible blank RPWAR will also be maintained in this same file to support future maintenance. Documentation of the actual maintenance performed and testing accomplished by Ship’s Force is to be maintained in the ship’s completed CWP file required by this volume.
- e. Review or approve Oxygen, Nuclear and SUBSAFE CWPs as required by Part 1, Chapter 2, Appendix D of this volume.
- f. Coordinate with the Ship’s QAO and Engineering Department Master Chief to incorporate QA training as required by Part I, Chapter 3 and Part III, Chapter 3 (as applicable) of this volume and reference (a) (as applicable) into the Engineering Department Training Plan.

1.5.6 Availability Coordinator (Submarines only). A submarine served, nuclear trained Limited Duty Officer will be assigned to augment the normal ship's complement during Depot Modernization Periods, Engineered Refueling Overhauls, or Engineered Overhauls and will act as the Availability Coordinator for the ship. The Availability Coordinator's responsibilities include:

- a. Become a knowledgeable member of the availability project team.
- b. To support these requirements, the Availability Coordinator will be assigned as early as possible during the pre-availability test and inspection period, nominally 15 months before the availability starts. Prior to reporting to the submarine, the Availability Coordinator will be trained in shipyard processes and Availability Work Package requirements in accordance with reference (e), Appendix H. After reporting to the submarine, the Availability Coordinator should spend a significant portion of his time working with the shipyard project team prior to the start of the availability. This may require that he remain ashore during key pre-availability planning phases while the submarine is at sea. Finally, to prevent interference with his responsibilities for availability planning and execution, the Availability Coordinator should not be assigned routine watch standing duties. He should maintain proficiency requirements (about two watches per month), but his watch standing duties should not interfere with daily project management routine or the increased pace of coordination associated with major key events (e.g., undocking).
- c. Educate/train Ship's Force on shipyard tools and processes to be used during the availability. This responsibility does not circumvent the requirements placed on the industrial activity to train Ship's Force, but the Availability Coordinator will coordinate and complement the training provided by the industrial activity.
- d. Coordinate the integration and execution of Ship's Force responsibilities during the availability planning and execution.
- e. Act as the primary liaison between Ship's Force and the shipyard project team.

1.5.7 Ship's Maintenance Manager (Aircraft Carriers only). Maintenance Manager is responsible to establish and maintain a Quality Deficiency Reporting Program for resolving quality issues for work performed by outside activities and to ensure that each work request/job order is screened for Quality Control/QA requirements and marked up or stamped as to specific category applicable in each of the following situations as required by this volume:

- a. Nuclear.
- b. Level I.
- c. Special cleanliness requirements.
- d. Special testing requirements.
- e. Special fabrication requirements.

1.5.8 Ship's Principal Assistant. Principal Assistants will be responsible for duties as assigned by the Engineer/Reactor Officer.

1.5.9 Ship's Division Officer. Division Officers are responsible to:

- a. Review TWD as required in Part I, Chapter 2 Appendix D, TWD Review and Approval matrix, of this volume.
- b. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- c. Verify controlled work is accomplished in accordance with an approved CWP.
- d. Ensure personnel assigned to their divisions perform QA surveillance, qualification, training, etc. as defined in this instruction.
- e. Supervise QA training of division personnel.
- f. Provide timely response to QA 14, indicating root cause analysis and actions taken.

1.5.10 Ship's Work Center Supervisor. Work Center Supervisor is responsible to:

- a. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- b. Have TWD prepared, when designated the Lead Work Center (LWC), and as required by Part I, Chapter 2, paragraph 2.2 of this volume:
 - (1) Verify the FWP provides the correct written instructions both in sequence and requirements to satisfactorily accomplish the controlled work.
 - (2) Verify the FWP contains/lists the correct technical specifications or requirements (e.g., torque values, dimensions, Nondestructive Testing (NDT) inspection, special cleanliness, recertification test) for certification attributes to be documented on the appropriate QA form.
 - (3) Ensure signatures for repair work attributes are annotated as requiring Certification Signature Block (CSB) or signature, as applicable, on the QA form and in the FWP as discussed in Part I, Chapter 2 of this volume by use of (R), (S), (C), (I), (Q) and (V) in the margin by the appropriate step.
- c. Ensure all controlled work is accomplished in accordance with approved CWP.
- d. Ensure proper work authorizations have been obtained prior to starting work.
- e. Ensure tools, measuring and test equipment used during maintenance and testing are of proper range, scale and in calibration.
- f. Conduct QA training of work center personnel.
- g. Ensure work center personnel are properly trained and qualified, if required, prior to assignment to tasks requiring QA and/or special cleanliness (e.g., oxygen, hydrogen, reactor plant, steam plant) certifications.
- h. Ensure only material specified by the applicable drawings, standards, or specifications is ordered and installed.
- i. Submit request for use of rejected material using a Reject Tag (QA form 3).
- j. Obtain written permission from the QAO to downgrade LI stock program material, NRP, or controlled material for non-level use.
- k. Supervise QA programs within assigned work centers.
- l. Review work for satisfactory completion.
- m. Ensure CWPs for completed controlled work are complete, properly reviewed and forwarded with all certifying documents.
- n. Initiate a DFS for non-nuclear or Liaison Action Request (LAR) for nuclear tests, inspections, material or other requirements of any maintenance action in which the requirements were not met.

1.5.11 Ship's Craftsman. Craftsman is responsible to:

- a. Perform all maintenance actions in accordance with the approved procedure. If that guidance is either incorrect, incomplete or unclear, stop and seek clarification from the work center or shift supervisor.
- b. Ensure QA forms associated with the maintenance are correctly completed in accordance with the applicable sections of this volume.
- c. Enter signature, printed name and date on all QA data forms completed.
- d. Initiate a DFS for non-nuclear or LAR for nuclear tests, inspections, material or other requirements of any maintenance action in which the requirements were not met.
- e. Ensure only Test, Measuring and Diagnostic Equipment (TMDE) (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, are used for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.

1.5.12 Ship's Quality Assurance Officer. QAO is responsible to:

- a. Administer the ship's QA program.
- b. Review TWD as required in Part I, Chapter 2, Appendix D, TWD Review and Approval matrix, of this volume.
- c. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- d. Verify the FWP, in the CWP, specifies the correct OQE that is to be generated to prove recertification of the system or component.
- e. Verify the testing requirements for controlled work, called out in the FWP, are correct and in accordance with the latest applicable specifications as required by Part I, Chapter 2, paragraph 2.3 of this volume.
- f. Verify completed test results for controlled work fully satisfy test requirements, or corrective action is taken.
- g. Review and close out all TWDs for work on systems or components required for reactor plant startup, propulsion plant startup or ship's underway operations (e.g., if the work is on a spare component it may not be necessary to close the TWD) prior to startup or getting underway.
- h. Maintain the following record files in accordance with Part I, Chapter 10, paragraph 10.5 of this volume:
 - (1) Completed CWPs.
 - (2) QA Assessments, audits, surveillance and deficiency correction.
 - (3) Controlled material.
- i. Determine suitability for use of Level I, SOC, SFCC or Nuclear Level I material from another ship in own ship's system, when the transfer is directly from the donating ship.
- j. Provide disposition instructions for material rejected at receipt inspection.
- k. Obtain chemical analysis, NDT, destructive testing and generic materials identity testing results as required by Part I Chapter 6 of this volume to certify material for use in a certified (e.g., Level I, SUBSAFE, Nuclear, Scope of Certification) system.
- l. Provide technical services to the Supply Officer for determining material requirements.
- m. Authorize downgrading of LI stock program material, NRP or controlled material for non-level use.
- n. Review requests for DFS for accuracy and technical merit, and forward to Department Head.
- o. Maintain an auditable file of outstanding DFS and the record of DFS numbers assigned. Prior to each underway following any scheduled Fleet/CNO Maintenance Availability, the ship's QAO will audit active DFSs against associated Job Control Numbers to verify a current up to date entry in the Current Ship's Maintenance Project exists.

- p. Maintain a file of DFS which have been approved as permanent repairs and result in change in configuration until they are reflected in ship's drawings.
- q. Verify ship's mapping plans and selected records and drawings are updated (marked up) when approved DFS authorize a change in configuration as a permanent repair.
- r. Submit DFS clearance reports, using Departure Clearance Report (QA form 12A) to the approving authority when the work was done which corrects specific DFS. If unable to use a QA form 12A, use the message format of Part I, Chapter 8, Appendix B, of this volume.
- s. Manage the ship's internal QA Audit and Surveillance program as required by Part I Chapter 9 of this volume. Coordinate with the ship's Executive Officer to resolve surveillance scheduling and accomplishment problems.
- t. Ensure that QA training is conducted as required by Part I, Chapter 3 and Part III, Chapter 3 (as applicable) of this volume and reference (a) (as applicable). The QAO will coordinate with the Ship's Engineer and Engineering Department Master Chief to incorporate these requirements into the Engineering Departmental Training Plan. The QAO will attend QA training when practical.
- u. Assess QA training and provide input to Engineering Department Master Chief and Ship's Engineer for incorporation into the periodic Engineering Department Training assessment as required by reference (f).
- v. Implement a formal qualification program for QAIs, CMPOs, Cleanliness Inspector/Certifiers, QASs, Work Center Supervisors and Maintenance Planners (if assigned).
- w. Conduct oral qualification interviews for QAIs/QASs/CMPOs/Cleanliness Inspector/Certifiers, Work Center Supervisors and Maintenance Planners.
- x. Maintain a current master list of qualified CMPOs/Controlled Material Handlers (CMH), Cleanliness Inspectors, QAIs, QASs (if assigned), Oxygen Clean Workers, Oxygen Clean Instructors, Work Center Supervisors and Maintenance Planners as specified in Part I, Chapter 10 of this volume.
- y. (Submarines only) Verify all reactor plant hull integrity area maintenance is accomplished in accordance with appropriate directives.
- z. (Submarines only) Verify REC is initiated for work within the SUBSAFE boundary (unless REC exception as specified in reference (g)), work within the SFCC boundary and work within the DSS-SOC boundary.
- aa. (Submarines only) Maintain SUBSAFE, SFCC and DSS-SOC REC/CWP records including the CWP log.
- ab. (Submarines only) Coordinate with the ISIC and the FMA to ensure the administration, scheduling and reporting of the URO MRC program is in accordance with the applicable class URO MRC manual, and this volume.
- ac. (Submarines only) Retain any QA form 34 generated in connection with controlled assembly performed as a REC exception in accordance with Part I, Chapter 5, paragraph 5.6.7, Note 3 of this volume.
- ad. Review in detail as many non-nuclear NDT weld records as possible (minimum of 10 percent per year) to ensure that all of the requirements of the applicable fabrication documents have been and are continuously being met.
- ae. Verify an active Job Control Number exists for all active temporary DFSs at the completion of all scheduled Fleet Maintenance Activity Availabilities, major or minor, CNO availabilities or at least quarterly and maintain an auditable record of the verification until superseded.
- af. (Submarines only) At the end of a scheduled FMA upkeep, verify all SUBSAFE deficiencies documented in the ship's Current Ship's Maintenance Project have been corrected or have an appropriate DFS.

1.5.13 Ship's Assistant Quality Assurance Officer. A QAO is responsible to perform duties as assigned by the QAO.

1.5.14 Ship's Quality Assurance Supervisor. QAS, if assigned, will perform the duties as specified in paragraph 1.6.12 of this chapter.

1.5.15 Ship's Quality Assurance Inspectors. QAIs are responsible for coordinating and administering the QA Program within their respective work centers. The QAI will:

- a. Develop a thorough understanding of the QA program.
- b. After verifying work completed, enter initials or signature (as required by the form, tag or procedure), and the date on all applicable QA forms/tags and CWP steps.
- c. Verify QA form 2 is filled out correctly and attached to items removed from a controlled system for transfer to another Fleet activity and ensure items received from another ship have QA form 2 tags attached.
- d. As LWC QAI, review each CWP prepared which requires QAI CSBs to verify inspection requirements are adequately addressed before submission to QAO and/or Department Head as required by Part I, Chapter 2, Appendix D, of this volume.
- e. Verify all work inspected meets the minimum requirements set forth in latest applicable plans, specifications and directives of higher authority as stated in the FWP.
- f. Perform QA inspections of certification attributes as required by Part I, Chapter 5, of this volume.
- g. Ensure all inspections beyond the capability of the QAI are performed by FMA inspectors prior to final acceptance/installation of the product by the ship.
- h. Ensure only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, are used for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.
- i. Ensure items removed from controlled systems are tagged with QA form 2 when required by Part I, Chapter 6 of this volume. Tags are not required if material is nuclear non-Level (Level N/A) or non-nuclear non-level.
- j. Ensure controlled material (SUBSAFE, Level I, Nuclear Level I, Scope of Certification) delivered to a RMC/FMA work center for work is tagged with a QA form 2.
- k. Report all work and testing discrepancies/deficiencies to the department head and the QAO via chain of command. Ensure the deficiency is resolved before work continues.
- l. Sign QA form 2 when controlled material is installed for SUBSAFE and nuclear systems.
- m. As LWC QAI, review all completed QA forms and data sheets for accuracy, completeness and technical correctness.
- n. Reject untraceable, damaged, or unclean controlled material using a material reject tag (QA form 3).
- o. Witness controlled assemblies, as a second party not involved in the actual work.
- p. (Submarines only) Complete the necessary recertification information for maintenance performed by Ship's Force; for material changes/replacement, material generic identification (if not previously documented) or fastener torque on the applicable blank RPWAR pages and submit to the Engineer Officer for review prior to approval by the Commanding Officer. The general notes for report preparation and use, supplied with each RPWAR, will be used in completing the recertification form.
- q. Review certification testing as part of CWP preparation.
- r. Witness and document results of tests (hydrostatic, drop, joint tightness). Work center tests of components conducted by the FMA need not be witnessed, unless directed by the Department Head or FMA CWP. Promptly inform supervisors of unsatisfactory test results. Ensure test documentation is complete and accurate.
- s. Review DFS/LAR prepared by the work center for accuracy and technical merit, and forward to the Division Officer and QAO.

1.5.16 Ship's Controlled Material Petty Officer. CMPOs are responsible to:

- a. Ensure all material under their cognizance is stored and controlled to the requirements of references (a) or (e).
- b. Receipt inspect all LI stock program material, SFCC and NRP received by work center/division.
- c. Request disposition instructions for rejected material.
- d. Remove QA form 3 from previously rejected and now accepted controlled material, annotate the material acceptance on the QA form 2 and file the QA form 3 with the CWP.
- e. Maintain custody of controlled material in segregated stowage in accordance with reference (h).
- f. Inspect controlled material storage areas of their work center semi-annually, as a minimum in accordance with Part I, Chapter 6 of this volume.
- g. Ensure controlled material is properly stowed and handled so the identification of the subject material and its certification are always maintained.
- h. Ensure nuclear material received without Ready for Issue tags is certified to the required "Level of Essentiality".
- i. Reject unsatisfactory material. Fill out and attach QA form 3 and request disposition instructions.
- j. Send any material certification documents for material which has been provided by the ship to the RMC/FMA QA office. Ship should retain original.
- k. Perform receipt inspection of package alteration kits that contain controlled material when ready for use.
- l. Ensure controlled material markings are on all pieces when cutting a smaller piece from a larger one.
- m. Ensure controlled material markings are moved to an unaffected area, if the controlled material item will lose the markings due to a fabrication process (e.g., welding, machining) prior to the fabrication process.
- n. Ensure all controlled material is identified, color coded, marked and tagged as required by this volume and the applicable material control standard.

1.5.17 Ship's Cleanliness Inspector/Certifier. Cleanliness Inspectors/Certifiers are responsible to perform initial, in process and final cleanliness inspections during maintenance/repairs for those systems requiring cleanliness controls per Part I, Chapter 5, paragraph 5.4, of this volume.

1.5.18 Ship's Nondestructive Test Examiner. The ship's NDT Examiner shall be appointed in writing by the Commanding Officer and shall be responsible for all aspects of the command's Nondestructive testing program. NDT Examiner qualification and certification requirements are specified in reference (i). The following shall comprise the core responsibilities of the ship's NDT Examiner:

- a. Coordinate the efforts of other assigned NDT examiners at the activity.
- b. Act as the command's point of contact for NDT technical issues. In addition, act as the command's point of contact with NAVSEA for NDT issues.
- c. Develop the command's NDT examiner guidelines, to include the command's written practice for NDT certification when required by reference (j) utilizing the input of all participating NDT examiners.
- d. Ensure submittal of required reports of certification or re-certification to higher authority as required by reference (k).
- e. Review all requests for NDT training courses and examiner certification services. Provide recommendations to the chain of command regarding eligibility of the requestor, and the need for such training or certification based on current and projected NDT personnel resources.
- f. Approve examination material for all NDT methods utilized at the activity for which they are certified. Ensure examination material reflects changes made to applicable fabrication documents.

- g. Approve, and qualify NDT procedures for each method utilized at the activity. Revise and approve procedures as necessary when changes are made to applicable fabrication documents.
- h. Schedule and perform NDT Inspector surveillance. Maintain records of surveillance in order to perform trend analysis of inspector abilities and program effectiveness.
- i. Schedule and administer NDT examinations. Maintain records of examinations sufficient to trace inspector qualifications to original examination material. Maintain a matrix of high miss questions in order to assess inspector knowledge and program effectiveness.
- j. Train, certify and monitor NDT Inspectors as required by applicable specifications and Part I, Chapter 3 paragraph 3.2.2 of this volume.
- k. Schedule eye examinations for NDT Inspectors.
- l. Ensure each NDT Inspector's service record is kept updated with qualification status.
- m. Maintain individual records of qualification for NDT inspectors.
- n. Monitor the welder/brazer qualification and training per reference (I).
- o. Review all welder/brazer qualification records for completeness, semi-annually.
- p. Review completed NDT inspection reports for technical completeness and accuracy and sign, where indicated on the report, on completion of work.
- q. Review, approve and monitor the command's welder/brazer training and qualification program as required by reference (I).
- r. Prepare and execute the training and qualification program for each NDT method that leads to inspector certification in each method and maintains inspector competency in each method.

1.5.19 Ship's Nondestructive Test Inspector. NDT Inspectors are responsible to:

- a. Verify CWP's which include NDT inspections properly identify the inspection requirements and acceptance criteria.
- b. Ensure NDT inspections are completed correctly and in accordance with the applicable requirement and inspection reports are technically complete and accurate.
- c. Ensure use of only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.
- d. When no NDT Examiner is assigned, monitor the welder/brazer qualification and training per reference (I).

1.5.20 Engineering Department Master Chief. The Engineering Department Master Chief is responsible to coordinate with the Ship's Engineer and QAO to incorporate the QAO provided training as required by Part I, Chapter 3 and Part III, Chapter 3 (as applicable) of this volume and reference (a) (as applicable) into the Engineering Department Training Plan.

1.5.21 Ship's Maintenance Planner (Submarines and Aircraft Carriers only). Maintenance Planners are responsible to:

- a. Prepare the FWP/CWP as required in Part I, Chapter 2, paragraph 2.3.1.b of this volume.
- b. Perform ship check/job check to verify equipment configuration supports work package development.
- c. Develop FWPs/CWPs with the correct written instructions both in sequence and requirements to satisfactorily accomplish the work.
- d. Develop FWPs/CWPs with the correct technical specifications or requirements (e.g., torque values, dimensions, NDT inspection, special cleanliness, recertification test) for certification attributes to be documented on the appropriate QA form. Fill in all preplaced data required by QA form instructions prior to routing CWP.

- e. Ensure signatures for repair work attributes are annotated as requiring CSB or signature, as applicable, on the QA form and in the FWP as discussed in Part I, Chapter 2 of this volume by use of (R), (S), (C), (I), (Q) and (V) in the margin by the appropriate step.
- f. Ensure correct materials, spare parts and special test equipment to be used during maintenance and testing are called out in the materials section of the FWP.
- g. Initiate revisions to FWPs/CWPs when requirements of Part I, Chapter 2, paragraph 2.3.7.3.b(2)(b) and (d) of this volume are met.
- h. Maintain file of Standardized FWPs in accordance with Part I, Chapter 2, paragraph 2.3.7.10.e. of this volume, for their respective divisions. Submit Standardized FWPs to LWC Supervisor for approval prior to use.
- i. Initiate procurement of material specified by the applicable drawings, standards or specifications to complete the designated repairs.
- j. Prepare and route a DFS for non-nuclear or LAR for nuclear tests, inspections, material or other requirements of any maintenance action in which the requirements were not met.

1.6 REGIONAL MAINTENANCE CENTER/FLEET MAINTENANCE ACTIVITY RESPONSIBILITIES.

1.6.1 RMC Commander/FMA Commanding Officer. Responsible for QA in the maintenance, repair and alteration of fleet ships as follows:

- a. Designate the RMC/FMA QAO in writing.
- b. (Submarines only) Provide a written report of certification to the tended ship, at the conclusion of a maintenance period and prior to a tended ship's next underway.
- c. Certify the qualifications of QA personnel.
- d. Ensure the RMC/FMA has an effective audit and surveillance program capable of assessing work performance and identifying areas of poor performance.
- e. Initiate a semi-annual evaluation of the RMC/FMA QA Program by the QAO.
- f. (Submarines only) Implements all aspects of the SUBSAFE and FBW-SCS programs as delineated by references (a), (c), (g) and (m).

1.6.2 RMC Deputy Commander/FMA Executive Officer. Responsible for the following:

- a. Monitoring the QAO's administration of the RMC/FMA's QA surveillance, training and qualification programs.
- b. Providing senior command level authority to backup the QAO in the performance of the QAO's duties.
- c. Spot checking performance of QA training by attending/monitoring training periodically.
- d. Assigning an AQAO who is an E-7 or above or a senior civilian to be an administrative assistant to the QAO.
- e. Assigning sufficient QASs and QAIs to the QA Division.

1.6.3 RMC Production Officer/FMA Repair Officer. Production Officer/Repair Officer is responsible to:

- NOTES:
- 1. AT TRIDENT REFIT FACILITIES SOME OF THESE RESPONSIBILITIES MAY BE UNDER THE COGNIZANCE OF THE PLANNING OFFICER. HOWEVER, THEY WILL NOT BE DELEGATED TO A LEVEL LESS THAN A DEPARTMENT HEAD.
 - 2. WHERE NOTED, SOME OF THESE RESPONSIBILITIES MAY BE UNDER THE COGNIZANCE OF THE ENGINEERING DEPARTMENT HEAD AT AN RMC.
- a. Implement a work request screening process such that jobs requiring special controls are recognized.
 - b. Implement a QA Program that ensures all work accomplished by the Production/Repair Department meets the material and workmanship requirements of approved plans and specifications.

- c. Provide liaison with other department heads when their functions are directly or indirectly related to the QA requirements of the Production/Repair Department.
- d. Review and approve TWD as required in Part I, Chapter 2, Appendix D, TWD Review and Approval matrix, of this volume.
- e. Review and approve the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- f. (Submarines only) Approve and sign all recertification RPWAR and ensure these documents are forwarded to the Reactor Plant Planning Yard with copy to NAVSEA 08, TYCOM and tended ship's parent ISIC.
- g. Review all DFS initiated by the RMC/FMA.
- h. (Submarines only) Review and approve all LARs initiated by the FMA.
- i. Maintain a sufficient number of qualified personnel to adequately staff the QA Division. At RMCs this may be performed by the Quality Assurance Department Head.
- j. Implement a formal training and qualification program for all personnel assigned to the Production/Repair Department who perform, plan, and/or supervise controlled work, covering QA requirements and practices.
- k. Designate nuclear/non-nuclear Metallographic Test Method Examiner and Generic Material Alloy Identification Examiners (as applicable). At RMCs this may be performed by the Quality Assurance Department Head.
- l. Verify the RMC/FMA has an effective audit and surveillance program capable of assessing work performance and identifying areas of poor performance. At RMCs this may be performed by the Quality Assurance Department Head.
- m. Ensure fact-finding critiques are held to establish underlying causes and pursue corrective actions when major errors, mistakes, or problems occur during maintenance that affect Nuclear, Level I, SFCC, DSS/SOC or SUBSAFE work, or result in serious damage to equipment or injury to personnel. Contact the ISIC immediately for issues which will result in a SUBSAFE/FBW SCS/DSS/SOC critique, SUBSAFE/FBW SCS/DSS/SOC trouble report, and/or SUBSAFE/FBW SCS/DSS/SOC fact-finding and send a copy of the report to the TYCOM. At RMCs this may be performed by the Engineering or Quality Assurance Department Head.
- n. Ensure that each work request/job order is screened for Quality Control/QA requirements and marked up or stamped as to specific category applicable in each of the following situations as required by this manual:
 - (1) SUBSAFE.
 - (2) Level I.
 - (3) SAED.
 - (4) Nuclear.
 - (5) Special cleanliness requirements.
 - (6) Special testing requirements.
 - (7) Special fabrication requirements.
 - (8) SOC.
 - (9) SFCC.
- o. (Submarine Repair Facilities) Oversees the implementation of the SUBSAFE, DSS-SOC and FBW-SCS programs as directed by references (a), (c), (g) and (m).

1.6.4 FMA Supply Officer. Supply Officer is responsible to:

- a. Designate area(s) for stowage of LI/SOC/SW/VU stock program material and NRP in the custody of the supply department.

- b. Ensure procurement, stowage, and issue of SAED – Submarine Antenna Quality Assured Material, Nuclear, SOC, SFCC and Level I materials are in compliance with the applicable material control standards, instructions and this volume.
- c. Ensure accompanying certification documents remain with the LI/SOC stock program material, SW, VU and NRP for which the supply department has custody.
- d. Turn over material certification documentation (or copy, if issuing other than the entire lot) for LI/SOC stock program material, SFCC and NRP to the customer.
- e. Return defective LI/SOC stock program material, SW, VU and NRP to the Navy supply system in accordance with supply department procedures. Submit defective material reports.
- f. Ensure appropriate supply personnel receive training on nuclear and non-nuclear material covering material certification, material procurement, receipt inspection, and LI/SOC stock program material, SW, VU and NRP stowage requirements.
- g. Ensure semiannual inventories of supply's LI/SOC stock program material, SW, VU and NRP are conducted.

1.6.5 FMA Nuclear Repair Officer. When assigned, the Nuclear Repair Officer is responsible to:

- a. Determine and specify the material requirements and the certification requirements for the NRP to be used in nuclear controlled work.
- b. Initiate procurement action for NRP required for accomplishment of nuclear tasks.
- c. Review and approve the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- d. Prepare and promulgate the CWP, when OQE is required at the conclusion of the nuclear work and as required by Part I, Chapter 2 of this volume.
 - (1) Verify the FWP is the correct procedure both in sequence and requirements to satisfactorily accomplish the controlled work.
 - (2) Verify the CWP contains/lists the correct technical specifications or requirements (e.g., torque values, dimensions, NDT inspections, special cleanliness, test) for certification attributes to be documented on the appropriate QA form.
 - (3) Ensure test requirements for controlled work comply with the latest applicable specifications.
 - (4) Ensure signatures for repair work attributes are annotated as requiring CSB or signature, as applicable, on the QA form and in the FWP as discussed in Part I, Chapter 2 of this volume by use of (R), (S), (CI), (G), (C), (I), (Q) and (V) in the margin by the appropriate step.
- e. (Submarines only) Review and sign the necessary recertification RPWAR pages, as required by Part I, Chapter 5, paragraph 5.11, of this volume for repair/maintenance actions performed in Reactor Plant SUBSAFE/Hull Integrity areas by the FMA and forward to the QAO for review.
- f. (Submarines only) Maintain copies of approved RPWAR forwarded to the Reactor Plant Planning Yard in an auditable fashion.
- g. Provide the tended ship the test requirements and joints/components to be tested for recertification of FMA work prior to commencing work on the tended ship.
- h. Conduct oral examinations for qualification of personnel as reactor plant Cleanliness Inspector/Certifier.
- i. Ensure only appropriately trained and/or qualified personnel perform nuclear work.

1.6.6 RMC/FMA Planning and Estimating Officer. Planning and Estimating Officer is responsible to:

- a. Determine and specify the material requirements and the certification requirements for the LI/SFCC and other materials to be used in non-nuclear controlled work.
- b. Initiate procurement action for LI/SFCC stock program material and other materials required for accomplishment of non-nuclear tasks assigned.

- c. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- d. Prepare and promulgate the CWP when OQE is required at the conclusion of the non-nuclear controlled work and as required by Part I, Chapter 2 of this volume.
 - (1) Verify the FWP is the correct procedure both in sequence and requirements to satisfactorily accomplish the controlled work.
 - (2) Verify the CWP contains/lists the correct technical specifications or requirements (e.g., torque values, dimensions, NDT inspections, special cleanliness, tests) for certification attributes to be documented on the appropriate QA form.
 - (3) Ensure test requirements comply with the latest applicable specifications.
 - (4) Ensure signatures for repair work attributes are annotated as requiring CSB or signature, as applicable, on the QA form and in the FWP as discussed in Part I, Chapter 2, paragraph 2.3 of this volume by use of (R), (S), (CI), (G), (C), (I), (Q) and (V) in the margin by the appropriate step.
- e. Provide the tended ship the test requirements and joints/components to be tested for recertification of FMA work prior to commencing work on the tended ship.

1.6.7 RMC/FMA Division Officer. Division Officers are responsible to:

- a. Supervise and direct QA program within work centers under their cognizance.
- b. Ensure divisional personnel understand the requirements for/of a CWP.
- c. Ensure all repair actions performed by their division conform to applicable specifications and any deviation from specifications is reported as a DFS for non-nuclear work or LAR for nuclear work.
- d. Ensure CMPOs are assigned, qualified and executing their duties for each work center handling or stowing controlled material.
- e. Ensure areas are designated and are appropriate for proper stowage of controlled material.
- f. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- g. Review each TWD as required in Part I, Chapter 2, Appendix D, of this volume.
- h. Conduct/monitor divisional and work center QA training.
- i. Obtain written permission from the QAO to downgrade LI Stock Program Material or NRP for non-level use.

1.6.8 RMC/FMA Work Center Supervisor. Work Center Supervisors are responsible to:

- a. Ensure controlled and non-controlled material to be installed is correct per plan, drawing or other specification.
- b. Review each TWD for the work center as required in Part I, Chapter 2, Appendix D, of this volume.
- c. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- d. Supervise QA programs within assigned work centers.
- e. Review work for satisfactory completion.
- f. Ensure CWPs for completed controlled work are complete, properly reviewed and forwarded with all certifying documents, when work is completed.
- g. Ensure work center personnel are properly trained and qualified, if required, prior to assignment to tasks requiring QA and/or special cleanliness (e.g., oxygen, hydrogen, reactor plant, steam plant) certifications.
- h. Ensure all personnel use only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.

- i. Prepare DFS or LAR for non-conforming conditions found or caused by the work center, sign, and forward to QAO.

1.6.9 RMC/FMA Craftsman. Craftsman is responsible to:

- a. Perform all maintenance actions in accordance with the FWP. If that guidance is either incorrect, incomplete or unclear, **stop** and seek clarification from the work center or shift supervisor.
- b. Ensure QA forms associated with the maintenance are correctly completed as required by the applicable sections of this volume.
- c. Enter signature, printed name and date on all QA data forms completed.
- d. Ensure only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which has current calibration stickers/records attached or available, is used for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.

1.6.10 RMC Quality Assurance Department Head (Code 130) or Industry Management Department (Code 400 at Puget Sound Naval Shipyard and Intermediate Maintenance Facility). (For NAVSEA managed RMCs) These departments are responsible to:

- a. Implement a QA program in accordance with this volume that ensures all work accomplished by the Production/Repair Department meets the material and workmanship requirements of approved plans and specifications.
- b. Provides liaison with other department heads when their functions are directly or indirectly related to the QA requirements of the Production/Repair Department.
- c. Provide the Commander/Commanding Officer with a semi-annual evaluation of the overall adequacy and effectiveness of the RMC's QA program.
- d. Verify the RMC/FMA has an effective audit and surveillance program capable of assessing work performance and identifying areas of poor performance.
- e. Maintain sufficient number of qualified personnel to adequately staff the QA Department.
- f. Designate nuclear/non-nuclear Metallographic Test Method Examiner and Generic Material Alloy Identification Examiners (as applicable) (Code 130 responsibility at Puget Sound Naval Shipyard and Intermediate Maintenance Facility).
- g. Ensure fact-finding/critiques (as applicable) are held to establish underlying causes and pursue corrective actions when major errors, mistakes or problems occur during maintenance, or result in serious damage to equipment or injury to personnel. Notify Commander Navy Regional Maintenance Center of critiques and trouble reports in accordance with reference (n).
- h. Assign a qualified Quality Assurance Officer to the Code 133 division (RMC) or Code 450 (Puget Sound Naval Shipyard and Intermediate Maintenance Facility).

1.6.11 RMC Code 133 Division Head/FMA Quality Assurance Officer. Code 133/QAO is responsible to:

- a. Organize and implement a QA program within the RMC/FMA to carry out provisions of this volume.
- b. Provide guidance and evaluate efforts to produce work of acceptable standards.
- c. Prepare QA procedures, where necessary, to implement the provisions of this volume.
- d. Assist the TYCOM/ISIC as requested in performing QA audits on tended ships.
- e. Assist the TYCOM/ISIC as requested in providing indoctrination training on the QA program to the Engineer Officers and QAOs of assigned ships. Provide QA training for tended ship's personnel qualifying as CMPO/CMH, QAS and QAI.
- f. Approve downgrading of controlled material.
- g. Determine suitability for use of controlled material received from one ship, for use on another ship, when the transfer is via an RMC/FMA work center.

- h. Provide disposition instructions for rejected material.
- i. Institute a formal qualification program for QA personnel.
- j. Train and qualify work center CMPOs/CMHs. Inform the appropriate Division Officer and the Production/Repair Officer in writing of those qualified and any changes.
- k. QAO will review FMA generated DFS for accuracy and technical merit, sign and forward to the Repair Officer. At an RMC, this function will be the responsibility of the NAVSEA Technical Authority Warrant Holder in Engineering Department.
- l. Obtain chemical analysis, NDT and destructive testing required to upgrade or certify material for nuclear and non-nuclear applications for both the RMC/FMA and tended ships.
- m. Establish and coordinate RMC/FMA procedures for material control as delineated in this volume.
- n. Review, open and close out TWDs as required in Part I, Chapter 2, Appendix D, TWD Review and Approval matrix of this volume. Establish positive controls to ensure that repairs which are not in conformance with specification are not accepted without an approved DFS for non-nuclear systems or LAR for nuclear systems.
- o. Review the FWP as required in Part I, Chapter 2, paragraph 2.3.4 of this volume.
- p. (Submarines only) Review and sign RPWAR.
- q. Develop a QA training program, in conjunction with the Training Officer, which includes training for personnel who perform, plan and/or supervise controlled work.
 - (1) Supervise training and qualification of:
 - (a) QAS.
 - (b) QAIs.
 - (c) CMPOs/CMHs.
 - (d) Cleanliness Inspectors/Certifiers.
 - (2) Review and evaluate training of all personnel performing controlled work. Ensure that the continuing training is in sufficient detail and depth to provide effective training in all topics and areas specified in Part I, Chapter 3 of this volume.
- r. Maintain a current master list of qualified QASs (if assigned), QAIs, CMPOs/CMHs, Cleanliness Inspectors, Oxygen Clean Workers and Oxygen Clean Instructors as specified in Part I, Chapter 10 of this volume.
- s. Establish and administer a comprehensive RMC/FMA QA audit and surveillance program capable of assessing the work performance, training and qualifications and identifying areas of poor performance. Enlist the assistance of other repair department officers and senior enlisted personnel for audits and surveillance in the repair and supply departments.
 - (1) Prepare and update a written surveillance and annual audit schedule.
 - (2) Provide the Quality Assurance Department Head (for RMC) and Commander/Commanding Officer (for FMA) with a semi-annual evaluation of the overall adequacy and effectiveness of the RMC's/FMA's QA program.
- t. Ensure record files are maintained for CWP, controlled material, audits, surveillance, audit deficiency corrections, qualifications and training.
- u. Ensure all testing required for completion of TWD is complete and reviewed prior to the tended ship reactor plant startup, propulsion plant startup, or getting underway or a DFS for non-nuclear systems or LAR for nuclear systems has been submitted and approved.

- v. Perform opening reviews of CWP as assigned to assure OQE generated will support work recertification. Perform closing reviews of CWP as assigned to assure technical accuracy and satisfactory OQE exists for record history.
- w. Supervise QASs, QAIs, Cleanliness Inspectors/Certifiers, CMPOs/CMHs and other personnel, involved in controlled work, in the performance of their QA duties.
- x. Conduct QA audits, surveillance and coordinate corrective actions to ensure compliance with specifications.
- y. Maintain QA records and files, which includes completed CWPs including radiography film (if radiography used for acceptance of work), controlled material records (e.g., QA form 1, certification papers received with the material), training and qualification, etc.

1.6.12 RMC/FMA Assistant Quality Assurance Officer. AQAO is responsible to perform duties as assigned by the QAO.

1.6.13 RMC/FMA Quality Assurance Supervisor. QAS is responsible to:

- a. Ensure all testing required for completion of CWP is complete and reviewed prior to the tended ship reactor plant startup, propulsion plant startup, or getting underway or a DFS for non-nuclear systems or LAR for nuclear systems has been submitted and approved.
- b. Perform opening reviews of CWP as assigned to assure OQE generated will support work recertification. Perform closing reviews of CWP as assigned to assure technical accuracy and satisfactory OQE exists for record history.
- c. Train and supervise QAIs, Cleanliness Inspectors/Certifiers, CMPOs/CMHs and other personnel, involved in controlled work, in the performance of their QA duties.
- d. Conduct QA audits, surveillance and coordinate corrective actions to ensure compliance with specifications.
- e. Maintain QA records and files including completed CWPs (including radiography film if radiography used for acceptance of work), controlled material records (e.g., QA form 1, certification papers received with the material), training and qualification, etc.
- f. Review DFS for accuracy and technical merit and forward to QAO (FMA only).

1.6.14 RMC/FMA Quality Assurance Inspector. QAIs are responsible to:

- a. Review steps in CWP which require QAI signatures to verify all requirements are adequately addressed.
- b. Ensure all work inspected meets the requirements set forth in the latest applicable plans, specifications and directives of higher authority as stated in the CWP.
- c. Perform QA inspections of certification attributes.
- d. Verify permanent markings on controlled material are properly transferred and new material control tags are affixed.
- e. Ensure all personnel use only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.
- f. Sign QA form 2 as controlled material is correctly installed for SUBSAFE, SOC and nuclear systems.
- g. Witness and verify testing and inspections. Promptly inform supervisors of unsatisfactory test results.
- h. Ensure all test results are completed, properly documented and the QA forms are returned to the CWP except for those specifically designated as work center records.
- i. Review DFS for accuracy and technical merit and forward to QAO.

1.6.15 RMC/FMA Controlled Material Petty Officer/Controlled Material Handler. CMPO/CMHs are responsible to:

- a. Receipt inspect all controlled material received by their work center/division.
- b. Ensure all material under their cognizance is stored and controlled to the governing material control requirements.
- c. Inspect controlled material storage areas of their work center semi-annually, as a minimum, in accordance with Part I, Chapter 6 of this volume.
- d. Ensure controlled material is properly stowed and handled so the identification of the subject material and its certification are always maintained.
- e. Reject unsatisfactory material. Fill out and attach QA form 3 and request disposition instructions.
- f. Send any material certification documents for material which has been provided by a ship along with the QA form 1 to the QA office. Ship shall retain originals when the material has been issued for installation.
- g. Receipt inspect package alteration kits that contain controlled material when ready for use.
- h. Remove QA form 3 from previously rejected and now accepted controlled material, annotate the material acceptance on the QA form 2 and file the QA form 3 with the CWP.
- i. Retain custody of controlled material when it is not in the custody of a craftsman or in a controlled material storage area.
- j. Ensure controlled material markings are on all pieces when cutting a smaller piece from a large one.
- k. Ensure controlled material markings are moved to an unaffected area, if the controlled material item will lose the markings due to a fabrication process (e.g., welding, machining) prior to the fabrication process.

1.6.16 RMC/FMA Cleanliness Inspector/Certifier. Cleanliness Inspectors/Certifiers are responsible to perform initial, in process and final cleanliness inspections during maintenance/repairs for those systems requiring cleanliness controls per Part I, Chapter 5, paragraph 5.4 of this volume.

1.6.17 RMC/FMA Command Nondestructive Test Examiner. The Command Nondestructive Test (NDT) Examiner shall be appointed in writing by the Commander/Commanding Officer and shall be responsible for all aspects of the Command's Nondestructive testing program. The Command NDT Examiner will perform the responsibilities of the NDT Examiner per paragraph 1.6.17 of this chapter when a single Examiner is assigned to the RMC/FMA. The following shall comprise the core responsibilities of the FMA Command NDT Examiner:

- a. Coordinate the efforts of other assigned NDT Examiners at the activity.
- b. Act as the Command's point of contact for NDT technical issues. In addition, act as the Command's point of contact with NAVSEA for NDT issues.
- c. Develop the Command's NDT Examiner guidelines, to include the Command's Written Practice for NDT certification when required by reference (j) utilizing the input of all participating NDT examiners.
- d. Ensure submittal of required reports of certification or re-certification to higher authority as required by reference (o).
- e. Review all requests for NDT training courses and examiner certification services. Provide recommendations to the chain of command regarding eligibility of the requestor and the need for such training or certification based on current and projected NDT personnel resources.

1.6.18 RMC/FMA Nondestructive Test Examiner. RMC/FMA NDT Examiner is responsible to:

- a. Approve examination material for all NDT methods utilized at the activity for which they are certified. Ensure examination material reflects changes made to applicable fabrication documents.
- b. Approve and qualify NDT procedures for each method utilized at the activity. Revise and approve procedures as necessary when changes are made to applicable fabrication documents.

- c. Schedule and perform NDT Inspector surveillance. Maintain records of surveillance in order to perform trend analysis of inspector abilities and program effectiveness.
- d. Schedule and administer NDT examinations. Maintain records of examinations sufficient to trace inspector qualifications to original examination material. Maintain a matrix of high miss questions in order to assess inspector knowledge and program effectiveness.
- e. Train, certify and monitor NDT Inspectors as required by applicable specifications and Part I, Chapter 3 paragraph 3.2.2 of this volume.
- f. Schedule eye examinations for NDT Inspectors.
- g. Ensure each NDT Inspector's service record is kept updated with qualification status.
- h. Maintain individual records of qualification for NDT inspectors.
- i. Monitor the welder/brazer qualification and training per reference (l).
- j. Review all welder/brazer records for completeness semi-annually. This review may be performed by the welding engineers at Trident Refit Facilities (TRF).
- k. Review completed NDT inspection reports for technical completeness and accuracy and sign, where indicated on the report on completion of work.
- l. Review, approve and monitor the commands' welder/brazer training and qualification program as required by reference (l).
- m. Prepare and execute the training and qualification program for each NDT method that leads to inspector certification in each method and maintains inspector competency in each method.

1.6.19 RMC/FMA Nondestructive Test Inspector. NDT Inspectors are responsible to:

- a. Verify CWP's which include NDT inspections properly identify the inspection requirements and acceptance criteria.
- b. Ensure NDT inspections are completed correctly and in accordance with the applicable requirement and inspection reports are technically complete and accurate.
- c. Ensure use of only TMDE (i.e., measuring devices, instruments, inspection tools, gauges, jigs or fixtures), which have current calibration stickers/records attached or available, for production, acceptance and testing. Uncalibrated/untested TMDE will be tagged and removed from service immediately.
- d. Sign QA form 2 as controlled material is correctly installed.

1.7 OTHER ACTIVITY RESPONSIBILITIES. Activities other than RMC/FMAs will conform to the requirements of this volume through a formal MOA, as defined in Volume II, Part I of this manual, with the ISIC while conducting maintenance on fleet activities. This includes work performed by naval shipyards, government agents, civilian contractors and other activities not specifically mentioned in other sections of this instruction.

- a. Ship's Force is ultimately responsible for all work accomplished on board their ship.
- b. Ship's Force is responsible for the development of TWDs for use in technical assist visits.
- c. In some cases, technical assists may provide troubleshooting services or complete equipment changes. Technical representatives are expected to utilize approved QA procedures or observe the requirements of this manual. The contractor or representative shall be able to explain what controls he/she will place on a given job, including testing and documentation to be provided for OQE.
- d. Technical support agencies and contracted organizations may not perform work inside the SUBSAFE, FBW-SCS or DSS-SOC boundary. Only activities that are listed in reference (m) are authorized to perform SUBSAFE, FBW-SCS or DSS-SOC work. In cases where RMCs or other activities are assisting on maintenance inside the SUBSAFE, FBW-SCS or DSS-SOC boundary, paragraph 1.7.a and 1.7.b of this chapter will be strictly adhered to.

- e. Product Quality Deficiency Reporting shall be in accordance with reference (k), with the exception of Aircraft Launch and Recovery Equipment. Quality Deficiency Reporting associated with Aircraft Launch and Recovery Equipment is addressed in reference (o).

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**APPENDIX A
FORMAT FOR SUBMARINE QA PRE-UNDERWAY CHECKLIST**

| | | | |
|--|---|------------|---------------------------------------|
| SSGN/SSBN/SSN _____ | | Date _____ | |
| URO Review (*with ISIC) (48-24 Hours Prior to Underway) | | | |
| (init) | | | |
| | All URO Data for UROs done for periodicity received and reviewed, AWR turned in and signed as complete. | | |
| | No URO will become due prior to next scheduled INPORT period with the exception of a scheduled URO-22 rise blow. | | |
| | Plan approved to complete UROs due next INPORT/availability/underway (e.g. URO 022 rise blow). | | |
| | * URO Schedules and Inventories are up to date. | | |
| | Retests to certify URO parameter due to maintenance reviewed by QAO/Department Head. | | |
| | * Latest URO MRC Change on hand and verified current. Latest Change _____. | | |
| | * Review SUBMEPP URO/HIPs website and or the Schedules and Inventories to verify no URO/HIPs (as applicable) are due or will become due prior to return to port (This review is to be completed by the URO/PMR Coordinator and ISIC QAO). | | |
| Other Reviews (48-24 Hours Prior to Underway) | | | |
| | REC Exception Binder updated for work performed this availability. | | |
| | No CAT "A" A&I will become overdue prior to start of next availability or those that will become overdue have been adjudicated via an approved departure. | | |
| | No underway limiting OSARs exist or any underway limiting OSAR has been adjudicated via an approved DFS. | | |
| | No outstanding Audit/Assessment/Survey ICARS (CAT 1) exist _____. No overdue AS&E responses due. Next report of corrective actions due: _____. | | |
| | DEI date _____, next DEI due date (18 months) _____ (DFS _____), Major Deficiencies corrected or not due (30 days and No RBOs). | | |
| QA-11 Log Review (Within 24 Hours of Underway) | | | |
| | FMA QA-11 Log Closed | | Ship's QA-11 Log Closed Out |
| | | | DDS QA-11 Log Received and Closed Out |
| Custody Transfers (Within 24 Hours of Underway) | | | |
| | DDS Custody Transfer Msg/letter Received/Issued. | | |
| | Copy of DDS Continuity Message/Letter received following installation/removal received and reviewed. | | |

| | | | | | | | |
|---|---|--|---------------------|--|------------------------------------|--|---------------------------------|
| DFS Review (includes waiver and deviations) (Within 24 Hours of Underway) | | | | | | | |
| No active DFS will expire prior to start of next scheduled availability (except AT-SEA TESTING). | | | | | | | |
| All SUBSAFE/SOC/FBW-SCS AT-SEA TESTING departures verified against Continuity Letter. | | | | | | | |
| Ship has completed DFS to JCN audit. | | | | | | | |
| All identified non-conformances adjudicated (no outstanding DFS awaiting approval). | | | | | | | |
| After a Scheduled Availability verify all AWRs marked SUBSAFE/SOC/FBW-SCS are cleared or adjudicated on a DFS by review of RMAIS. | | | | | | | |
| Continuity Letters /Certification/Completion Letter Separate letters required from each activity performing SS, SOC, FBW-SCS SFCC work on ship system. For DDS installation/removal (only), Ship's Continuity Letter issued as USER and Sustaining Activity. | | | | | | | |
| | Lead NSA CERT (PHNSY/PSNS/PNSY/ NNSY) | | EB/SOSG (SS/FBW) | | NGNN/SOSN (SS/FBW) | | OII/NWCCD (SS/FBW) |
| | Lead FMA/RMC | | EB/SOSG (SOC) | | NGNN/SOSN (SOC) | | OII/NWCCD (SOC) |
| | FMA/RMC | | | | Ship (SS/FBW) Continuity letter | | Ship (SOC) Continuity letter |

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VOLUME V
PART I
CHAPTER 2
QUALITY MAINTENANCE PROCESSES

REFERENCES.

- (a) OPNAVINST C9210.2 - Engineering Department Manual for Naval Nuclear Propulsion Plants
- (b) NAVSEA 389-0153 - Radiological Controls
- (c) NAVSEA S9213-33-MMA-000 - Radiological Controls for Ships
- (d) NAVAIR AD-700A1-MDB-000 - Recovery Assistance Traversing (RAST) System
- (e) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (f) NAVSEA S0300-B2-MAN-010 - Supervisor of Shipbuilding, Conversion and Repair Operations Manual
- (g) NAVSEA 389-0317 - Procedures for Maintenance and Repairs to Naval Reactor Plants
- (h) NAVSEA 0387-LP-046-8000 - System Hydrostatic Test Requirements
- (i) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (j) NAVSEA S9074-AR-GIB-010/278 - Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels
- (k) NAVSEA 0900-LP-001-7000 - Fabrication and Inspection of Brazed Piping Systems
- (l) NAVSEA S9086-CH-STM-010 - NSTM Chapter 074 V1 (Welding and Allied Processes)
- (m) NAVSEA S9AA0-AB-GOS-010 - General Specifications for Overhaul of Surface Ships (GSO) 1983 Edition
- (n) NAVSEA T9074-AD-GIB-010/1688 - Requirements for Fabrication, Welding and Inspection of Submarine Structure
- (o) NAVSEA S9086-T4-STM-010 - NSTM Chapter 589 (Cranes)
- (p) NAVSEA SS800-AG-MAN-010/P-9290 - System Certification Procedures and Criteria Manual for Deep Submergence Systems
- (q) NAVSEA SS521-AA-MAN-010 - U.S. Navy Diving and Manned Hyperbaric Systems Safety Certification Manual
- (r) COMSUBLANT/COMSUBPACINST 6470.5 - Submarine Radiation Health Manual

LISTING OF APPENDICES.

- A Technical Work Document Illustration
- B Work Package Decision Process
- C Formal Work Package Approval/Revision Sheet
- D Technical Work Document Review and Approval Matrix

2.1 PURPOSE. To provide the requirements for generating work procedures that will provide the craftsman with clear, concise, and technically correct instructions to complete the maintenance task while conforming to technical specifications. The work instructions will vary in complexity depending on the type of work to be performed, the amount of existing guidance available, the extent of preparation and system restoration required, and the technical ability of the craftsman.

2.2 TECHNICAL WORK DOCUMENTS. Technical Work Documents (TWD) consist of three general types: Maintenance Procedures (MP), Formal Work Packages (FWP) and Controlled Work Packages (CWP). Refer to Appendices A and B to determine which type of TWD is required.

2.2.1 Minimum Requirements for using Technical Work Documents.

- a. Nuclear Propulsion plant maintenance as defined in reference (a).
- b. Repair or troubleshooting to Fleet Maintenance Activity (FMA) Nuclear Support Facility systems or components.

- c. Radioactive repair work as discussed in references (b) and (c). Major work accomplished in reactor compartments or high radiation areas as required by references (b) and (c).
- d. Manufacture and corrective maintenance of electrical/electronic nuclear support and test equipment (e.g., switchgear test equipment, scram breaker time response equipment).
- e. Propeller/propulsor replacement or repair.
- f. Any Freon systems including self-contained units when the gas path is penetrated.
- g. FMA work on tended ship's systems.
- h. Level I/Submarine Safety (SUBSAFE) system work.
- i. Tests for FMA non-nuclear controlled work, which requires hydrostatic testing for recertification.
- j. All flammable liquid shipboard systems.
- k. Electric motor rewind.
- l. (Submarines only) Repair of Masts and Antennas.
- m. Other Ship's Force repair or troubleshooting as determined by the Department Head.
- n. Troubleshoot and repair of Gas Turbines when:
 - (1) Repairs affect the gas path.
 - (2) Removal, repair and/or replacement of accessory gearbox and components.
 - (3) Repairs to bleed air piping.
- o. Troubleshoot and repair of Main Propulsion Turbines/Generator Turbines.
- p. Troubleshoot and repair of Propulsion and Generator Lube Oil systems.
- q. Troubleshoot and repair of Propulsion and Generator Reduction Gearing/Drive Train Assemblies.
- r. Troubleshoot and repair of Auxiliary Turbines and pumps in which disassembly is required.
- s. Troubleshoot and repair of Boilers, Diesel Engines and their support systems.
- t. Any work within the Scope of Certification boundary.
- u. Troubleshoot and repair to submarine towed array handling systems.
- v. Welding and brazing requiring a CWP per paragraph 2.2.4 of this chapter.
- w. Maintenance on Weight Handling Equipment.
- x. Maintenance on Recovery Assist, Securing and Traversing systems, per reference (d).
- y. Maintenance performed which invokes MIL-STD 1330 or MIL-STD 1622 cleanliness standards.
- z. Maintenance on Fly-By-Wire Ship Control Systems, per reference (e).
- aa. Steering Gear Systems
- ab. (Submarines only) Special Valves
- ac. (SSBN only) Troubleshooting and repair of Missile Gas, Missile Hydraulic and Missile Tube systems that remove the ability to inert and jettison the tube contents.

NOTE: THE HEX PLUGS (MS PLUGS) DISCUSSED IN THESE PARAGRAPHS ARE NOT EQUIVALENT TO THE MS PLUGS DESCRIBED IN TABLE 5-1, RE-ENTRY CONTROL EXCEPTIONS OF CHAPTER I-5 OF THIS VOLUME. THE FOLLOWING PARAGRAPHS REFER TO TABLE 2-1 BELOW.

| Table 2-1 Types of PTS/TPS Fittings | | | |
|--|---|---------------------------------|-----------------------|
| Style | Description | Ship/Class | Drawing/Specification |
| Style 1 | Rectangular block assembly | SSN 688 Class | NGNN 2300-818 |
| Style 2 | Integral assembly or TRIDENT style fitting | SSBN 726 Class SSN 774 Class | NAVSEA 845-4687601 |
| Style 3 | Threaded boss assembly or Shroeder test fitting | SSN 21 Class SSN 774 Class | MIL-V-24695 |
| Pressure Test Stations (PTS) and Test Pressure Stations (TPS) in the SUBSAFE boundary refer to components of different design that perform a similar function. | | | |

- (1) Style 1 and 2 PTSs and TPSs hex plugs form part of the secondary pressure boundary and serve as contaminant protection. Removal and reinstallation of the hex plug requires a TWD but does not require Re-Entry Controls or controlled assembly. The TWD shall verify that seat leakage criteria and seating surface and hex plug inspections are performed in accordance with applicable technical specifications.
- (2) Re-Entry Controls are not required when operating Style 1 or 2 PTSs or TPSs associated needle valves in accordance with normal operating procedures identified in Ship Safety Manuals, Steam and Electric Plant Manuals or other NAVSEA-approved procedures. If a ship's operating procedure is unavailable, a locally prepared FWP will be generated to operate the valve.
- (3) Style 3 PTSs and TPSs have a Delrin cap. Removal and reinstallation of the Delrin cap requires a TWD but does not require Re-Entry Controls or controlled assembly. The TWD shall verify that seat leakage criteria and seating surface and Delrin cap inspections are performed in accordance with applicable technical specifications.
- (4) Any disassembly for major or minor repair of Style 1, 2 or 3 PTSs or TPSs requires a SUBSAFE Re-Entry Control CWP.

2.2.2 Maintenance Procedure. MPs may be fully usable in their existing form. The minimum requirements to perform any work are a valid MP and permission to perform maintenance.

- a. (Submarines only) If an approved NAVSEA Maintenance Standard (MS) is invoked to perform an emergent repair and there is no intention to reset the maintenance interval, then the MS can be used as a guide to the extent necessary to perform repair. Parts removed can be inspected in accordance with the MS. Inspection criteria for parts not addressed by the MS (e.g., those parts identified as mandatory replacement parts) shall be inspected in accordance with general acceptance criteria or the system drawing or the component technical manual. Additionally, the torque, lubrication, and test criteria cited in the MS may provide revised values which differ from NAVSEA drawings and/or component technical manuals.
- b. The following are examples of existing MPs:
 - (1) Planned Maintenance System (PMS) Maintenance Requirement Cards.
 - (2) MSs.
 - (3) Ship Systems Manuals.
 - (4) Component Technical Manuals.
 - (5) Shipyard Process Instructions.
 - (6) Ship Alteration Instructions.
 - (7) Reactor Plant Manual Operating Procedures, Operating Instructions, Maintenance and Replacement Instructions, and Reactor Maintenance Requirement Page.

- (8) Alteration and Improvement Instructions.
- (9) Naval Sea Systems Command (NAVSEA) Drawings which include disassembly/reassembly instructions.
- (10) Shipyard Task Group Instructions (TGI).
- (11) Steam and Electric Plant Manual.
- (12) (Surface Force ships only) Reference (f) Appendix 4E specifications.

2.2.3 Formal Work Package. An FWP coordinates in a single document materials required, initial conditions, MP, test and inspections, and system restoration for the selected maintenance task. In some instances, the maintenance task will not have an existing MP. This will require the activity to develop an FWP in order to ensure first time quality accomplishment of the maintenance task. FWPs should be only as detailed as required by the complexity of the work, craftsman knowledge, technical requirements, extent of tests, and level of worker supervision required (see Appendix B).

2.2.4 Controlled Work Package. A CWP is required when higher authority requires a record (Objective Quality Evidence (OQE)) of repairs/maintenance for fabrication, repair, installation, inspection and testing process for specific systems/components, such as Level I, SUBSAFE, Submarine Flight Critical Components (SFCC) or nuclear. CWPs may be necessary when required by the level of work control of the system (nuclear, SUBSAFE, SFCC and Level I) or when other extensive and formal Quality Assurance (QA) or test requirements exist (weight test, crane repairs, etc.). In its simplest form a CWP will consist of, as a minimum, a MP and the required QA forms. Examples of required CWPs:

- a. Level I.
 - (1) Manufacture, installation, and repair of Level I components/systems except for the following actions, which may be controlled with TWDs other than CWPs.
 - (a) Software replacement (e.g., O-rings, packing glands, body to bonnet gaskets, silver seal replacements).
 - (b) Inspections to support routine maintenance programs or troubleshooting.
 - (c) Replacement of any non-pressure boundary parts which are non-Material Identification and Control (MIC) level pieces.
 - (2) Repair by welding, brazing, machining, lapping or manufacture of Level I fittings or components.
- b. Reactor Plant/Nuclear Support Facility/Controlled Industrial Facility.
 - (1) Manufacture, installation, and repair of nuclear Level I systems and components. The following actions may be controlled with TWDs other than CWPs provided all assembly procedures and inspections (Quality Assurance Inspector (QAI)) requirements specified in reference (g) are delineated in the procedure section of the FWP:
 - (a) Software replacement (e.g., O-rings, packing, body to bonnet gaskets, silver seal replacements).
 - (b) Inspections to support routine maintenance programs or troubleshooting.
 - (c) Replacement of any non-pressure boundary parts which are non-Material Identification and Control (MIC) level pieces.
 - (2) Hydrostatic testing as required by reference (h) to certify reactor plant work conducted.
 - (3) Welding and Nondestructive Testing (NDT) which provides OQE of the integrity of reactor plant piping, and structural welding.
 - (4) Work affecting the integrity of permanent shielding installations.
 - (5) Work affecting reactor plant brazed joints that are inaccessible during reactor operations.

- (b) “Division Officer/Leading Petty Officer (LPO)/Nuclear Repair Officer (NRO)/Radiological Control (RADCON) Officer: Conduct a pre-work briefing. Complete attendance sheet provided as Enclosure ().”
- (2) List the initial plant/system conditions required to properly and safely accomplish the work to be done. This should include work boundaries which will be specified by the Ship/FMA depending on the job. The isolation boundaries will be determined and established by the duty officer/tagout authorizing officer prior to authorizing commencement of the maintenance (this includes the isolation valve lineup, power isolation, etc.). The extent of this section will vary depending upon the type of job.
- (a) For a Ship’s Force job, this section should identify work boundaries and plant/system conditions (e.g., Pressure/Temperature Band, cold iron). The duty officer/tagout authorizing officer will determine and set the isolation boundaries.
- (b) For an FMA ship to shop job, this element is not applicable.
- (c) For an FMA job on a tended ship, the FMA must determine the work boundaries and identify to the ship any plant conditions that must be maintained during the work. The ship will determine and set the isolation boundaries.
- j. Procedure (required element). This section contains the instructions on how to accomplish the work. Concentrate on putting the steps of the job in proper sequence. Don’t describe technically how to do a step (unless past experience has shown some of this type of information is required). The following steps describe how to write this section of the FWP:
- (1) Outline the various steps necessary to accomplish the work to be done. Whenever there is a need to provide information, or caution the reader, write the word (NOTE or CAUTION) in capital letters followed by a colon and the text of the note or caution in ALL CAPITAL LETTERS. The NOTE or CAUTION is to appear immediately before the step or section it is applicable to. NOTES and CAUTIONS do not perform work, but are used as the first sentence(s) in a work step. Where NOTES and CAUTIONS are used in the same work step, the CAUTION will be specified first.
- (a) CAUTIONS should only be used whenever a specific danger to personnel, equipment, or the potential for loss of cleanliness exists.
- 1 **CAUTION: THE ANTI-SEIZE COMPOUND USED IN THIS STEP IS A HAZARDOUS MATERIAL AND REQUIRES SPLASH PROOF GOGGLES AND RUBBER GLOVES TO BE WORN WHILE HANDLING OPEN CONTAINER OR USING THE MATERIAL.**
- 2 **CAUTION: ENSURE CLEANLINESS PLUGS ARE STAGED FOR USE PRIOR TO BONNET REMOVAL.**
- (b) NOTES should inform the reader about key information, sequence allowance or direct him/her to additional information.
- 1 NOTE: STEPS 8, 9, AND 10 MAY BE PERFORMED IN ANY SEQUENCE.
- 2 NOTE: STEPS 1 THROUGH 4 MAY BE PERFORMED SIMULTANEOUSLY.
- (2) Work Center Designations. This is not mandatory for Ship’s Force work if a single Work Center is performing all steps contained in the FWP. Otherwise, each work step of the procedure shall have a Work Center (i.e., 31A, EM01, etc.) designated responsible for performing that step. A specific designation (e.g., NRO, Engineering Officer of the Watch, Engineering Duty Officer, LPO/LWC Supervisor, LPO) may be substituted for Work Center designations where appropriate. More than one Work Center Designation may be used where dual responsibilities are needed. Examples of Work Center Designations:

- (a) “38A/93B: Perform a final disc-to-seat blue check. Verify that a satisfactory final seat-to-disc blue check has been performed.”
- (b) “38N: NOTE: SEE FIGURE [1] OF ENCLOSURE (3) FOR CANOPY JOINT INFORMATION AND LOCATION. Fit-up the upper and lower body-to-bonnet canopy joints.”
- (3) Symbols. The symbols below are located in the margin of the FWP and indicate the following:
 - (a) (R) = Steps requiring verification/inspection as defined in references (b) and (c).
 - (b) (S) = Steps in an FMA procedure requiring verification by a member of Ship’s Force.
 - (c) (C) = Steps requiring Cleanliness Inspection by craftsman.
 - (d) (I) = Steps requiring inspection by a QAI or NDT Inspector.
 - (e) (CI) = Steps requiring independent Cleanliness Inspectors (SCI, RCI).
 - (f) (Q) = Critical Quality Control Points (Q-Point).
 - (g) (V) = Steps requiring verification by a craftsman.
 - (h) (G) = Government notification required.
- (4) Signature Requirements in FWPs and CWPs. Certain steps require positive assurance that the step was actually performed and/or completed in a prescribed manner. Signatures are also required for assurance of critical requirements, critical measurements, or requirements for OQE. If the step requires completion of a data form (e.g., inspection, NDT record, hydrostatic test data sheet), the signature block shall be on the data form, not the procedure step. The following is a list of typical steps/examples requiring signatures:
 - (a) Steps which require performance of QA checks or NDT that are documented on a QA form in order to provide traceability of signatures. Personnel who sign QA forms or other OQE documents will print their name along with their signature, badge number (where applicable) and date. These types of steps must include a statement of satisfactory compliance adjacent to the signature block in the associated QA form.
 - (b) Completion of a strength test.
 - (c) Hull and backup valve blue checks of seat and disc and stack height measurements.
 - (d) Completion of Controlled Assembly steps.
- (5) For nuclear work, Certification Signature Blocks are required where specifically called out in NAVSEA technical documents.

NOTE:

- WHEN INVOKING A MS WHEN OTHER THAN A COMPLETE COMPONENT OVERHAUL IS PLANNED, THE MS MAY BE USED AS A GUIDE. THERE IS NO NEED TO INVOKE THE ENTIRE MS FOR SPECIFIC REPAIRS: E.G., PUMP MECHANICAL SEAL REPLACEMENT NEED NOT INVOLVE COMPLETE BREAKDOWN AND INSPECTION OF THE PUMP.
- (6) Procedure Detail. The procedure should be used to list the various tasks to be performed and the sequence in which they should be accomplished. Notes on proven craftsmanship skill techniques that significantly aid in first-time quality and are not addressed in other reference documents should be included. A well-written procedure is designed for use by trained personnel who have a requisite level of knowledge about their specialty and the work to be performed. A procedure must have sufficient detail to allow a determination of exactly what was done, material used, inspections required, and allow re-certification of the system or component.

VOLUME V
PART I
CHAPTER 3
PERSONNEL QUALIFICATION AND TRAINING

REFERENCES.

- (a) NAVEDTRA 43523 - Personnel Qualification Standard for Quality Maintenance Program
- (b) NAVSEAINST C5511.32 - Safeguarding of Naval Nuclear Propulsion Information
- (c) MIL-STD-1330 - Standard Practice for Precision Cleaning and Testing of Shipboard Oxygen, Helium, Helium-Oxygen, Nitrogen and Hydrogen Systems
- (d) COMSUBFORINST C5400.30 - Engineering Department Organization Manual
- (e) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (f) NAVSEA SS800-AG-MAN-010/P-9290 - System Certification Procedures and Criteria Manual for Deep Submergence Systems
- (g) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (h) NAVSEANOTE 5000 - Activities Authorized to Perform SUBSAFE, FBW-SCS and DSS-SOC Work

LISTING OF APPENDICES.

- A NAVEDTRA 43523 Qualification Matrix
- B Outlines of Typically Effective Training Topics
- C Recommended Training Topics for Selected Positions

3.1 PURPOSE. To define the requirements and guidance necessary to establish a standard qualification and training program for personnel who plan, perform, inspect or supervise the maintenance tasks listed in Part I, Chapter 2, paragraph 2.2.1 of this volume.

3.2 GENERAL. Personnel who screen, plan, perform, inspect and supervise the maintenance performed to the following requirements shall be trained and qualified in accordance with this volume and reference (a).

- a. Maintenance requiring a Technical Work Document per Chapter 2, paragraph 2.2.1 of this volume.
- b. Maintenance listed as Material Certification Record (MCR) exceptions per Part I, Chapter 2, paragraph 2.2.5 of this volume.
- c. Maintenance listed as Re-Entry Control (REC) exceptions per Part I, Chapter 5, paragraph 5.6.7 of this volume.

3.2.1 Discussion. A continuing training and qualification program is essential for all maintenance personnel to achieve a maintenance program with high standards of quality. Personnel involved in the approval, supervision, planning or performance of shipboard maintenance will be participants in the training and qualifications associated with this volume.

3.3 QUALIFICATION. Qualification procedures established herein shall be formal, and designed to heighten awareness of those tasked with the responsibility of administering, managing and executing the Fleet Quality Maintenance (QM) program.

- a. Each organization shall maintain a personnel qualification list per Part I, Chapter 10, of this volume.
- b. Each organization shall maintain a list of personnel authorized to sign off portions of reference (a).
- c. Maintenance personnel shall be qualified through completion of formal qualification programs (e.g., Job Qualification Requirements/Personnel Qualification Standard (PQS), written exams, oral boards and formal schools). Reference (a) provides the standard PQS for the majority of QM qualifications. Appendix A provides a qualification matrix for maintenance personnel PQS requirements.

- d. All personnel performing the maintenance identified in Part I, Chapter 2, paragraph 2.2.1 of this volume shall be 3-M 301 qualified and Craftsman 301 qualified or an equivalent Quality Assurance (QA) qualification for non-naval personnel.

3.3.1 Re-qualification. Personnel with prior documented qualifications may be re-qualified by written exam and/or oral board as directed by Quality Assurance Officer (QAO) or Department Head. Personnel found to be deficient in level of knowledge will be required to complete an upgrade program established by the QAO prior to re-qualification.

3.3.2 Required Service Record Entries. Record of qualification will be inserted in the individual's service record.

3.4 QUALIFICATION REQUIREMENTS.

3.4.1 Ship's Quality Assurance Officer.

- a. Should be a commissioned officer with engineering/repair experience.
- b. (Submarines only) Submarine officer must have completed submarine qualification and for nuclear powered ships should be nuclear trained.
- c. Designated in writing by the Commanding Officer.
- d. QA Officer course requirements are as follows:
 - (1) A surface ship QAO shall be a qualified Quality Assurance Supervisor (QAS) and shall be a graduate of a QAO course.
 - (2) A submarine QAO shall be a graduate of the Submarine Officers' and Supervisors' Quality Maintenance course, F-4H-0182. No other formal PQS qualification is required. With a formal waiver (Naval message or letter) endorsed by the Immediate Superior In Command (ISIC) and approved by the Type Commander (TYCOM), this requirement can be temporarily waived by the TYCOM but the waiver may not exceed 6 months. The waiver must list the interim QAO and qualifications, the perspective QAO and graduation date from F-4H-0182 and/or the report date.
 - (3) An aircraft carrier QAO shall be a graduate of the 5-week Quality Assurance Officer Course (S-4H-0001) for CVN officers. No other formal PQS qualification is required. With a formal waiver (Naval message or letter) endorsed by the ISIC and approved by the TYCOM, this requirement can be temporarily waived but the waiver may not exceed 6 months. The waiver must list the interim QAO and qualifications, the perspective QAO and graduation date from S-4H-0001 and/or the report date.
- e. (Submarines only) Complete an oral interview with the ISIC or submarine support component QAO.

3.4.2 Ship's Assistant Quality Assurance Officer.

- a. Normally E-6 or above with engineering/repair experience.
- b. Designated in writing by the Commanding Officer.
- c. (Submarines only) Complete an oral interview with the ISIC or Submarine Support Component QAO.

3.4.3 Immediate Superior In Command.

- a. Quality Assurance Officer.
 - (1) Should be a commissioned officer, but may be a civilian with engineering/repair experience.
 - (2) Should be a graduate of a QAO course. No other formal PQS qualification is required.
 - (3) Designated in writing by the ISIC.
- b. Assistant Quality Assurance Officer.
 - (1) Normally E-7 or above, but may be a senior civilian with engineering/repair experience.
 - (2) Should be a graduate of a QAO course.

- (3) Qualified as QAS. QAS qualification is not required if he/she is a graduate of the Norfolk Naval Shipyard Fleet Maintenance Support Branch QAO course.
- (4) Designated in writing by the Commanding Officer. The duties assigned, including signature authority, shall be clearly delineated.

3.4.4 Regional Maintenance Center/Fleet Maintenance Activity Quality Assurance Officer.

- a. Should be a commissioned officer, but may be a civilian with engineering/repair experience.
- b. Will not be assigned collateral duties or responsibilities that divert attention from primary duties of QM.
- c. Should be a graduate of a QAO course. No other formal PQS qualification is required.
- d. Designated in writing by the Commanding Officer.

3.4.5 Regional Maintenance Center/Fleet Maintenance Activity Assistant Quality Assurance Officer.

- a. Normally E-7 or above, but may be a senior civilian with engineering/repair experience.
- b. Qualified as QAS or a graduate of a QAO course.
- c. Designated in writing by the Commanding Officer.

3.4.6 Quality Assurance Supervisor.

- a. Normally E-6 or above, but may be a civilian.
- b. Complete PQS for QAS, and pass a written examination and oral board.
- c. QAS is a mandatory qualification for Fleet Maintenance Activities (FMA). Qualification of QAS for ships is at the TYCOM's discretion.

3.4.7 Quality Assurance Inspector.

- a. Normally a petty officer, but may be a civilian.
- b. Complete PQS for Quality Assurance Inspector (QAI) and pass a written exam and oral board.
- c. The qualification card may be split into separate nuclear and non-nuclear QAI qualifications. If this is done, the command must ensure QAIs do not inspect areas excluded from their qualifications.

3.4.8 Controlled Material Petty Officer/Controlled Material Handler.

- a. Normally a petty officer, but may be a civilian.
- b. Complete PQS for Controlled Material Petty Officer (CMPO)/Controlled Material Handler (CMH), and pass a written exam and oral board.
- c. Activities may modify the qualification card to allow CMPO/CMH qualification for specific materials only. If this is done, commands must have a method to ensure CMPOs/CMHs do not handle material excluded from their qualification.

3.4.9 Steam Plant Cleanliness Inspector/Certifier.

- a. Normally a petty officer, but may be a civilian.
- b. Complete PQS for Steam Plant Cleanliness Inspector and pass a written exam and oral board.

NOTE: INFORMATION ON THE QUALIFICATION REQUIREMENTS FOR REACTOR PLANT CLEANLINESS INSPECTOR/CERTIFIER IS SAFEGUARDED IN ACCORDANCE WITH REFERENCE (b).

3.4.10 Gas Systems Cleanliness Inspector/Certifier.

- a. Normally a petty officer, but may be a civilian.
- b. Satisfactorily complete an Oxygen Clean Worker course of instruction in accordance with reference (c).

3.4.11 Oxygen Clean Instructors. An Oxygen Clean Instructor will be certified in accordance with reference (c). Oxygen Clean Instructors will re-qualify every three years. If an individual is scheduled for transfer within six months after the expiration of qualification, it is permissible to extend the qualification until transfer. The local command may exempt the senior instructor from re-qualification.

3.4.12 Ship's and Fleet Maintenance Activity Oxygen Clean Workers. Oxygen Clean Workers will be certified in accordance with reference (c). Oxygen Clean Workers will re-qualify every three years. If an individual is scheduled for transfer within six months after the expiration of qualification, it is permissible to extend the qualification until transfer.

3.4.13 Oxygen Calibration Technicians. Oxygen Calibration Technicians qualify to perform oxygen instrument cleaning and calibration by satisfactory completion of Oxygen Calibration School. Naval Sea Systems Command certifies successful candidates for two years following a report of satisfactory completion of Oxygen Calibration School. Local Regional Maintenance Center re-certifies Oxygen Calibration Technicians during the calibration capability reviews of FMAs or Strategic Systems Program Office capabilities and proficiency evaluation of SSBN/SSGN FMAs.

3.4.14 Work Center Supervisors and Planners. The qualification of QA Maintenance Planners and QA Work Center Supervisors is required in all work centers that perform corrective maintenance tasks outlined in Part I, Chapter 2, paragraph 2.2.1 of this volume. Work Center Supervisors and Maintenance Planners will, as a minimum, complete the applicable qualifications of reference (a) prior to performing any unsupervised maintenance tasks. QA Maintenance Planners prerequisite qualifications (QAI and Cleanliness Inspector) may be deleted in work centers that do not perform controlled work. Activities with separate planning organizations are exempt from having planners assigned to individual work centers.

3.4.15 Qualification Requirements for Submarine Nuclear Propulsion Plant Operator Welders (Navy Enlisted Classification Code 3351 and Supervisor Welders 3361).

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH REFERENCE (b).

3.4.16 Qualification Requirements for Submarine Fly-By-Wire Ship Control System Maintenance Technician. Shall be a graduate of the Ship Control System Maintenance Technician School (A-623-0118 for SSN 21 Class, A-623-0131 for SSN 774 Class).

3.5 TRAINING.

3.5.1 Maintenance Personnel Training. All personnel involved with planning, performing and supervising maintenance specified in Section 3.2 of this chapter will be trained using the following guidance:

- a. Appendices B and C of this chapter and Part II, Chapter 1, Appendix A of this volume (where applicable) provide information on program elements normally contained in effective maintenance training programs. Appendix B is applicable to Ship's Force whereas Appendix C is applicable to Fleet Maintenance Activities (e.g., mechanics, Nondestructive Test (NDT) technicians, welders and planners). All appendices identified in this paragraph are provided as information only and are not to be considered mandatory listings.
- b. Findings from QA form 14s, audits, assessments and surveillance should be included, when appropriate, to re-emphasize the most recent problems experienced in the department.
- c. Include the training with existing topics where possible (i.e., CMPO training held with Repair Parts Petty Officer training or Steam Plant Cleanliness training held in conjunction with Machinery Divisions training on the Steam Plant). However, some areas may require separate training to be held.
- d. Joint training between departments and organizations is acceptable. The Department Head will coordinate with the QAO on training concerning QM. It is not the intent to create a separate training program, nor is the intent to hold one annual training session that covers all of the topics.
- e. In order to assess the effectiveness of the training program, the QAO should:
 - (1) Periodically monitor training.

- (2) Assess knowledge level retention in conjunction with the conduct of annual QA and welder training and qualification program audit required by reference (a), paragraph 9.3.1.

3.5.2 Requirements. The training topics of this chapter shall be fully integrated into the Engineering Department Training Plan in accordance with reference (d). The QAO shall provide a list of applicable training topics to the Engineer and Engineering Department Master Chief for all ship's departments for inclusion in the Engineering Department training plans.

- a. These topics shall be reviewed and updated annually or whenever a new long range training plan is generated.
- b. For maintenance personnel, the QAO shall provide a list of applicable training topics using Appendices B and C of this chapter as a guide.
- c. For personnel responsible for planning, approving, inspecting or supervising maintenance on systems/equipment included in the QM Program, the QAO shall submit a separate advanced training program. At a minimum, the following items shall be covered.
 - (1) Requirements and generation of a controlled work package and formal work package including objective quality evidence, required inspections and critical QM points.
 - (2) Material certification, control and stowage requirements.
 - (3) In-process control including torquing, controlled assembly, system cleanliness requirements for specific systems (e.g., air systems, hydraulic systems) and common mistakes noted in completed QA forms.
 - (4) Testing.
 - (5) Departure from specifications.

3.5.3 Submarine Safety Awareness Training (Submarines and Submarine Repair Facilities only). All hands shall receive Submarine Safety (SUBSAFE) awareness and Fly-By-Wire Ship Control (if assigned to, work on or oversee 21 Class or 774 Class submarines) training during initial indoctrination and annually thereafter. Personnel at Submarine Repair Facilities who supervise or manage SUBSAFE, Deep Submergence System-Scope of Certification or Fly-By-Wire-Ship Control System work will receive training on parent requirements to include (at a minimum) references (e), (f), (g) and (h). ISIC and TYCOM staff members that routinely review SUBSAFE objective quality evidence, make determinations on SUBSAFE Departures from Specifications and perform other SUBSAFE work oversight will receive annual SUBSAFE awareness training to keep knowledge and proficiency levels high.

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10. Nuclear Training Topics.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH
NAVSEAINST C5511.32.

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APPENDIX C**RECOMMENDED TRAINING TOPICS FOR SELECTED POSITIONS**

1. Experience has shown that effective training should be related to job skills required by the individual.
 - a. Mechanical craftsmen should cover areas like:
 - (1) Tools and their uses.
 - (2) Shop safety.
 - (3) Work authorization.
 - (4) Material identification.
 - (5) Rework and their causes.
 - (6) Valve construction and methods to perform:
 - (a) Stack height measurements.
 - (b) Blue checks.
 - (c) Lapping of a valve seat.
 - (7) Pump construction and methods to perform:
 - (a) Mechanical seal replacement.
 - (b) Alignments.
 - (8) Testing requirements.
 - (9) Cleanliness requirements.
 - (10) Technical manuals and their usage.
 - (11) Drawings and their usage.
 - (12) Work packaging administration.
 - b. NDT inspectors and welders should cover the following areas:
 - (1) NAVSEA S9074-AR-GIB-010/278; Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery Piping and Pressure Vessels.
 - (2) NAVSEA T9074-AD-GIB-010/1688; Fabrication, Welding and Inspection of Submarine Structures.
 - (3) MIL-STD-1689 (for Surface Ships only); Fabrication, Welding and Inspection of Ship's Structures.
 - (4) NAVSEA 0900-LP-001-7000; Fabrication and Inspection of Brazed Piping Systems.
 - (5) NAVSEA T9074-AS-GIB-010/271; Requirements for Nondestructive Testing Methods.
 - (6) MIL-STD-2132; Nondestructive Examination Requirements for Special Applications.
 - (7) Material control.
 - (8) Cleanliness.
 - (9) Work package administration.
 - c. Planners should cover the following areas:
 - (1) SUBSAFE program.
 - (2) Level I program.

- (3) QA forms.
- (4) Welding requirements.
- (5) Manufacturing specifications.
- (6) Cleanliness requirements and specifications.
- (7) Hydrostatic testing.
- (8) Material control.
- (9) Manufactured fittings specifications.
- (10) Plant conditions.
- (11) System flushes.
- (12) NDT requirements.
- (13) Testing requirements.
- (14) Index of technical publications.
- (15) Military standards and specifications.
- (16) Selected record drawings/ship's drawing index.
- (17) Maintenance data systems.
- (18) Blue print reading.
- (19) For activities involved in Scope of Certification maintenance:
 - (a) NAVSEA SS800-AG-MAN-010/P-9290, System Certification Procedures and Criteria Manual for Deep Submergence System.
 - (b) Scope of Certification material control classification.
 - (c) Implodability.
- (20) Submarine Flight Critical Components.

2. Proven training methods include the use of mockups and training aids that show practical application of the lecture material. Hands on mockup training, performed by the workers is the most highly effective method followed by the demonstration of skills by the instructor.

3. Nuclear Training Topics.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH NAVSEAINST C5511.32.

VOLUME V
PART I
CHAPTER 5
IN-PROCESS CONTROL

REFERENCES.

- (a) NAVSEA S9510-AB-ATM-010/020 - Nuclear Powered Submarine Atmosphere Control Manual
- (b) NAVSEA S9086-RJ-STM-010 - NSTM Chapter 504 (Pressure, Temperature and other Mechanical and Electromechanical Measuring Instruments)
- (c) NAVSEA 389-0317 - Procedures for Maintenance and Repair of Naval Reactor Plants (Nuclear)
- (d) NAVSEA 0989-LP-043-0000 - Commissioned Surface Ship General Reactor Plant Overhaul and Repair Specification
- (e) NAVSEA 0989-LP-037-2000 - Commissioned Submarine General Reactor Plant Overhaul and Repair Specification
- (f) NAVSEA S9505-AM-GYD-010 - Submarine Fastening Criteria (Non-Nuclear), Description, Design and Maintenance
- (g) NAVSEA S9086-CJ-STM-010 - NSTM Chapter 075 (Threaded Fasteners)
- (h) MIL-STD-1330 - Standard Practice for Precision Cleaning and Testing of Shipboard Oxygen, Helium, Helium-Oxygen, Nitrogen and Hydrogen Systems
- (i) NAVSEA S9086-T4-STM-010 - NSTM Chapter 589 (Cranes)
- (j) NAVSEA MS 7650-081-091 - Submarine Hull Inspection
- (k) NAVSEA MS 6310-081-015 - Submarine Preservation
- (l) NAVSEA 0989-064-3000 - Cleanliness Requirements for Nuclear Propulsion Plant Maintenance and Construction
- (m) NAVSEA 0989-LP-058-1000 - Destroyer Tender and Submarine Tender Nuclear Support Facilities Overhaul and Repair Specification
- (n) MIL-STD-767 - Cleaning Requirements for Special Purpose Equipment, Including Piping Systems
- (o) NAVSEAINST 9210.41 - All Naval Nuclear Propulsion Plants - Use of Standard Lubricants and Penetrating Fluid; Requirements for
- (p) NAVSEA S9086-CM-STM-010 - NSTM Chapter 078 (Gaskets, Packing and Seals)
- (q) MIL-STD-413 - Visual Inspection Guide for Elastomeric O-Rings
- (r) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (s) COMSUBLANTNOTE C3120 - Submarine Operating Restrictions and Depth Authorizations
- (t) COMSUBPACNOTE C3120 - Submarine Operating Restrictions and Depth Authorizations
- (u) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (v) Fly-By-Wire Ship Control System Certification Boundary Book (ship specific)
- (w) NAVSEA SL720-AA-MAN-020 - Fleet Modernization Program (FMP) Management and Operations Manual
- (x) NAVICPINST 4441.170 - COSAL Use and Maintenance Manual

LISTING OF APPENDICES.

- A Determining Software Usability
- B Format for Submarine Certification Continuity Report
- C Format for Fleet Maintenance Activity Certification Report to Tended Submarine
- D Format for Non-Fleet Maintenance Activity Certification Report to Tended Submarine
- E RPCCR Cover Letter for SHIPALTS (Sample)
- F Technical Manual Deficiency Report (TMDER)
- G Fleet COSAL Feedback Report

5.1 PURPOSE. To provide the requirements or direct the user to the appropriate references to ensure that maintenance performed during the ship's life cycle (new construction through decommissioning) supports certification at all times. Sections 5.4 through 5.7 of this chapter provide explicit inspection and acceptance criteria. This guidance is adequate for all non-nuclear, non-Submarine Safety (SUBSAFE), non-Scope of Certification (SOC)/Deep Submergence Systems (DSS) and Fly-By-Wire Ship Control Systems (FBW SCS) maintenance performed by forces afloat. All material used within any nuclear and non-nuclear submarine pressure hull shall be certified for use in accordance with reference (a).

5.2 TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT.

5.2.1 General Requirements. Test, Measuring and Diagnostic Equipment (TMDE) for in-process work must be properly selected and used. TMDE requiring periodic calibration must be within its calibration periodicity when in use. All TMDE should be selected ensuring the equipment is of the proper range to perform the test, inspection or repair. The craftsman and Quality Assurance Inspector (QAI) should inspect all TMDE prior to use and reject questionable equipment. When inspections or measurements using TMDE are performed with the results documented on a Quality Assurance (QA) form, the type of equipment, range, serial numbers and calibration due dates for TMDE used will be recorded on the QA form as part of the Objective Quality Evidence (OQE).

5.2.2 Torque Wrenches.

- a. Selection. Torque wrenches should be selected in such a manner that the required final torque falls within 20% to 90% of the torque wrench range. For example:
 - (1) A torque wrench with a scale range of 0-100 ft-lbs can be used for a maximum torque of 90 ft-lbs and a minimum torque of 20 ft-lbs.
 - (2) A torque wrench with a scale range of 50-250 ft-lbs can be used for a maximum torque of 225 ft-lbs and a minimum torque of 50 ft-lbs.
- b. Calibration. Calibration should be verified to be within the required periodicity (based on due date on the calibration label) prior to use. Most Navy torque wrenches are calibrated for use in one direction only. These tools will have a label affixed stating, "Use Clockwise Only" or "Use Counterclockwise Only". The tool can be used only in the direction indicated. Torque tools calibrated for bi-directional use will bear a yellow "SPECIAL CALIBRATION" tag or label indicating that the tool was calibrated for use in both directions. Navy torque wrenches can be calibrated for bi-directional use only if specifically authorized by model number in the latest Naval Sea Systems Command (NAVSEA) OD 45845.
- c. Micrometer adjustable torque wrenches. To ensure acceptable performance of micrometer adjusted torque wrenches, users must adhere to the following requirements:
 - (1) Exercise the wrench (apply pressure until snap mechanism activates) six times at approximately 60 percent of the rated maximum value before each use. This procedure minimizes the erratic readings often experienced with this type of wrench during the first few activations.
 - (2) Micrometer-type wrenches to be used in counterclockwise applications should be calibrated in the counterclockwise direction and marked as such.
 - (3) Some micrometer "click" type torque wrenches do not accommodate torque values down to 20 percent of the maximum rated capacity. Requests to use a specific torque wrench/meter, outside of the ranges specified above, require an engineering evaluation and written authorization from a technical warrant.
- d. Extensions/Adapters. Torque wrenches are calibrated based on the specific length of the wrench as established by the wrench manufacturer. Use of an extension changes the effective length of the wrench. The actual torque being applied to the fastener will be different than that indicated on the wrench dial. Any time extensions are used, the following mathematical formulas should be used to determine the wrench dial reading required for the required applied torque:

NOTE: EXTENSIONS CAN SIGNIFICANTLY AFFECT THE APPLIED TORQUE TO INDICATED TORQUE RELATIONSHIP. ANY EXTENSION OTHER THAN A DIRECT ATTACHMENT (I.E., CROWSFOOT) MUST BE TAKEN INTO ACCOUNT.

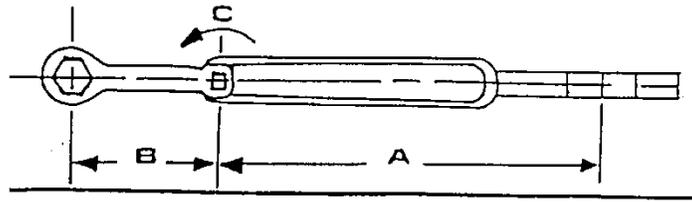
$$T_{ind} = \frac{T_{act} \times L_1}{L_1 + L_2}$$

Where:

| | | |
|-------------|---|--|
| T_{act} | = | Applied torque required |
| T_{ind} | = | Torque indicated on dial |
| L_1 | = | Length of torque wrench |
| $L_1 + L_2$ | = | Length of torque wrench plus length of extension |

When an adapter or extension is used on a torque wrench it increases the torque range of the wrench. The formula for computing torque when using an adapter or extension is explained in Figure 5-1 of this chapter.

Figure 5-1 Use of Torque Wrench Adapters

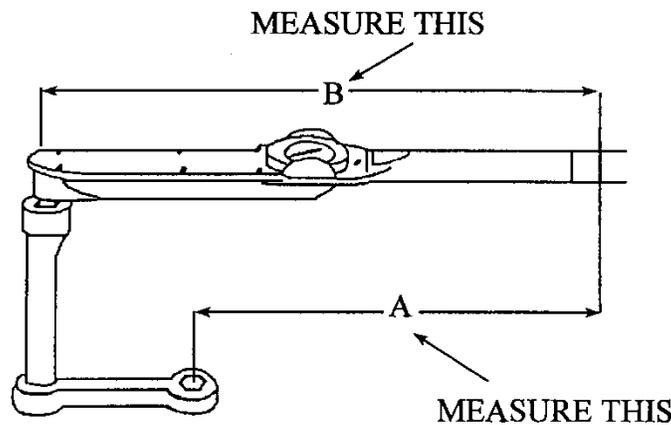


FORMULA FOR USING ADAPTERS

C = ACTUAL TORQUE APPLIED TO WRENCH A = DISTANCE FROM DRIVE TO PULLER'S HANDGRIP
 B = LENGTH OF ADAPTER T = TORQUE REQUIRED FOR FASTENER

FORMULA: $C = \frac{A \times T}{A + B}$ PROBLEM: $\frac{28 \times 200}{28 + 9} = \frac{5600}{37} \quad C = 150$

ADAPTER REQUIRING REVERSE CORRECTION



A = TOTAL LENGTH = 18" B = TORQUE WRENCH LENGTH = 24" C = CORRECTION FACTOR = $A \div B = 18 \div 24 = 0.75$
 T = TORQUE REQUIRED FOR FASTENER

FORMULA FOR USE OF CORRECTION FACTOR

D = Actual Torque Applied to Wrench C = Correction Factor = $A \div B$

Formula: $D = \frac{T}{C}$ Problem: $\frac{200}{.75} = 266$

5.2.3 Gauges.

- a. General. Gauges used for in-process functions, whether installed in the system or temporary, must be verified to be within calibration periodicity prior to use. Craftsmen should ensure the appropriate calibration information is recorded on the QA form.

- b. Non-Nuclear Hydrostatic Testing. Master test gauges and backup gauges used for hydrostatic testing shall be selected and the calibration verified current in accordance with reference (b) and Volume IV, Chapter 9 of this manual.

5.3 TORQUE.

5.3.1 General Requirements. Care must be used when torquing fasteners or plugs. Special attention is required to select the proper torque specification for a given application/specification as it is specifically selected to reduce the tendency for the fastener to loosen in service and to improve the fastener fatigue life. Torque requirements found in drawings, Maintenance Standards (MS) or technical manuals, etc. will be used in preference to general guides for torquing. If no specific torque requirement exists, references (c), (d), (e), (f) or reference (g) may be used as guidance but ensure that the information applies exactly to the system and fastener type being torqued.

5.4 INSPECTIONS.

5.4.1 General Requirements. This section provides the minimum requirements and guidance for the performance of inspections. Inspections during the performance of maintenance form one of the fundamental elements essential in assuring that the task is completed properly and in compliance with all specifications. Inspections occur during the in-process phase of repair/maintenance (disassembly, repair, and re-assembly) and the re-certification phase (testing). Inspections serve to provide a careful and critical examination of the areas being inspected and form one of the cornerstones of a successful QA Program. Use of inspections have and will continue to establish the OQE necessary for ensuring compliance to technical requirements.

5.4.2 Inspection Records. Inspection records provide a lasting record that the inspection was performed and completed according to the applicable specifications. Inspection records will be maintained when required for OQE and will be documented on appropriate QA forms contained in this volume, or as Certification Signature Blocks in the Formal Work Package (FWP).

5.4.3 Critical Inspections. An inspection on any system or component, which by its nature is so critical to the successful completion of the task, that the inspection requires verification by a separate individual, other than the craftsman, qualified as an inspector. These inspections will be annotated in the written work procedure by the presence of an (I) or circle I, or in the case of Cleanliness Inspections (CI) or circle CI in the margin next to the applicable paragraph requiring the inspection and will be documented either as a Certification Signature Block (for those nuclear work items in Part 2 Chapter 1 of this volume) or signature, as applicable, in the FWP or on the appropriate QA form.

NOTE: THESE ARE CONSIDERED MINIMUM REQUIREMENTS FOR USAGE OF AN INDEPENDENT INSPECTOR DURING THE PERFORMANCE OF CONTROLLED WORK. IT MUST BE UNDERSTOOD THAT THE REQUIREMENTS FOR AN INDEPENDENT INSPECTOR DO NOT NECESSARILY MEAN THAT THE DATA PROVIDED IS RETAINABLE AS OQE. VARIOUS SOURCE DOCUMENTS ADDRESS RECORD RETENTION AND SHALL BE FOLLOWED FOR ENSURING THE PROPER OQE IS RETAINED.

- a. Critical Inspections applicable to all platforms are as follows:
 - (1) Inspections performed for all acceptance testing (e.g., hydrostatic testing, drop tests, joint tightness tests, weight tests) for certification of work completed under a Controlled Work Package (CWP). (Nuclear and non-nuclear manually operated valves which have adjustable packing do not require certification by an independent inspector.)
 - (2) Inspections performed to verify permanent markings of Level I material (those which the Fleet Maintenance Activity (FMA) manufacture, upgrade, or transfer to smaller pieces of controlled material). These inspections may also be performed by a Controlled Material Petty Officer.

- (3) Mechanical measurements used to verify wall thickness of components for work performed using a CWP.
 - (4) Inspections performed for post machining of any Level I component.
 - (5) All sealing surface inspections for work performed as a Controlled Assembly.
 - (6) Inspections for oxygen, nitrogen, and hydrogen systems cleanliness as required by reference (h). These independent inspections are performed by personnel qualified as Oxygen Clean Workers in accordance with reference (h).
 - (7) Material receipt inspection. These inspections may also be performed by a Controlled Material Petty Officer.
 - (8) Weight testing to certify or re-certify shipboard cranes when repairs are performed in accordance with reference (i).
 - (9) Performance of Emergent Controlled Work in accordance with Part I, Chapter 2 of this volume.
 - (10) Verification of body bound stud stand out measurements and break away torque for stud installations in SOC, SUBSAFE and Level I systems.
- b. Additional Critical Inspections applicable to submarines and DSSs only.
- (1) Sealing surface inspections for all SUBSAFE Hull Integrity joints and SOC bolted pressure boundary joints.
 - (2) Hull Integrity joint body bound stud inspections. For new stud installations, this includes stud stand out measurements and break away torque verification. For studs that were not removed and are to be reused, this includes verification of markings of significance (.K. or KM) or completion of generic material identification check.
 - (3) Final torque verification of SUBSAFE Hull Integrity and SOC bolted pressure boundary joints.
 - (4) Verification of new controlled material installed into the SUBSAFE or SOC boundary.
 - (5) Verification of proper software installation in SUBSAFE Hull Integrity or SOC bolted pressure boundary joints.
 - (6) Stack height measurement verification for hull packing installation (e.g., periscope, rudder, planes).
 - (7) Seat tightness tests of SUBSAFE hull and backup valves. When seat tightness testing is impractical, verification of stack height and cavity dimensions or seat blue checks as applicable.
- c. Visual inspection of submarine structure in between Unrestricted Operations (URO) MRC 003 Inspections.

NOTE: NOT APPLICABLE TO SUBMARINES AT SEA OR SHIP'S FORCE MAINTENANCE ACTIONS OUTSIDE A SCHEDULED REFIT/FLEET MAINTENANCE AVAILABILITY/CHIEF OF NAVAL OPERATIONS AVAILABILITY. THE SHIP SHALL REPORT ANY UNUSUAL, UNEXPECTED OR POTENTIALLY DANGEROUS CONDITIONS AND/OR LARGE PRESERVATION FAILURES TO THE TYPE COMMANDER (TYCOM) AS SOON AS POSSIBLE. CURRENT SHIP'S MAINTENANCE PROJECT ENTRIES SHALL DOCUMENT DEFICIENCIES FOUND AND DEPARTURES FROM SPECIFICATION (DFS) SHALL BE WRITTEN IF SO DIRECTED BY TYCOM.

- (1) Submarine tanks and other areas not scheduled for a URO MRC 003 inspection and which are more than halfway to the next scheduled URO MRC 003 inspection based on the inspection periodicity, and which are opened/entered for other reasons, shall receive a visual examination in the vicinity of work being conducted and the path to the work by personnel qualified per

reference (j). Any evidence of preservation systems breakdown, corrosion, thickness reduction, and/or deformation and cracking shall be evaluated in accordance with the requirements of references (j) and (k). Any unusual, unexpected or potentially dangerous conditions such as, but not limited to, large preservation failures, extensive early corrosion or severe damage shall be reported immediately to NAVSEA (SEA 07T12) via TYCOM by telefaxed letter or message to determine if there is a structural integrity problem.

- (2) Any normally wetted, previously obscured areas (i.e., areas not visible during normal operations) of the submarine pressure hull, non-pressure hull, tanks and/or supporting structure (interior or exterior) in way of any components, hull insulation, or damping or acoustic material which is removed for other reasons shall receive a visual examination by personnel qualified per reference (j) for any evidence of preservation systems breakdown, corrosion, thickness reduction, and/or deformation and cracking. Any evidence of the above shall be evaluated and corrected in accordance with the requirements of references (j) and (k). Results of examinations shall be submitted in accordance with the reporting format required by references (j) and (k). Any unusual, unexpected, or potentially dangerous conditions such as, but not limited to, large preservation failures, extensive early corrosion, or severe damage shall be reported immediately to NAVSEA (07T12) via TYCOM by telefaxed letter or message to determine if there is a structural integrity problem.

5.4.4 Cleanliness Inspections. Cleanliness controls are required to prevent the entry of foreign material which could interfere with the operation of any system or component. Cleanliness controls are essential during maintenance with the degree of control depending upon the system and work to be accomplished. Steam plant system cleanliness controls are necessary to minimize corrosion of steam plant materials and prevent the entry of foreign materials into the steam plant. Improper cleanliness controls can result in damage to operating machinery, chloride contamination, or fouling of system components. The time spent making sure the work site is clean and system openings are properly controlled will help prevent premature component failure and rework.

- a. Cleanliness Inspectors are individuals who are trained and qualified to perform CI required by work procedures for systems/components requiring cleanliness controls. At the TRIDENT Refit Facilities, they are called Cleanliness Certifiers.

NOTE: ALL SYSTEMS REQUIRE VARYING DEGREES OF CLEANLINESS CONTROLS, BUT MAY NOT REQUIRE AN INDEPENDENT INSPECTOR. CRITICAL QUALITY CONTROL POINT INSPECTIONS BY SUPERVISORY PERSONNEL SHOULD BE USED WHERE APPROPRIATE.

- b. Acceptance inspections of cleanliness by an independent inspector (Cleanliness Certifier/Inspector) are required for the following as a minimum:
- (1) Oxygen, nitrogen, and hydrogen systems per reference (h).
 - (2) Naval Nuclear Propulsion systems.
- c. Results of cleanliness acceptance inspections required by paragraph 5.4.4.b of this chapter shall be documented in the Technical Work Document and certified by a signature. These inspections will be identified by a (CI) or circle CI in the left margin, if performed by an independent inspector.
- d. There are no specific requirements for independent CI/acceptance by a Cleanliness Certifier/Inspector, during steam plant (nuclear or fossil fuel) system maintenance. However, for maintenance involving steam plant (nuclear) systems, the cleanliness requirements for steam plant (nuclear) systems from Chapters 1 and 3 of reference (l) apply. For steam plant (fossil fuel) or general shipboard systems listed in paragraph 5.4.6 of this chapter, the cleanliness requirements shall be determined during the work planning phase. Many jobs may be performed using craftsman to verify cleanliness vice requiring independent Cleanliness Inspector presence. When the risk or consequence of loss of cleanliness is minimal during a maintenance action, such as work requiring bonnet removal from a small steam valve, maintenance of cleanliness may be verified by the craftsman. When the risk or consequences of loss of cleanliness is significant, such as when removing the bonnet from a main steam root valve, work

involving opening of turbine throttles, or when the type or quantity of detrimental materials (e.g., cutting oils) pose a significant risk, the use of an independent inspector to verify maintenance of cleanliness should be considered by the Department Head, Quality Assurance Officer (QAO), and Planning Officer (if assigned).

- e. It is the responsibility of Ship's Force to ensure the appropriate cleanliness control requirements are incorporated in any maintenance for which clear responsibility for cleanliness is not assigned.

5.4.5 Nuclear Propulsion Plant and Nuclear Support Facility General Cleanliness Requirements.

5.4.5.1 Reactor Plant.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH NAVSEAINST C5511.32.

5.4.5.2 Steam Plant. Reference (l) provides a list of applicable steam plant systems and the minimum steam plant cleanliness requirements. It applies to all steam plant work performed in naval nuclear powered ships when not at a shipyard. This chapter also applies to steam plant work performed by forces afloat when at a shipyard.

- a. Nuclear powered ship steam plant maintenance affecting those systems listed in Chapter 1 of reference (l) shall be assigned only to activities that have reference (l) in force.
- b. The Steam Plant Manual/Steam and Electric Plant Manual shall be consulted for cleanliness requirements when performing steam plant maintenance.
- c. If a loss of cleanliness occurs as explained in reference (l), then cleanliness shall be reestablished according to the requirements and procedures of reference (l). Additionally, upon a loss of cleanliness the QAO, the Lead Work Center Division Officer, and appropriate Department Head(s) will approve the recovery procedure.
- d. Control of tools and maintenance products will be per reference (l).
- e. Reference (l) cleanliness requirements for Nuclear Aircraft Carrier catapult steam and drain systems shall be complied with regardless of which Department Head has responsibility for the system.

5.4.5.3 Nuclear Support Facility.

- a. Reference (m) provides specific cases that invoke reference (l) and reference (n).
- b. Where the above references do not address a specific Nuclear Support Facility system or component, reference (l) may be used for guidance as determined to be appropriate. The component technical manuals and NSTMs should also be consulted for cleanliness requirements as appropriate.

5.4.5.4 Standard Lubricants and Penetrating Fluid. General overhaul specifications for reactor plants and Nuclear Support Facility Manuals for Submarine Tenders require the use of reference (o). Reference (l) contains requirements to control detrimental materials.

5.4.6 General Shipboard Steam Plant Systems Cleanliness Requirements.

5.4.6.1 Purpose. To define the general requirements for cleanliness controls during maintenance/repair of steam plant systems on Surface Force ships.

5.4.6.2 Applicability. The requirements of this paragraph are applicable to the following steam plant systems:

- a. Main Steam.
- b. Auxiliary Steam (Defined as steam which returns to the boiler).
- c. Feedwater.
- d. Condensate.
- e. High Pressure Drains.
- f. Reserve Feedwater.

- g. Heating steam and condensate return piping from distilling units.
- h. Steam drains.

5.4.6.3 Discussion. Significant contamination of boilers with chlorides and/or other detrimental materials has resulted from the introduction of foreign materials into steam plant systems during maintenance onboard conventionally powered ships. The guidance for foreign material exclusion and general cleanliness controls for steam plant system components (e.g., boilers, turbines, condensers) are formally promulgated by NSTMs. However, there is no definitive NAVSEA guidance for many of the steam plant systems piping on conventionally powered ships during maintenance and repair. Therefore, the guidance for cleanliness controls provided in the following paragraphs is for those instances where there is no definitive NAVSEA guidance.

5.4.6.4 Requirements. During general maintenance that breaks the system boundaries, the following cleanliness controls will be implemented:

- a. Maintenance of cleanliness.
 - (1) Temporary covers or plugs will be installed on all steam system piping, components, and tanks opened for work except during the time that the opening must actually be uncovered to perform the work. Covers and plugs will be designed to preclude loose pieces from entering the steam system. Covers and plugs will be rubber, metal, or rigid plastic and will be securely fastened to the component or piping.
 - (2) Following maintenance and prior to removing plugs or covers from inside piping or components, inspect and thoroughly clean the work area to ensure that no tools, rags, lubricants, or other foreign materials are left inside. This includes removal of loose scale and other easily removed corrosion products, as well as removal of residue from grinding, chipping, welding, or other maintenance.
- b. Control of foreign material introduction.
 - (1) New or repaired components should be cleaned to the maximum extent practical without disassembly prior to installation into the system to ensure preservatives, desiccants, etc. are removed.
 - (2) Assembly and maintenance may require the use of lubricants, sealants, and other compounds. Those compounds should be used only as authorized and only applied in the flow path, if authorized by the process instruction.
 - (3) During all maintenance, ensure action is taken to ensure all foreign materials are removed following the maintenance and prior to system operations.
 - (4) Water used for cleaning or flushing steam plant systems must meet the criteria for steam plant makeup/feedwater.
- c. Verification of cleanliness. When verification of cleanliness is required, verification should be accomplished by visual inspection. If configuration of the system or component precludes visual inspection, and cleanliness has not been maintained, then flushing may be used to verify cleanliness.
 - (1) Visual inspections will be conducted using normal reading level lighting. Mirrors and borescopes may be used provided resolution is sufficient to verify cleanliness.
 - (2) Components should not be disassembled just to conduct visual cleanliness verification. Instead a flush may be used to verify cleanliness. Valves may have the visual inspection performed on the accessible portions of the flow area.
 - (3) Flushes will be conducted for period of not less than five minutes.
 - (4) Visual inspection acceptance criteria.
 - (a) No grease, oil, or other foreign material.
 - (b) For uncoated surfaces, tightly adherent corrosion products typical for the type of material (e.g., carbon steel) are acceptable. No loose corrosion products may be present.

- (c) For coated surfaces, the coating must be acceptable to the process instruction used to apply the coating. No loose corrosion products may be present.
- (5) Flush acceptance criteria (Visual).
 - (a) For water flushing, the water sample must be free of foreign material.
 - (b) For steam flushing, a sample of condensate downstream of the area being flushed must be free of foreign material.
 - (c) For lines flushed with compressed gas, place a white filter cloth at the outlet to collect debris. After flushing, the cloth must contain only light speckling and/or staining due to rust and dirt and must contain no readily apparent quantities of foreign materials (e.g., metal shavings, abrasive grit, oil).
 - (d) For piping where direct sampling of the flush effluent is not possible, the following requirements apply:
 - 1 For lines that cannot be directly sampled during flushing (e.g., lines that discharge into a tank or condenser without drains or sample taps between the area being flushed and the tank), flush for five minutes. Sample the collected discharge from the tank, the water sample must be free of foreign material.
 - 2 Dead-ended piping in a line being flushed by opening a mechanical connection, will have water, steam, or gas (as applicable) flushed past the dead end connection to the main stream for a minimum of five minutes at the maximum practical flow rate. When cleanliness is verified for the main stream, it is also verified for the dead-ended piping.
 - 3 For piping which cannot be sampled because it discharges overboard, flush for at least five minutes. No acceptance criteria are applicable.

NOTE: CLASS 3 STUDS KNOWN TO BE SET WITH ANAEROBIC SEALING COMPOUND BASED UPON DRAWINGS REQUIREMENTS OR OTHER OQE MAY USE THE "IN-SERVICE ANAEROBIC STUD ROTATION" CHECKS FROM QA FORM 34 TO DETERMINE THE ACCEPTABILITY FOR USE WITHOUT RESETTING.

5.4.7 Set Stud Inspection. During disassembly or reassembly, inspect set studs to ensure no rotation is exhibited during nut loosening and tightening. Where direct visual inspection is not possible, marking the top of the stud (e.g., felt tip marker) to a reference point on the assembly may be used. Rotation of any stud during disassembly is cause for rejection (except studs known to be class 3 studs set with anaerobic sealing compound) and the stud must be reset prior to final assembly. If marking is used, use care to not remove material markings such as material color coding during marking removal.

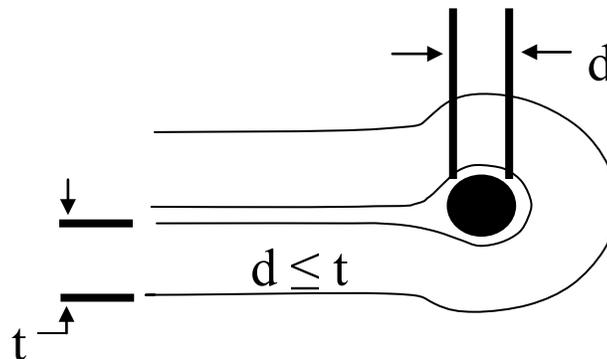
5.5 SOFTWARE.

5.5.1 Determination of Acceptability and Use of Piping System Software. To assist in the determination of acceptability of non-metallic packing materials (e.g., O-Rings, wall seals) for installation in non-nuclear and nuclear systems, decision aids have been developed from reference (p) and are provided in Appendix A. In case of question or conflict the requirements of reference (p) apply. Additional guidance regarding non-metallic seals is provided in the following paragraphs.

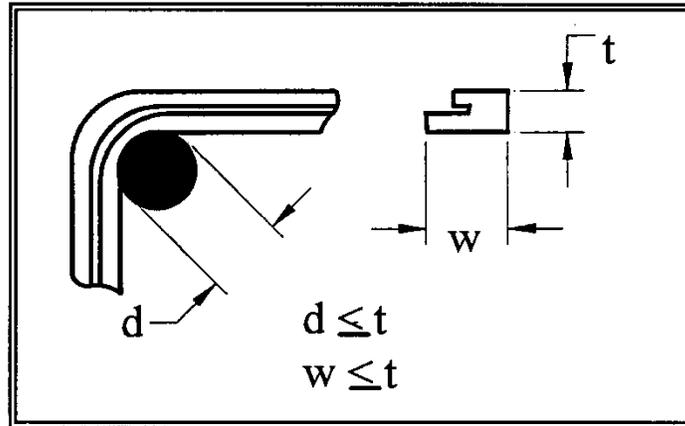
- a. It is Fleet policy that software (e.g., O-Rings, gaskets) will be reused only as a last resort. If new software is not available, software may be used after satisfactory inspection for damage, resiliency, discoloration, or cracking in accordance with reference (p).
- b. In all cases, the guidance provided in applicable NAVSEA technical documents (e.g., drawings, component technical manuals, references (p) and (q) for nuclear and non-nuclear applications) will be followed.

- c. Reuse of software during daily Planned Maintenance System (PMS) or other specified situations. The practice of not reusing software does not apply to items of daily PMS (e.g., drain pump strainer, lubricating oil strainers) or the Logistics Escape Trunk on submarines and, therefore, the O-Ring or gaskets may be reused provided the software has been inspected and is not damaged.
- d. Software which have exceeded their recommended shelf life may be used in naval reactor plant applications provided the following criteria are met:
- (1) The software has been properly stored in its original package.
 - (2) Software shall be inspected as part of issuing the software for a job or prior to installation. Inspection by a QAI or Controlled Material Petty Officer is not required. No certification signatures are required. The user activity shall define who shall test software with expired shelf lives to ensure they are adequately tested.
 - (3) Except for tubing, each surface of the material shall be examined. For tubing, only the outside surface shall be examined. The software shall be resilient and show no evidence of cracking, discoloration, flaking, tackiness, brittleness, surface contaminants, or other physical damage. Further, each surface shall be inspected and shall exhibit no cracks under 5X magnification when it is deformed as follows:
 - (a) For flat pieces, strips, and O-Rings, bend material onto itself over a rod of diameter (d) no greater than the cross sectional thickness (t) as illustrated in Figure 5-2 below:

Figure 5-2 Simple Software Deformation Inspection



- (b) For complex shapes or parts with non-uniform cross section which closely resemble flat pieces, strips, or O-Rings, bend the material at least 90 degrees over a rod of diameter (d) no greater than the maximum cross sectional thickness (t or w) as illustrated in Figure 5-3 below.

Figure 5-3 Complex Software Deformation Inspection

- (c) For parts which do not fall into the above categories and parts which are too stiff to be deformed as required, approval shall be obtained on a case basis from the respective Reactor Plant Planning Yard via a Liaison Action Request per Part I, Chapter 8, Section 8.4 of this volume.

5.6 SUBMARINE SAFETY MAINTENANCE CERTIFICATION/RE-ENTRY CONTROL NUCLEAR AND NON-NUCLEAR.

5.6.1 Purpose. To promulgate the policy and procedures for:

- a. Maintaining continuity of SUBSAFE certification during the operating cycle.
- b. General Maintenance Certification Record administrative requirements.

5.6.1.1 General.

- a. Reference (r) establishes the SUBSAFE certification criteria which must be accomplished on submarines in order for NAVSEA to recommend UROs to design test depth. Once the certification criteria are satisfied, NAVSEA will make a recommendation to the appropriate TYCOM that the submarine be authorized for URO to design test depth. Based upon the NAVSEA recommendation, TYCOM will authorize the submarine to operate to design test depth, or some lesser depth depending upon specific conditions. Each TYCOM summarizes the authorized operating depths and restrictions for ships in reference (s) or (t).
- b. Continued URO to design test depth is dependent on:
 - (1) The positive control and re-certification of all re-entries into the SUBSAFE or hull integrity boundaries of the ship and
 - (2) The satisfactory and timely completion of URO MRC requirements.

5.6.2 Re-Entry Control Program.

- a. Applicability. This section is applicable whenever work is accomplished within a SUBSAFE boundary as defined by SUBSAFE Requirements Manual, reference (r), and as depicted in the SUBSAFE Certification Boundary Book.

NOTE: SUBSAFE REQUIREMENTS MANUAL IS THE FINAL AUTHORITY FOR DETERMINING IF AN ITEM IS WITHIN THE SUBSAFE BOUNDARY. THE SUBSAFE CERTIFICATION BOUNDARY BOOK IS AN ILLUSTRATED REFERENCE TO AID IN THE DETERMINATION OF WHETHER AN ITEM IS SUBSAFE OR NOT.

- b. General. The Re-Entry Control (REC) Program includes those elements associated with maintenance and/or repair necessary to maintain the certification established by NAVSEA. The program provides auditable OQE of the following:
 - (1) What work was accomplished, including material and components used, re-test requirements, tests performed, and test data.
 - (2) Why work was required.
 - (3) Who authorized and accepted the REC.
 - (4) Who did the work.
 - (5) When and where the work was accomplished, including the work and re-test boundaries.
- c. When it becomes necessary to re-enter a SUBSAFE certified system or structure, it will be accomplished in accordance with the requirements and procedures of paragraph 5.6.4 of this chapter. Specific direction on completing the Maintenance Certification Record (MCR) (QA form 9) is contained in the instructions for QA form 9.
- d. Some exceptions to RECs are allowed due to frequent entry into the certified boundary for routine operations or maintenance actions. These exceptions and administrative and/or operational control requirements are contained in paragraph 5.6.7 of this chapter.
- e. NAVSEA SUBSAFE Grams are not authorized for use by submarines or maintenance activities managed by the TYCOM. SUBSAFE Grams will be engineered into the Joint Fleet Maintenance Manual where appropriate.

5.6.3 Nuclear Submarine Safety System Re-Entry. When Re-Entry of a nuclear SUBSAFE system or a portion of a nuclear SUBSAFE system is necessary, the applicable Reactor Plant Manual, reference (e), and the ship's specific Reactor Plant Work Accomplishment Report (RPWAR) will be reviewed and used to provide technical guidance. Nuclear SUBSAFE Re-Entry will be in accordance with the requirements and procedures of Section 5.7 of this chapter. Nuclear SUBSAFE RECs shall be marked in Block 2 of the QA-9 as SUBSAFE and NUCLEAR. Approval to open and close the Nuclear REC will be in accordance with Part I, Chapter 2, Appendix D of this volume using the "NUC" review and approval matrix.

5.6.3.1 Reactor Plant Planning Yard Liaison Action Requests.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH NAVSEAINST C5511.32.

5.6.4 Re-Entry Control Administrative Procedures.

- a. General. REC procedures provide a continuous, auditable record of work done on fully certified systems to provide positive assurance that they remain "certified". Continuity of Certification is mandatory throughout the operational life of the ship to ensure URO to design test depth.
- b. REC. When re-entry of a SUBSAFE system or a portion of a SUBSAFE system (or component) is necessary, the work and re-certification of the work will be documented using the MCR/REC, QA form 9.
 - (1) A MCR/REC will be used for each re-entry of the pressure hull and/or each certified system, certified component or portion thereof as defined by the SUBSAFE certification boundaries.
 - (2) A MCR/REC will be restricted to a single system within a single mapping plan, a single component removed from a system, or a single component removed/worked that requires multiple mapping plans (e.g., trash disposal unit, Main Sea Water hull/backup valves and hydraulic actuators, modified after signal ejectors).
 - (3) When a MCR/REC is opened by a ship to permit removal of a component by Ship's Force for repair by an FMA as a "ship to shop" job, a MCR/REC must be opened by the FMA to cover the work and retesting of the work center work performed by the FMA.
 - (4) Where other certified systems must be re-entered to accomplish a MCR/REC, each system will have its own MCR/REC, except as described in paragraph 5.6.4.b.(2) above.

- (5) The MCR/REC and records of MCR/REC will contain all of the OQE necessary to comply with paragraph 5.6.2.b above.
- (6) The work procedures associated with a MCR/REC will contain sufficiently detailed instructions to assure that all requirements for certification are properly accomplished and documented.
- (7) Work and test boundaries will be defined in terms that are unique and directly identifiable with the specific mapping plan and/or task involved.
- (8) When work and test boundaries are different, both boundaries will be set forth. The work boundaries, test boundaries and pressure boundaries should be specified and should not be confused. Work boundaries define the limits to which work was performed. Test boundaries define the limits for testing to certify the work; these tests may involve actuators, indicators or components other than those actually repaired. Pressure boundaries define (perhaps by valve lineups) the limits of the system which were pressurized to hydrostatically test the work. The pressure boundaries and test boundaries may be the same.
- (9) On a “ship to shop” job the work boundaries may be best described by system joint designators even though those joints were not “disturbed” by the FMA (e.g., rebuild a Rubber Insert Sound Isolation Coupling (RISIC), the work/test boundaries will be the end flanges that bolt up to the system, the joint identification numbers may be clearest identification of that boundary point).
- (10) Previously certified hardware will be reused when certification is not affected by the re-entry, or when it can be recertified. The words “replace”, “repair”, and “re-install” should be used carefully. “Replace” means the use of a different/new component, while “re-install” indicates the use of the previously installed component, whether repaired or not. “Repair” indicates that some refurbishment, other than mere disassembly and/or cleaning, was performed.
- (11) Associated supporting documents such as Nondestructive Testing (NDT) records, material certification, test data, etc., will be specifically identified and referenced on the MCR/REC.
- (12) When it becomes necessary for an FMA to re-enter a certified component (periscopes, Auxiliary Sea Water pumps, Electronic Warfare Support Measures masts) which will not be returned to the ship from which it was removed, or when a component is re-entered when the ship on which it will be installed is not present, the FMA will control the work and document the re-entry using a QA form 9, MCR/REC. The MCR/REC will be initiated and closed out by the FMA. A copy of the completed MCR/REC will accompany the component when it is installed in a certified SUBSAFE submarine or shipped to another activity as proof of certification. These controls are required whether the certified component is to be installed in a SUBSAFE certified ship or stored. Each component must retain its certification. These RECs are separate from and in addition to any MCR/REC required for removal of a component from SUBSAFE system and are only necessary whenever the original component will not be returned during the current availability to the ship from which it was removed.
- (13) The CWP/REC Log, QA form 11 will be established and maintained by the QAO in accordance with the detailed instructions for QA form 11 in Part I, Chapter 11 of this volume. The QA form 11 shall be reviewed by the QAO to verify all MCR/RECs are closed prior to submerged operations. The FMA QAO will maintain a log for the FMA only and one for each tended ship RECs. The QA form 11 shall be reviewed by the FMA QAO to verify all FMA MCR/RECs are closed prior to underway operations of each tended ship.
- (14) Revisions to the MCR/REC are required for the following:
 - (a) Change in work boundaries (e.g., breaking additional or new mechanical joints not previously identified on the MCR/REC). A REC revision is not required to delete undisturbed joints. Deletion of joints must be authorized by cognizant technical authority and documented in the REC package. Block 13 must be annotated to reflect joint deletions prior to signing REC Block 16.

- (b) Change in NDT or test requirements (e.g., “J” vice H hydrostatic test, when “H” was originally specified). This does not include a DFS for unaccomplished testing. A REC revision is not required for NDT incidental to minor repairs as defined in paragraph 5.6.4.b.(14) (d) below. NDT results must be documented in the REC package.
 - (c) Scope of work changes (e.g., originally replace software changed to weld repair sealing surfaces, originally replace software changed to metallic pressure boundary part replacement).
 - (d) The REC does not require revision in order to conduct minor repairs in support of the original scope of work. These minor repairs must be authorized by cognizant authority and documented in the REC package, with appropriate OQE generated and added to Block 16 prior to the signing of Block 17 of the QA form 9. Hot work is not classified as a minor repair. Minor repairs authorized to be performed without a revision are:
 - 1 Minor machining such that the machining is within the limits of the technical drawing, MS, or technical manual (e.g., taking a skim cut on an O-Ring groove such that the final machined dimensions are within the tolerances of the technical reference).
 - 2 Epoxy repairs.
 - 3 Electroplate repairs.
 - 4 Preventive coating application.
- (15) A revision cannot be used when a new MCR/REC is required (e.g., different system must be entered to conduct repair).
- (16) REC Cancellation and REC Administrative Closeout. In the event a CWP is prepared and the job is planned to be accomplished but for some reason it was cancelled or deferred the following actions should be taken:
- (a) If work was authorized to start, the CWP/REC must be revised to reflect that no work was accomplished and the REC was revised to close administratively. The QA form 11 log will be annotated that the job was “Cancelled”.
 - (b) If work was not authorized to start, and the job has been cancelled, annotate the remaining blocks of the QA form 9 with NA and note that the REC was cancelled and no work was accomplished. Blocks 20 and 21 will be signed to formally close the REC. If the REC was prepared by a Repair Facility, a copy of the QA form 9 will be provided to the tended unit with the Certification Continuity Letter. QA form 11 log will be annotated that the job was “Cancelled”.
 - (c) If work was not authorized to start and the job has been deferred to a future maintenance period, the REC is not required to be cancelled. The QA form 11 log will be annotated as “Deferred”. This is not considered an open REC.
- (17) Prior to every underway for submerged operations, all SUBSAFE RECs shall be closed. Commanding Officers of submarines will submit to Immediate Superior In Command (ISIC) a written report in accordance with paragraph 5.6.8 of this chapter. SUBSAFE certification letter is only required after an inport period in which SUBSAFE work was performed.
- (18) Ship’s Force is responsible for providing “Buddy” SUBSAFE, FBW-SCS or DSS-SOC REC serial numbers to outside repair activities performing SUBSAFE, FBW-SCS or DSS-SOC work on shipboard SUBSAFE, FBW-SCS or DSS-SOC systems. The Buddy REC number is issued from ship’s QA-11 log and will be documented on repair activities RE-ENTRY CONTROL FORM. The use of the Ship’s Force Buddy REC number is NOT required for

Chief of Naval Operations/TYCOM scheduled availabilities. The issue of the Ship's Force Buddy REC is an administrative tool to make REC Log keeping easier and ensure the required certification letters are received prior to underway. The Ship's Force Buddy REC does not result in a Ship's Force REC Form, does not require Ship's Force Record Retention and does not allow Ship's Force to participate in the assigned activities work or certification process, except performance of testing. Ship's Force will only issue Buddy RECs to SUBSAFE, FBW-SCS or DSS-SOC certified activities performing SUBSAFE Work.

5.6.5 Using a Controlled Dive Departure from Specification to Close a Maintenance Certification Record/Re-Entry Control. If a MCR/REC is closed by transferring at sea testing to a DFS (e.g., controlled dive to test depth for retest of a periscope hull gland, controlled dive for retest of a sea connected system in lieu of joint tightness test to "J" pressure of Test Pressure Drawing (TPD)), the ship will be restricted, as required by reference (r), as follows:

NOTE: IF AN UNSATISFACTORY CONDITION OR SEAWATER LEAKAGE IN EXCESS OF THE SPECIFICATION IS FOUND DURING THE CONDUCT OF THE CONTROLLED DIVE TO TEST DEPTH, THE SHIP SHALL CONTINUE TO TEST DEPTH UNLESS THE COMMANDING OFFICER DETERMINES IT APPROPRIATE TO ABORT THE DIVE.

- a. Except for the controlled dive to test depth to retest the system/component, ship's depth will be limited to one half test depth plus fifty feet until satisfactory completion of inspections during the controlled dive. The ship will stay at test depth for the time required as detailed in the normal retest procedure (i.e., 30 minutes if the normal joint tightness test is for 30 minutes) plus adequate time to permit inspections.
- b. If inspections of the system/component during the controlled dive are satisfactory, the ship is released for UROs with no immediate report required. Clearance of the DFS will be reported as required by Part I, Chapter 8 of this volume.
- c. If inspections of the system/component during the controlled dive are unsatisfactory, the ship is restricted to one half test depth plus fifty feet as indicated in paragraph 5.6.5a. above, unless specific authorization is received from TYCOM approving URO or changing the depth restriction. The DFS approved to perform the controlled deep dive shall be cancelled and a new major DFS for the failed testing shall be initiated by the ship. An immediate report of unsatisfactory inspections will be made to ISIC and, if required, a request, including Commanding Officer's evaluation of unsatisfactory conditions and justification for request, for approval to conduct operations at depths deeper than one half test depth plus fifty feet will be made to TYCOM with information copy to ISIC and NAVSEA (07T). Deficiencies discovered that are not joints specified for inspection in the MCR/REC and DFS are dispositioned as required by Part I, Chapter 8 of this volume and are not cause for depth restrictions unless the Commanding Officer deems necessary.
- d. Should the presence of an installed Dry Deck Shelter preclude a component requiring deep dive testing from seeing submergence pressure, the requirements of paragraph 5.6.5a. of this chapter shall apply upon removal of the Dry Deck Shelter and shall be so annotated in the approval comments of the deep dive DFS.

5.6.6 Voyage or At Sea Repairs. If emergent repairs or at-sea repairs involve REC work, the ship is limited to 200 feet or less until the ship's Commanding Officer has signed for the closed REC.

- a. If equipment malfunctions (except for casualties affecting recoverability, salvage, watertight integrity, or operation of ship's control surfaces), or seawater leakage in excess of the specification is found during the conduct of the initial tightness dive or the controlled dive to test depth, the ship should continue to the required depth and execute the sea trial agenda unless the Commanding Officer determines it appropriate to abort the dive. The Commanding Officer should be particularly circumspect in the case of leakage locations not isolable by flood control/other closures (e.g., electrical hull penetrators, periscope hoist rods, etc.).
- b. Following completion of the initial tightness dive and the controlled dive to test depth, SUBSAFE deficiencies which result in seawater leakage exceeding the specification for acceptance shall be reported to the TYCOM, NAVSEA and info to all concerned.

- c. If leakage is from an unisolable joint, ship’s depth will be limited to 1/2 test depth plus 50 feet until approval from the TYCOM is received to continue trials at depths greater than 1/2 test depth plus 50 feet.

5.6.7 Exceptions to Re-Entry Control. Table 5-1 of this chapter includes certain systems and equipment within the certified SUBSAFE boundary which require frequent entry into the certified boundary for routine operations or maintenance actions in order to enable the ship to carry out its mission. The operational requirements for these systems and equipment have been reviewed. Inherent operational controls in the present system are considered adequate and the below listed items are considered safe exceptions to the formalized REC system. The operational control which is considered as meeting the intent of the REC requirements is listed beside each item and must be in effect in order to use the exception. Some REC exceptions permit removal of material from the installed system to perform maintenance or testing. The original material must be reinstalled or a complete REC (controlled work package) must be used to capture the installation of new Level I material and/or certification testing for new material.

NOTE: MCR/REC EXCEPTIONS ARE FOR SHIP’S FORCE USE ONLY AND ARE NOT AUTHORIZED FOR USE BY REPAIR ACTIVITIES. REPAIR ACTIVITIES SHALL NOT REQUEST THE SHIP TO INVOKE A REC EXCEPTION IN CONJUNCTION WITH REPAIR ACTIVITY WORK.

NOTE: REC EXCEPTIONS ARE NOT AUTHORIZED TO BE USED FOR THE INSTALLATION OF NEW LEVEL I HARDWARE WITHIN THE SUBSAFE BOUNDARY.

Table 5-1 Re-Entry Control Exception List (SUBSAFE)

| REC EXCEPTION ITEM | OPERATIONAL CONTROL REQUIREMENT | RECERTIFICATION TESTING |
|--|--|-------------------------|
| Operation of access hatches and watertight doors | Ship’s operating instructions (Note 1) | None |
| Operation of trash disposal unit | Ship’s operating instructions (Note 1) | None |
| Streaming and retrieving the floating wire antenna | Ship’s operating instructions (Note 1) | None |
| Normal operation of signal ejector/launcher and hand ram operations | Ship’s operating instructions (Note 1) | None |
| Operating of shore services trunk and hook-up and disconnect of shore power, including removal and replacement of shore power covers | Ship’s operating instructions (Note 1) | None |
| Normal operation of torpedo tube system | Ship’s operating instructions (Note 1) | None |
| Entry into Auxiliary Tanks modified for storage (Does not include changing tank from wet to dry or vice versa) | Ship’s operating instructions (Note 1) | None |
| Streaming and retrieving of towed array sonar systems | Ship’s operating instructions (Note 1) | None |
| Operation of dry sonar sphere access hatch | Ship’s operating instructions (Note 1) | None |
| Removal/Reinstallation of MS plugs (9/16” and smaller) including test fittings for gauge test or hydrostatic test | FWP/Controlled assembly (Notes 2 and 3) | Note 4 |
| Removal/Reinstallation external salvage pipe cap | FWP/Controlled assembly (Notes 2 and 3) | None |
| Operation of Electronic Warfare Support Measure nitrogen purge lines | Operation by qualified FMA Electronic Warfare Support Measure repair personnel | None |
| Operation of periscope gassing valve | Operation by qualified FMA or RMC periscope repair personnel | None |
| Cleaning Sea Water Injection Strainers | FWP/Controlled assembly (Notes 2 and 3) | None |
| Main closure regreasing on MOD 25 MSW pumps, SSN 21 and SSN 774 Class Sea Water Pumps | FWP/Controlled assembly (Notes 2 and 3) | None |

| REC EXCEPTION ITEM | OPERATIONAL CONTROL REQUIREMENT | RECERTIFICATION TESTING |
|---|---|-------------------------|
| Fresh Water Flushing of Towed Array Handling System Valve/Seal Assembly | FWP/Controlled assembly (Notes 2 and 3) | None |
| Removal/Reinstallation of the special test plug from MSW and ASW hull and backup valve body access covers | FWP/Controlled assembly (Notes 2 and 3) | None |
| Cleaning of Main or Auxiliary Sea Water Pump Cyclone Separator | FWP/Controlled assembly (Notes 2 and 3) | None |

Notes:

- (1) Ship's operating instructions are procedures approved and signed by the Commanding Officer, or for SSN 688 and later classes of submarines, procedures promulgated in the Ship Systems Manual and Steam and Electric Plant Manual.
- (2) An FWP, in accordance with Part I, Chapter 2, paragraph 2.2.3 of this volume, will be used to control and document all work performed as a REC exception.
- (3) Controlled assembly requirements are:
 - (a) Verification that surface finishes of gasket/o-ring sealing surfaces are in accordance with applicable specifications.
 - (b) Verification that fastener material and installation is in accordance with applicable specifications.
 - (c) Verification that gaskets/o-rings are properly installed and in accordance with applicable specifications.
 - (d) Assembly is documented on a QA form 34.
 - (e) Inspected by a Quality Assurance Inspector (QAI) or Quality Assurance Supervisor.
- (4) The re-certification test is an operational test to system operating pressure.

NOTE: EXCEPTIONS FROM REC OTHER THAN THOSE LISTED ABOVE ARE NOT AUTHORIZED.

5.6.8 Certification Continuity Report. In order to ensure continued certification of each submarine, periodic reports are required as follows:

- a. Prior to each underway for submerged operations, all SUBSAFE RECs/**REC exceptions requiring a controlled assembly** shall be closed. Commanding Officers of submarines will submit to ISIC (deployed ISIC, if deployed), a written certification continuity report, which addresses the status of Ship's Force SUBSAFE/Submarine Flight Critical Component (SFCC) CWPs/**REC exceptions requiring a controlled assembly**, testing of SUBSAFE/FBW SCS systems, URO maintenance completed and RECs closed by transferring actions to a DFS. Appendix B provides the minimum requirements for the letter. If no SUBSAFE/SFCC controlled work/**REC exceptions requiring a controlled assembly**, testing or URO MRCs were accomplished, no report is required. Certification Continuity Reports may be delivered in person by a command representative, transmitted as a naval message, transmitted via email as an electronically signed PDF, transmitted via email as a signed letter scanned as a PDF.
- b. Prior to the ship's underway after an FMA availability, refit or inport period when SUBSAFE/SFCC work was performed, the FMA Commanding Officer will issue a letter report to each tended submarine, with a copy to parent ISIC, which addresses the status of SUBSAFE/SFCC CWPs, testing of SUBSAFE/FBW SCS systems, URO maintenance requirements completed and SUBSAFE non-conformances (i.e., DFS and LAR). Appendix C provides the minimum requirements for the letter.
- c. Prior to ship's underway, activities other than FMAs which perform SUBSAFE/SFCC maintenance on submarines will issue a letter report to the submarine with a copy to the parent ISIC, certifying that the maintenance performed meets the requirements of applicable specifications invoked by the governing document (e.g., unscheduled availabilities, contract) and the Memorandum of Agreement. Appendix D provides the minimum requirements for the letter.

5.7 REACTOR PLANT WORK ACCOMPLISHMENT REPORT (SUBMARINES ONLY).

5.7.1 Purpose.

- a. The RPWAR form is a listing of those pipe and components of the reactor plant which are SUBSAFE. It is specific for each ship and is provided by the Reactor Plant Planning Yard via the TYCOM. The RPWAR consists of:
 - (1) Status sheet.
 - (2) Cover sheet.
 - (3) RPWAR Master Pages.
 - (4) Addendum Sheet.
 - (5) RPWAR general notes.
- b. The reactor plant hull integrity area is comprised of those items on the RPWAR. Each ship must maintain the RPWAR current. Each completed RPWAR will be filed in an auditable manner along with the latest revision for the ship of the NAVSEA RPWAR status drawing. The reproducible blank RPWAR will be maintained in the same file. The ship will reproduce blanks as necessary to support reactor plant work.
- c. To properly complete the RPWAR, the preparer must review the general notes of the applicable RPWAR and the instructions in reference (e).
- d. To certify (or recertify) a nuclear SUBSAFE item, a RPWAR must be completed by the activity performing the maintenance (ship, FMA or shipyard) in accordance with reference (e) and forwarded as soon as possible to the Reactor Plant Planning Yard with copies to NAVSEA 08, TYCOM, ISIC and the ship. The RPWAR is to be signed in ink and the signed in ink copy should be forwarded to the Reactor Plant Planning Yard. Initials or typed signatures are not permitted. When work is complete, submit only those pages of the RPWAR line items that certify the work accomplished.
- e. The RPWAR does not, in any way, relieve the FMA or ship of its responsibility to comply with all applicable requirements specified in technical manuals, plans, and other NAVSEA documents.
- f. When the FMA works in an area covered by the RPWAR, the ship's Engineer Officer will provide the FMA with a reproduced RPWAR with the number filled in, notes, applicable certification forms and addenda sheet.
- g. Instructions contained in this section are in amplification of those included in reference (e) and the RPWAR drawing itself.

5.7.2 Specific Instructions for Completing Reactor Plant Work Accomplishment Report Cover Sheet.

- a. The ship's hull number must be specified in the space provided (if not already pre-printed).
- b. The reporting activity (ship, FMA or shipyard) must be listed.
- c. The report number must be included. The report number is the next consecutive number to that indicated on the latest completed RPWAR held by the ship.
- d. The report must be dated.
- e. The applicable block specifying when the work was accomplished must be checked.
- f. The signatures and titles of the personnel preparing, reviewing, and approving the RPWAR must be included. Each RPWAR submitted by ships is prepared by the Lead Work Center QAI, reviewed by the QAO and Engineer Officer, and approved by the Commanding Officer. Each RPWAR submitted by an FMA is prepared by the nuclear Planning and Estimating Work Center (10D), reviewed by the Nuclear Repair Officer and QAO, and approved by the Repair Officer.

5.7.3 Specific Instructions for Completing Reactor Plant Certification When New or Previously Uncertified Material is Installed in a Submarine Safety Application.

- a. The applicable revision of the drawing or plan must be referenced in the “DWG. NO. AND REV” block for each item worked on.

NOTE: IF A DRAWING OR PLAN OTHER THAN THAT REFERENCED IN THE “DWG. NO. AND REV” BLOCK IS USED BY THE REPORTING ACTIVITY, THE ACTUAL DRAWING OR PLAN USED SHOULD BE SPECIFIED IN EITHER THE “REMARKS” BLOCK OR ON THE ADDENDA SHEET AS A REFERENCED NOTE. THE REASON FOR USING A DIFFERENT DRAWING OR PLAN SHOULD ALSO BE SPECIFIED.

- b. The identification of the reporting activity’s detailed record should be entered in the “DETAILED RECORD IDENTIFICATION” block if the inspections required by the applicable inspection category were performed by the reporting activity (ship or FMA).

NOTE: THE RECORD RETAINING ACTIVITY, IF OTHER THAN THE REPORTING ACTIVITY, SHOULD BE IDENTIFIED IN THIS BLOCK.

- c. Where sufficient space does not exist for entry of information, refer to the addenda sheet in the “REMARKS” block and enter the required information on the addenda sheet.
- d. The report number will be entered in “REMARKS” block for each line item worked on by the reporting activity.
- e. The signature block must be completed, indicating that the corresponding line item work has been satisfactorily completed and that records substantiating this are on file.
- f. Where SUBSAFE work is accomplished in accordance with an Alteration, the reporting activity will reference, for each work item, the applicable Alteration with revision number in the “REMARKS” block.
- g. Waiver, if any, previously granted for each item must be identified, including reference to the NAVSEA approval letter.

NOTE: IF THE WORK PERFORMED ON THE SUBSAFE ITEM IS SUCH THAT THE PREVIOUS CERTIFICATION IS VOIDED (SUCH AS REPLACEMENT OF A SUBSAFE VALVE TAILPIECE), THE REPAIRED OR ALTERED ITEM MUST BE CERTIFIED AS NEW MATERIAL.

5.7.4 Specific Instructions for Completing Reactor Plant Certification When Previously Certified Material is Reinstalled.

- a. Reinstallation of previously certified material does not require a RPWAR unless specifically called out as a line item on the RPWAR requiring torque or installation verification.
- b. The fastener torque sheet is filled out as follows:
 - (1) The inspection document is the QA form 34, the FWP or CWP serial number and job sequence number.
 - (2) The signature block is signed by the QAI who verified the torque.
 - (3) If sufficient space is not available in the QA form 34, the addenda sheet should be used with the appropriate line item listed.

5.8 MATERIAL CONDITION MONITORING (SUBMARINES ONLY).

5.8.1 Unrestricted Operations Maintenance Requirement Card Program.

- a. The URO MRC program provides the minimum material condition requirements for URO to design test depth, with an established periodicity to accomplish. It is one of the programs required to maintain SUBSAFE certification. Accomplishment of the URO MRC will identify changes within the SUBSAFE or hull integrity boundaries of the ship, which result from the degradation caused by the service environment.

- b. Administration, scheduling and reporting of the URO MRC program will be in accordance with the requirements of Chapter 25, Volume VI of this manual. A summary of URO MRC status will be reported by the submarine Commanding Officer in accordance with paragraph 5.6.8 of this chapter.
- c. When performing corrective maintenance the following guidance is provided with regard to URO MRC:
 - (1) When performing corrective maintenance, associated URO MRCs should be reviewed to determine if the URO MRCs should be accomplished concurrently ahead of scheduled periodicity to preclude having to disassemble equipment again to accomplish the URO MRCs. Ship's schedule or FMA resources may preclude concurrent, early accomplishment of URO MRCs.
 - (2) If URO MRC criteria are used, in total or in part, during corrective maintenance, and a measured parameter is found out of tolerance and not restored, a major DFS must be submitted, in accordance with Part I, Chapter 8 of this volume, even though the periodicity of the URO MRC has not expired.
 - (3) When performing corrective maintenance that does affect a URO MRC measured parameter, perform that portion of the applicable URO MRC. A URO MRC measured parameter is any parameter that is documented on the Data Report Form during the performance of the URO MRC. The following are examples of corrective maintenance that may affect a URO MRC measured parameter:
 - (a) When the retest of the corrective maintenance is a documented URO MRC measured parameter (i.e., Emergency Flood Control Accumulator Tightness Test - URO MRC 026).
 - (b) When maintenance (such as opening mechanical joints or replacing hardware, adjustments, tests) affects the operation of a system inspected/tested by a URO MRC (i.e., Emergency Flood Control - URO MRC 025).
- d. Following installation of an alteration (Ship Alteration (SHIPALT), Alteration and Improvement, Temporary Alteration) that modifies the structure of the Ship, such that access to vital equipment is or may be impacted, the Ship shall evaluate the need to perform URO MRC 029. If access to vital equipment could be restricted, the Ship shall perform URO MRC 029 and provide a copy to the installing activity and the ISIC. Partial accomplishment of URO MRC 029 is acceptable if appropriate for the alteration. If partial accomplishment of the URO MRC is performed, provide a copy to the installing activity and the ISIC. If the complete URO MRC is accomplished, provide a copy to normal distribution.

5.9 SUBMARINE FLY-BY-WIRE MAINTENANCE CERTIFICATION.

5.9.1 Purpose. To promulgate the policy and procedure for:

- a. Maintaining continuity of the FBW SCS certification during the operating cycle.
- b. General Maintenance Certification Record administrative requirements.

5.9.1.1 General.

- a. Reference (u) establishes the FBW SCS certification criteria which must be accomplished on all applicable submarines in order to maintain system certification throughout the operating cycle of the ship. Once a submarine FBW SCS has been certified for unrestricted use or is accepted by the shipbuilder, all work within the SFCC Boundary and testing to support that work shall be accomplished, controlled, and documented in accordance with reference (u).
- b. All other Performance testing within the FBW SCS Boundary, for work within the FBW SCS Boundary shall be accomplished to support system certification and documented using the activity's normal work control processes.
- c. Work is defined as an action that actually or potentially changes (including disassembly and testing) the approved configuration of any part of the FBW SCS or SFCC Boundaries.

- d. The objective of this work control process for work within the SFCC Boundary is to provide maximum confidence that any work and all applicable testing is authorized, controlled, identifiable, and auditable. It provides positive assurance that all SFCC equipment and FBW SCS is restored and tested to a fully certified condition.

5.9.1.2 Applicability. The requirements in this section shall apply to SEAWOLF and VIRGINIA Class Submarine FBW SCSs.

5.9.1.3 Submarine Flight Critical Component Boundary. The Submarine FBW SCS Boundary shall consist of electronic hardware and software within the submarine FBW Boundary (see reference (v)) that process safety critical functions and data elements.

- a. Safety critical electronic components within the SFCC Boundary shall be determined per references (u) and (v) and shall be identified as SFCCs.
- b. Safety critical software units within the SFCC Boundary shall be determined per references (u) and (v). Safety critical software units shall require additional testing and/or analysis, be marked, configuration managed, and controlled per the requirements in reference (u).

5.9.2 Submarine Flight Critical Component Boundary Work Control Procedures.

- a. All fleet activities, In-Service Engineering Activity, repair activities or shipyards (public or private) must use CWPs, Task Group Instructions (TGI), or ripouts to document the accomplishment of work within the SFCC Boundary. CWPs/TGIs/ripouts shall provide greater assurance that any work accomplished is authorized, documented and executed in accordance with specifications and requirements, and is supported by OQE.
- b. Work control documents shall be clearly marked as SFCC for auditing purposes.
- c. Closed TGIs/CWPs/ripouts shall be retained by the work accomplishing activity and are subject to audit by cognizant activities (TYCOM, ISIC, shipyard, supervising authority or NAVSEA) during audits such as functional or certification audits.

5.9.3 Submarine Flight Critical Component Boundary Work Control Closeout.

- a. All CWPs/TGIs/ripouts for work in the SFCC Boundary shall be closed prior to the system being released for unrestricted use/Fast Cruise/Sea Trials. As part of the work control procedure closeout process, CWPs/TGIs/ripouts shall receive an independent review within the activity performing the work to verify:
 - (1) Work was authorized and approved.
 - (2) Work stayed within the authorized boundaries.
 - (3) Post work/maintenance testing was accomplished satisfactorily.
 - (4) Appropriate Quality Assurance Forms are included to document Certification of Maintenance, and all forms are completed with required signatures.
- b. All testing of the FBW SCS Boundary shall be verified closed prior to the system being released for unrestricted use/Fast Cruise/Sea Trials.
- c. As a policy, CWPs/TGIs/ripouts for work within the SFCC Boundary or test documents within the FBW SCS Boundary shall not be closed out until resolution of all actions necessary to verify certification has been maintained when any breach of the boundary has occurred. An acceptable alternative, however, is to close out a CWP/TGI/ripout or test documents within the FBW SCS Boundary by transferring remaining at sea testing actions to a separate auditable accountability system (e.g., Sea Trial Agenda). All CWPs/TGIs/ripouts closed in this manner shall be annotated by the activity with the reference documents that contained the transfer actions. This policy shall be verified by the activity accomplishing the work, supervising authority, submarine Commanding Officer and ISIC.

- d. Prior to each underway for submerged operations, Commanding Officers of FBW SCS submarines will submit to ISIC (deployed ISIC, if deployed), a written certification continuity report, which addresses the status of Ship's Force FBW SCS CWP, testing of FBW SCS, URO maintenance requirements in the format of Appendix B. If no FBW SCS controlled work or testing were accomplished, no report is required.

5.9.4 Objective Quality Evidence to Support Controlled Work on Fly-By-Wire Ship Control System Submarine Flight Critical Component. To standardize maintenance OQE, the following section provides guidance on the key elements needed to be documented to certify the work process, whether routine maintenance, major repairs, system upgrades or alterations. Reference (u) provides OQE requirements including additional attributes to be included as part of the SFCC Boundary work control process. This information should be used as follows:

- a. Activities performing work on FBW SCS within the SFCC Boundary should use this information, along with source documents, as a guide in developing OQE records that document work, inspections and tests performed within the SFCC Boundary.
- b. The elements listed are technical specifications and process documents required for a typical repair or system upgrade/alteration process.
- c. If Upgrades/Alterations or Major Repair Work of the FBW SCS was performed, the ISIC will accomplish a 100% audit, as defined in Part I, Chapter 9 of this volume, of the work. ISIC and TYCOM will use the FBW message reporting process for certification specified in Volume II, Part I, Chapter 3 of this manual, for availabilities of less than six months duration.

5.10 AIRCRAFT CARRIER MAINTENANCE DOCUMENTS.

5.10.1 Purpose. The purpose of this section is to provide amplifying/clarifying information on the processes involved and appropriate use of specific aircraft carrier maintenance related documents. Including:

- a. Request for Departure from Specification (DFS), Waivers or Deviation.
- b. Nuclear Liaison Action Request (LAR).
- c. Nuclear Liaison Inquiry (NLI).
- d. Steam Plant Action Request (SPAR).
- e. Steam Plant Liaison Inquiry (SPLI).
- f. Reactor Plant Configuration Change Report (RPCCR).
- g. Planned Maintenance System (PMS) Technical Feedback Reports (TFBR).
- h. Tech Manual Deficiencies & Manual Change Requests.
- i. Fleet Coordinated Shipboard Allowance List (COSAL) Feedback Reports.

5.10.2 Non-Nuclear Deviations, Waivers and Departure from Specifications. The terms "deviation" and "waiver" are often used synonymously. However, the principle difference is a deviation is requested prior to conducting work that will result in a non-conformance, where a waiver is requested after a non-conformance has been discovered. Requests for deviation and waivers shall be retained and tracked within the DFS system by Ship's Force and the ISIC/TYCOM until permanent documentation is confirmed to reflect the specific non-conforming condition. Use of the Web Based Electronic Departure from Specification or Electronic Waiver and Deviation programs facilitate meeting these requirements. A DFS (non-nuclear system/components only) is used specifically to identify a lack of compliance with plans, procedures, instructions, or authoritative documents during a maintenance action or operations.

5.10.2.1 During a Maintenance Action. A DFS is required for any lack of compliance with cognizant documents or drawings. For an "as found" condition during maintenance, the TYCOM, the ship and the Regional Maintenance Center (if involved) must evaluate the non-compliance using the guidance of paragraphs 8.2.4 and 8.2.5, of Part I, Chapter 8 of this volume to determine if the nonconforming condition meets the criteria as a Major or Minor DFS.

NOTE: IF THE SHIP IS AT SEA THE GUIDANCE OF PARAGRAPH 8.3.8 OF PART I, CHAPTER 8 OF THIS VOLUME APPLIES.

5.10.2.2 During Operations. A DFS is required for any lack of compliance with cognizant documents or drawings. For any “as found” conditions or equipment failures that result in a non-compliance, the ship (and/or TYCOM if in port) must evaluate the condition or failure using the guidance of paragraphs 8.2.4 and 8.2.5 of Part I, Chapter 8 of this volume to determine if the nonconforming condition meets the criteria as a Major or Minor DFS.

- a. If the nonconforming condition does not meet the criteria as a Major or Minor DFS, no DFS is required and the nonconforming condition will be entered in the ship’s Current Ship’s Maintenance Project (CSMP).
- b. If a DFS is required, the request should be processed as soon as possible to enable an engineering evaluation of the non-conformance and subsequent approval or disapproval issued without disrupting ship’s operations.
- c. Requests for DFS will be submitted, approved and cleared in accordance with paragraph 8.3.7 or 8.3.8 of Part I, Chapter 8 of this volume. Use of the Web Based Electronic Departure from Specification and Electronic Waiver and Deviation programs are acceptable unless directed otherwise by TYCOM.
- d. If a DFS is approved as “temporary” and requires rework to correct the discrepant condition at a later date, a new CSMP entry for correction of the discrepant condition will be initiated by the ship. The ship’s QAO shall ensure this action is accomplished.
- e. The QAO shall verify that an active Job Control Number (JCN) exists for all active temporary DFSs at the completion of all scheduled maintenance availabilities or at least quarterly and shall ensure that an auditable record of such verification is maintained until superseded.
- f. For all DFSs, deviations or waivers that have been adjudicated, the approving activity is required to provide a copy of the DFS, deviation or waiver to the ship’s QAO for retention and tracking per Part I, Chapter 8, paragraph 8.3.1.e of this volume.

5.10.3 Liaison Action Requests – Nuclear Cognizant Areas.

5.10.3.1 Technical Responsibilities. A memorandum of agreement exists between NAVSEA Nuclear Propulsion Directorate (08) and NAVSEA PMS 312/335 that details the division of responsibilities within the propulsion plants of nuclear powered ships. If a nuclear powered ship is unable to comply with specifications for reactor plant systems or components and also those systems identified as nuclear by the appropriate nuclear/non-nuclear interface diagram, then a review of NAVSEA 08 requirements shall be requested via a LAR. A formal resolution of all LARs is generally required prior to reactor plant or propulsion plant startup.

5.10.3.2 Technical Resolution. In general, technical resolution to questions or problems for reactor plant systems or components requires the submission of a LAR for nuclear powered surface ships in accordance with the requirements set forth in Appendix 4 (Liaison Services) of reference (d).

- a. Request for DFSs for nuclear systems will neither be requested nor approved. If a ship has a question, problem, or is unable to comply with any nuclear specification, a request for technical resolution will be made using a LAR.
- b. A LAR should not be submitted for cases of out of specification seat leakage of nuclear valves following repairs. The Reactor Plant Planning Yard and Reactor Plant Prime Contractors do not have the authority to waive valve leakage specifications. When valve seat leakage exceeds reactor plant manual specification after attempted Ship’s Force/FMA repairs, the guidance of Part I, Chapter 8, paragraph 8.4.2.c. of this volume may be used to defer any rework to a later date and close out the CWP.
- c. A LAR is also never used for removing or reprogramming work, to or from, an Availability Work Package (AWP).
 - (1) AWP’s for Chief of Naval Operations availabilities are developed and/or changed in accordance with Section 5.1.1 and Appendix D or F of the Aircraft Carrier Class Maintenance Plan (ACCOMP).
 - (2) The ACCOMP can be found on the Carrier Team One website under “Resources/Library”.

- d. An auditable LAR file shall be maintained by the originating activity. A copy of the status of all liaison actions LAR shall be kept as part of this file with a copy maintained in the applicable Controlled/ Formal Work Package, as required.

5.10.4 Nuclear Liaison Inquiry – Nuclear Cognizant Areas.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH NAVSEAINST C5511.32.

5.10.5 Steam Plant Action Request - Non-Nuclear Cognizant Areas. In 2003, the Propulsion Plant Engineering Activity (PPEA) was formed as an additional resource for assisting operational aircraft carriers with technical or operational issues, not associated with Ship Alteration Installation or configuration control.

- a. The Steam Plant Action Request (SPAR) is designed to allow the fleet and maintenance activities to submit requests for technical assistance on non-Ship Alteration related issues. The Carrier Engineering Team (CET) will assist in providing solutions which satisfy specification requirements, supply a technical evaluation or the basis for concurrence or non-concurrence with a deviation or proposed change. Where sufficient information is not available to resolve the problem, the CET may request additional information in a reply. Each SPAR will be categorized based on the type of action taken in the proposed reply.
- b. As with a LAR, if a ship or FMA has a question or technical problem or is unable to comply with a non-nuclear specification, technical assistance is available from the In-Service CET. CET Liaison services are requested using the SPAR discussed in detail in Appendix 4 of reference (d).

5.10.5.1 Usage. SPARs requesting changes or deviations from specification shall not be submitted or approved by the CET. The SPAR is not a substitute for a Request for DFSS described in Part I, Chapter 8 of this volume.

- a. SPAR should be submitted by the ship or FMA to the PPEA to address technical, logistical and/or operational problems with the steam and electric plant systems. It is the intent of these requirements to ensure consistency between fleet units and overhaul and repair activities in the content, format and completeness of SPAR submissions. The SPAR is not intended to replace Ship's Force and Overhaul/Repair Yard communication with the CVN68 class Engineering Configuration Manager for drawing and Ship Change Document/ShipAlt installation and configuration control issues using LARs prepared in accordance with reference (w).
- b. Examples of when generation of a SPAR is appropriate are:
 - (1) Receipt of spurious De-Aerating Feed Tank level alarms during maneuvering transients that the performance of available preventive maintenance and technical manual troubleshooting does not correct.
 - (2) Failure of the Emergency Diesel Generator to parallel across the Emergency Diesel Generator output breaker during a normal Emergency Diesel Generator feedback in accordance with the Steam Plant Manual and troubleshooting do not correct or identify the cause of the failure.
 - (3) Failure of a normal seeking Automatic Bus Transfer to transfer to its normal source upon a return of the normal power supply and Ship's Force is unable to identify the cause through available troubleshooting methods.
- c. The SPAR is not intended to replace:
 - (1) The CSMP for work requests/candidates.
 - (2) TFBRs for discrepancies with the PMS System.
 - (3) Technical Manual Deficiency/Evaluation Reports (TMDER) or Manual Change Requests for identifying discrepancies in technical manuals.
 - (4) Reporting changes to ship's configuration as a result of the Navy Modernization Program.
- d. A SPAR is also never used for removing or reprogramming work to or from an AWP.

- e. AWP for Chief of Naval Operations availabilities are developed in accordance with Section 5.1.1 and Appendix D or F of the ACCMP. The ACCMP can be found on the Carrier Team One website under the "Resources/Library" tab.

5.10.5.2 Validation. Upon receipt of a SPAR, the PPEA makes a determination, with NAVSEA concurrence as needed, as to whether the SPAR is a valid request. Once validated, the PPEA will route the SPAR to the appropriate cognizant engineering activity for resolution. If the appropriate activity is not clear, i.e. in the case of overlapping areas of cognizance, NAVSEA 05V will determine which organization will provide resolution. SPAR responses meeting the criteria below, DO NOT require NAVSEA approval and the PPEA has the authority to provide a final resolution to the requesting activity.

- a. The request concerns a PPEA cognizant system or component as defined in Enclosure (1) to PPEA-1.
- b. The request does not change:
 - (1) Engineering System Diagrams.
 - (2) System diagram attributes, such as system design or performance characteristics, material, pipe size, etc.
 - (3) Steam Plant Manual.
 - (4) Component Procurement Specifications.
 - (5) Component Technical Requirement documents.
 - (6) Component technical manuals.
 - (7) System testing requirements.
 - (8) GSO requirements.
- c. The request has no impact on Reactor Plant systems or components.

5.10.5.3 Categories. Actionable SPARs fall into one of four categories: Emergency, Urgent, Routine, and Date Needed By. Informational SPARs typically do not require a response. Emergency, Urgent, Routine and Date Needed By SPARs require an approved response delivered to the originator as follows:

- a. Routine – within 20 business days.
- b. Urgent – within 5 business days.
- c. Emergency – within 1 business day (24 hours).
- d. Date Needed by: Date specified by the originating activity to support upcoming evolutions or ship's schedule.

5.10.5.4 Coordination. Once a CVN SPAR response is developed, it is subsequently forwarded to NAVSEA 05V for approval. NAVSEA 05V1 coordinates the review and approval process for the various NAVSEA agencies. Any NAVSEA comments to the SPAR response are communicated directly to the responding activity during the approval process and then adjudicated. The approved SPAR response is returned to PPEA, who distributes the response to the ships and appropriate activities. The PPEA provides record retention services for all SPAR responses.

5.10.5.5 Routing. In addition to preparing SPAR responses, the PPEA is tasked as the Process Manager for both the SPAR and SPLI Programs. This involves dispositioning SPARs received, routing to the appropriate activity for resolution, routing of responses to NAVSEA for approval and distribution of approved responses to the requestor and other activities as appropriate.

5.10.5.6 Status. The EFORMS application maintains the status of all SPARs. This application includes the date the SPAR was received, the date the responding activity approved the response, the date the SPAR response was sent to NAVSEA, the current responsible party and current routing status. Reports listing all outstanding and completed SPARs for a desired time period can be retrieved from the application via the search engine function.

5.10.5.7 Software. Naval Sea Logistics Center is responsible for maintaining the EFORMS application that tracks SPAR status from receipt to completion, maintaining a historical file of completed SPARs, and having the ability to provide CET and PPEA management with meaningful statistics on SPAR processing.

5.10.5.8 Process Map. The PPEA SPAR Process Map is shown in detail in Figure 5-4 of this chapter.

5.10.6 Steam Plant Liaison Inquiry – Non-Nuclear Cognizant Areas. SPLIs are the Steam Plant equivalent of an NLI. SPLIs are used by the CET to request information, disseminate technical information associated with the Steam Plant, or direct work that does not require a drawing change or affect system configuration control, to the Fleet and overhaul activities. This document is intended to be a data collection tool only, and in general will not direct Forces Afloat to accomplish any repair, modification, or alteration to systems or components. Following NAVSEA approval, a SPLI is issued to the applicable TYCOM(s), who will forward the request to the appropriate ships via official letter. Each activity shall maintain an auditable file, containing all information associated with each incoming and outgoing (answered) inquiry. A SPLI may be necessary to obtain specific data and other information from Forces Afloat during development of SPAR responses and other CET products.

5.10.6.1 Process Manager. In addition to preparing SPLI's, the PPEA is tasked as the Process Manager for both the SPAR and SPLI Programs. Additionally, the PPEA is responsible for maintaining an SPLI log book/database and providing a historical file of completed SPLIs.

- a. The PPEA is responsible for keeping track of SPLIs in routing for concurrence, SPLIs issued to the fleet for accomplishment and ensuring the log book is updated as SPLIs are completed.
- b. The PPEA will route a copy of all SPLI responses received to the SPLI originator and other parties as applicable. If a SPLI request has exceeded the requested due date without the required response, the applicable CET representative shall contact the TYCOM to establish a revised due date. The final status of an SPLI shall be noted in the SPLI log book/database.
- c. The status of outstanding SPLIs will be reported monthly. The activity's report will be maintained by the PPEA SPAR/SPLI Process Manager and will list only those SPLIs which require a response.

5.10.6.2 Amplifying Information. Amplifying information is provided in the NLI/SPLI Process Map (Figure 5-5 of this chapter).

5.10.7 Reactor Plant Configuration Change Report. RPCCRs are used to report any and all changes to the configuration of any NAVSEA 08 cognizant space. This includes SHIPALTs, Ship Class Drawings, NLIs or any other form of authorized change. Addresses can be found in reference (d) or obtained through the TYCOM as needed.

- a. Formal instructions for completion of RPCCRs is found in Appendix 11 of reference (d). Blocks 1 - 30 (31 if needed) must be filled out in accordance with the instructions found in Appendix 11.
- b. Commanding Officers are directed to forward RPCCR(s) to NAVSEA 08 by official letter, similar to the sample in Appendix E of this chapter, using ship's letterhead with copies to the TYCOM, ANSTR Pittsburgh and A4W/A1G RPPY.

Figure 5-4 - PPEA SPAR Process Map

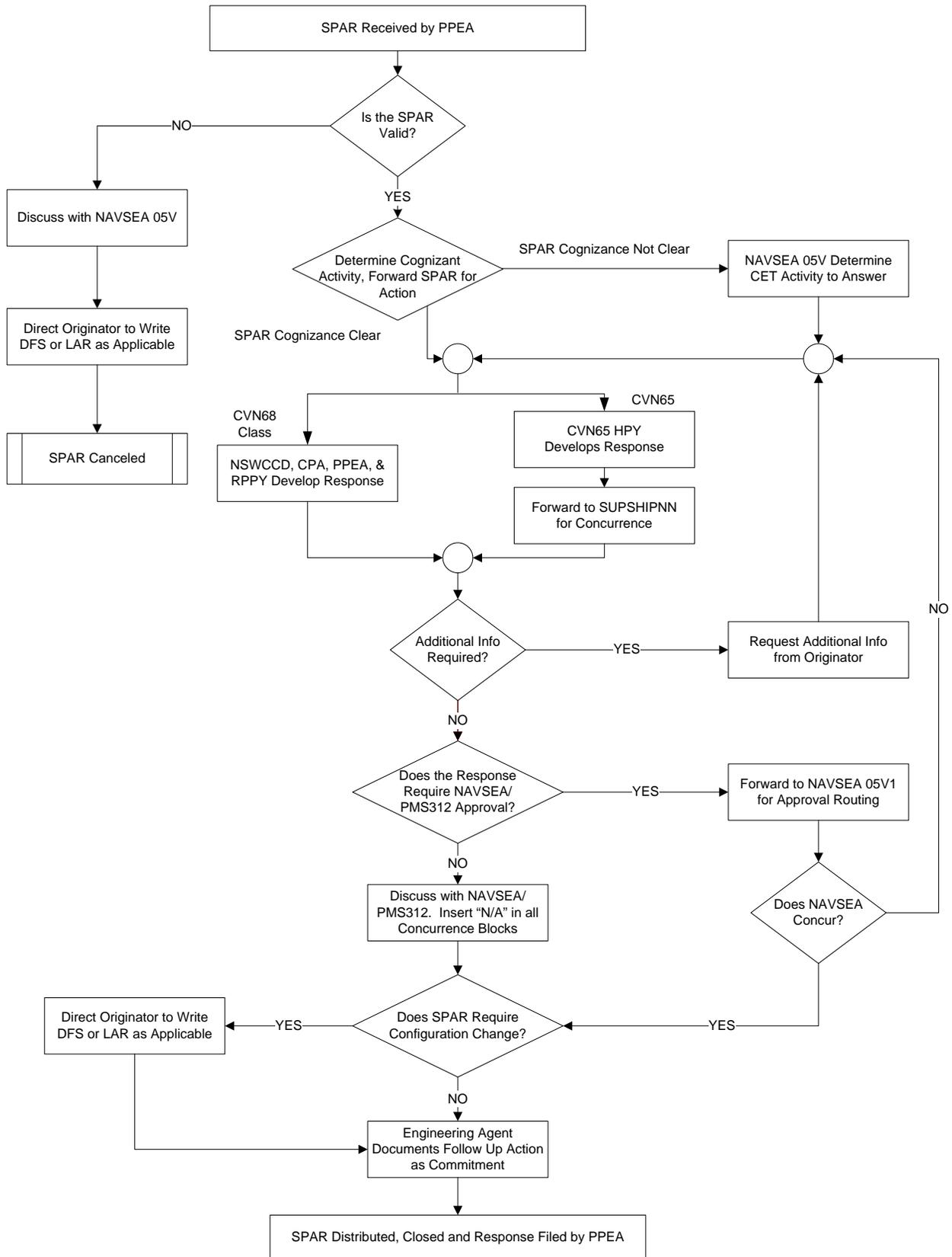
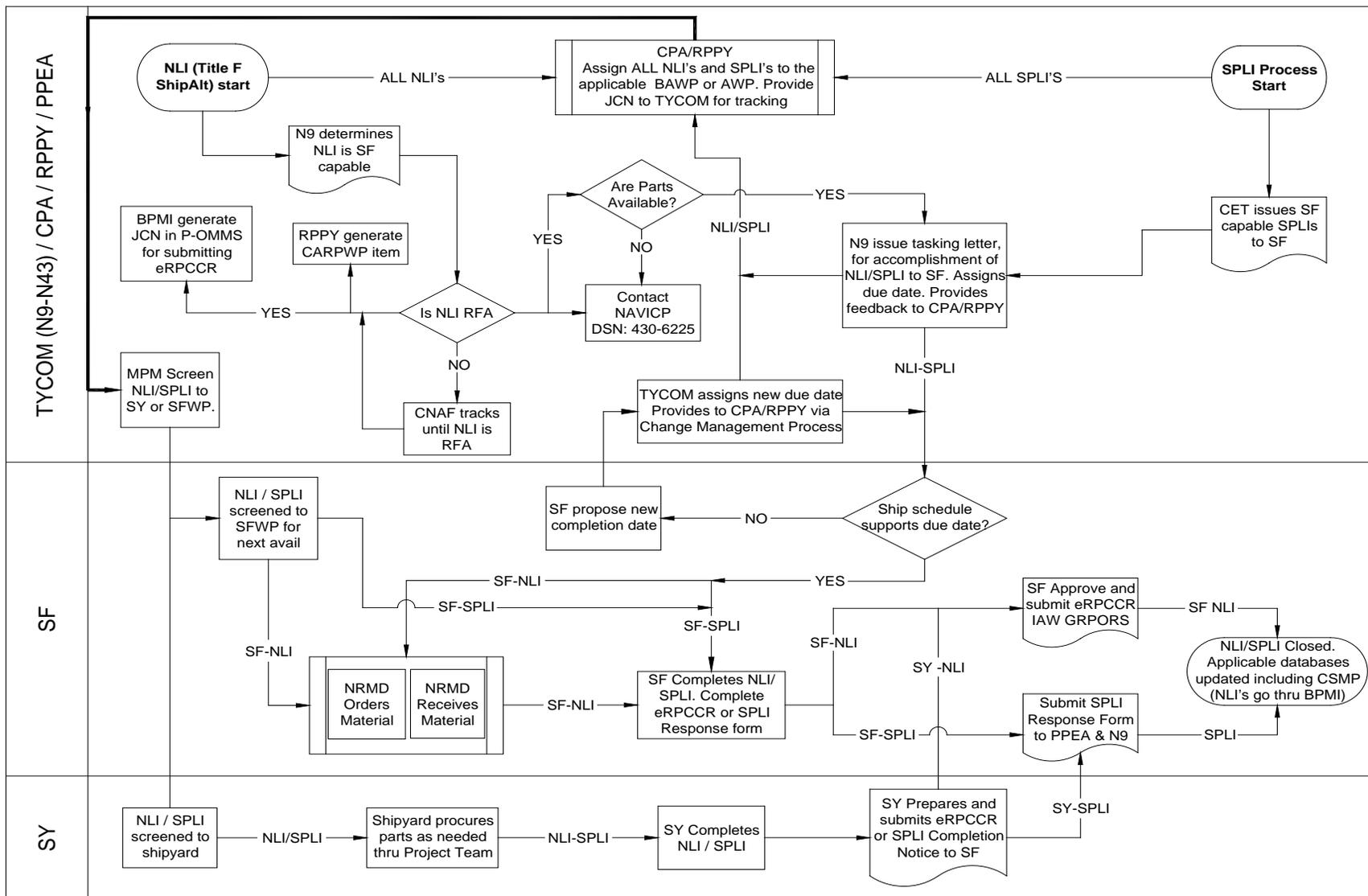


Figure 5-5 Overall NLI/SPLI Process Map



V-1-S-29

5.10.8 Technical Manual Deficiencies and Manual Change Requests.

5.10.8.1 Technical Manual Maintenance. Technical Manuals (TM) must be maintained current at all times. TMs associated with hardware must reflect current hardware configurations. Changes to hardware accordingly, must be accompanied by changes or revisions to the TMs. TMs must also be changed or revised to correct known deficiencies in the technical content in instances not related to hardware modifications.

5.10.8.2 Technical Manual Deficiency/Evaluation Report. The TMDER, NAVSEA/Space and Naval Warfare Systems Command (SPAWAR) Form 4160/1, (Appendix F of this chapter) is used to identify technical and non-technical discrepancies/deficiencies (non nuclear cognizant) in NAVSEA or SPAWAR technical manuals. It may be that a paragraph or page is missing, that measurements or troubleshooting procedures are incorrect, a safety step is omitted, instructions are unclear or that the text or illustrations are not legible. Whatever the issue, it must be corrected. The TMDER is a quick and efficient tool for reporting problems with technical manuals that are used every day.

5.10.8.3 URGENT Deficiencies.

- a. URGENT deficiencies should be reported to the Naval Systems Data Support Activity (NSDSA) by priority Naval Message addressed to:

Commander, Naval Surface Warfare Center (NSWC PHD)
Port Hueneme Division, Code 5E00,
4363 Missile Way,
Port Hueneme, CA 93043-4307

- b. Via the web at <https://nsdsa.nmci.navy.mil/tmder/tmdp.aspx>.
- c. For users with a Technical Data Management Information System (TDMIS) account, the most expedient manner of TMDER submission is via the TDMIS Web Site.
- d. Unclassified TMDERs can be submitted from the TDMIS database via the “deficiency module”. This method is strongly encouraged. Instructions for each method are detailed below.

5.10.8.4 Routine Deficiencies.

- a. Routine TM documentation deficiencies and concerns are reported via the web or using a paper TMDER. The paper form should be available in the back of any ship or NAVSEA/SPAWAR system tech manual. If not, a copy should be requisitioned.
- b. Attach a copy of the TM title page and the marked-up pages (if available) to the TMDER and mail to Commander, Naval Surface Warfare Center, Port Hueneme Division at the address above or via the web at <https://nsdsa.nmci.navy.mil/tmder/tmdp.aspx>.
- c. Again, TDMIS users may submit routine TMDERs via the “deficiency module” of TDMIS. Attachments may be uploaded in TDMIS.

5.10.8.5 Technical Manual Deficiency/Evaluation Report Process. TMDERs are received at NSDSA, logged into the TMDER tracking module and provided to the Technical Manual Maintenance Activity (TMMA) for review and response. The TMMA shall:

- a. Review, analyze and resolve TMDERs for all assigned TMs.
- b. Determine the accuracy and criticality of a reported deficiency.
- c. Inform the TMDER originator and update the deficiency data in the deficiency module of TDMIS: Urgent reports - 3 working days. Routine reports - 90 calendar days.
- d. Prepare or procure Field Change Bulletins, change packages and revisions or prepare changes, to correct TMDER reported deficiencies, using the Rapid Action Change process.
- e. Letters of response should include the appropriate status and shall be similar to the following:

- (1) Your TMDER # _____ for TM # _____ has been received by this activity for action. We have determined that a change to the manual is required. A change package (or revision) is in work or work is planned to start this fiscal year. Distribution is scheduled on (Mo/Yr).
 - (2) Your TMDER # _____ for TM # _____ has been received by this activity for action. We have determined that a change to the manual is not required for the following reason(s):
 - (3) Your TMDER # _____ for TM # _____ has been received by this activity for action. We have determined that the deficiency reported will not impede the operation/maintenance of the equipment, and that it is not cost effective to prepare a change at this time. The deficiency will be considered for incorporation with the next change package or revision.
- f. Notify NSDSA and the Acquisition Manager, TMDER originator or Designated Ship Program Management Office when a TMDER for the assigned TM cannot be reviewed, resolved, or TM updated. This notification can be completed via the on-line TMDER form in the TDMIS deficiency module.

5.10.9 Fleet COSAL Feedback Report.

5.10.9.1 Usage. This report is used specifically to call attention to and seek correction of any technical deficiencies found on Allowance Parts Lists (APL)/Allowance Equipage Lists (AEL), including those covered under P-OMMS. For example:

- a. The part/item is not listed on the APL/AEL, but is considered to be a “maintenance significant item”.
- b. APL is incomplete or is missing information, such as characteristics data, technical manual number, etc.
- c. Incorrect part/item listed on APL/AEL.
- d. Allowed quantity insufficient for PMS requirements.
- e. Part number in technical manual does not agree with APL.
- f. Non-allowed part required for PMS.
- g. APL technical problem such as incorrect Minimum Replacement Unit assignment.
- h. Source, Maintenance and Recoverability Codes and Allowance Note Codes noted on APL/AEL are not defined in any publication held.
- i. Suspected error in code assignments, e.g., Source, Maintenance and Recoverability Codes, Note Codes, etc.
- j. Circuit symbol number in Electronics APL (Section B) crosses to incorrect reference number or stock number.

5.10.9.2 Misuse. This report is not to be used to:

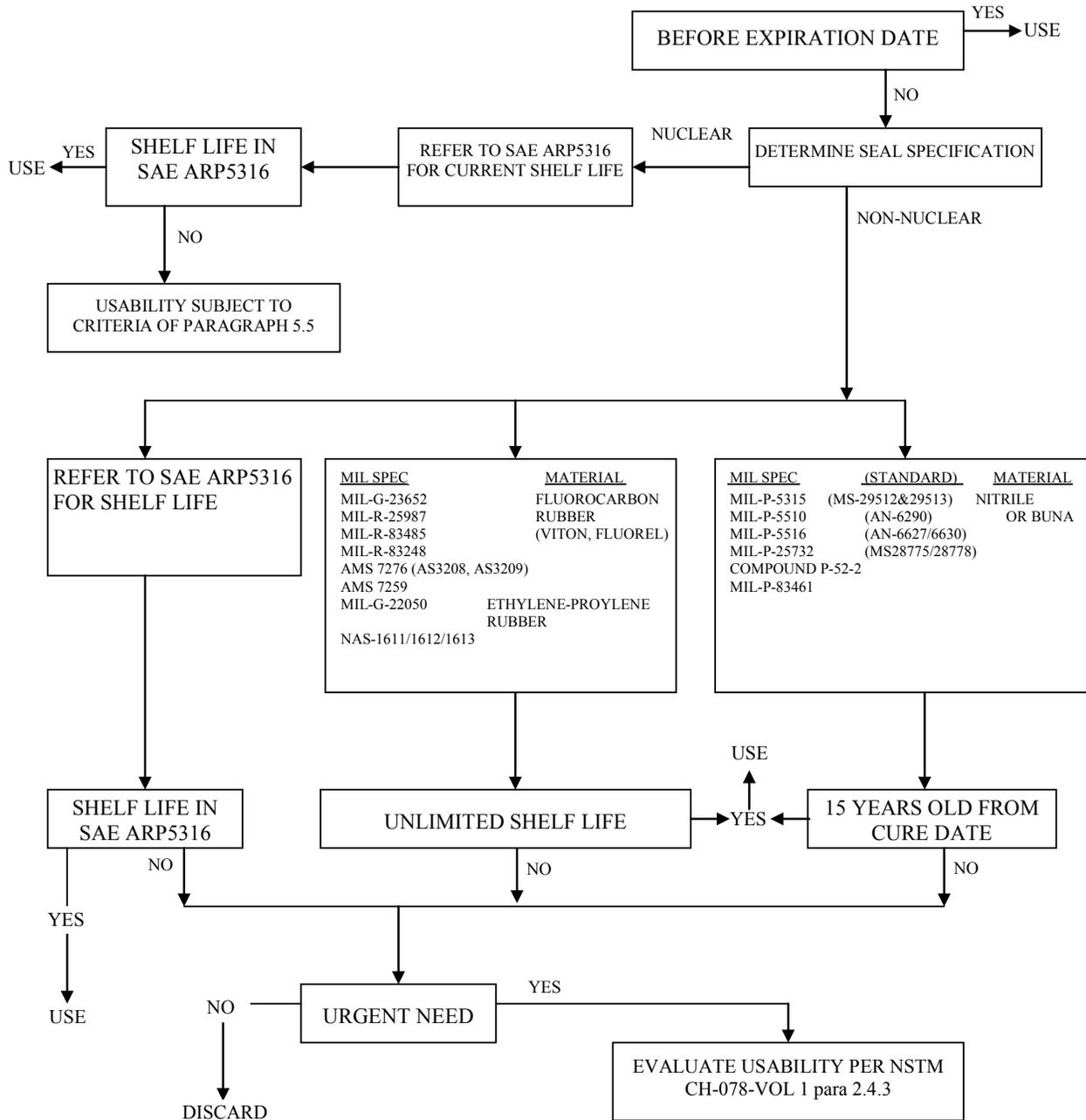
- a. Address any matters relating to Nuclear Reactor Plant COSAL (“Q” COSAL). Matters relating to Q-COSAL should be addressed by LAR through A4W RPPY
- b. Report equipment configuration changes. Ship’s Configuration Change Form, OPNAV Form 4790/CK, is to be used for this purpose. RPCCR for nuclear cognizant systems.
- c. Request changes in allowance for repair parts or equipage. Use NAVSUP Form 1220-2, except in cases when the allowance problem is caused by technical deficiencies in the COSAL, such as incorrect Minimum Replacement Unit assignment, PMS requirement not reflected in Standard Navy Stock List/Installation Sequence List etc. See reference (x) for further details concerning this form.

| 5.10.9.3 Form Location. The Fleet COSAL Feedback Report form (Appendix G of this chapter) can be found at www.anchordesk.navy.mil under the fleet support section. Distribution of the form should be as follows:

- a. Original to NAVSEALOGCEN Code N42.
- b. Copy to Ship's Supply Officer.
- c. Copy retained by Originator.

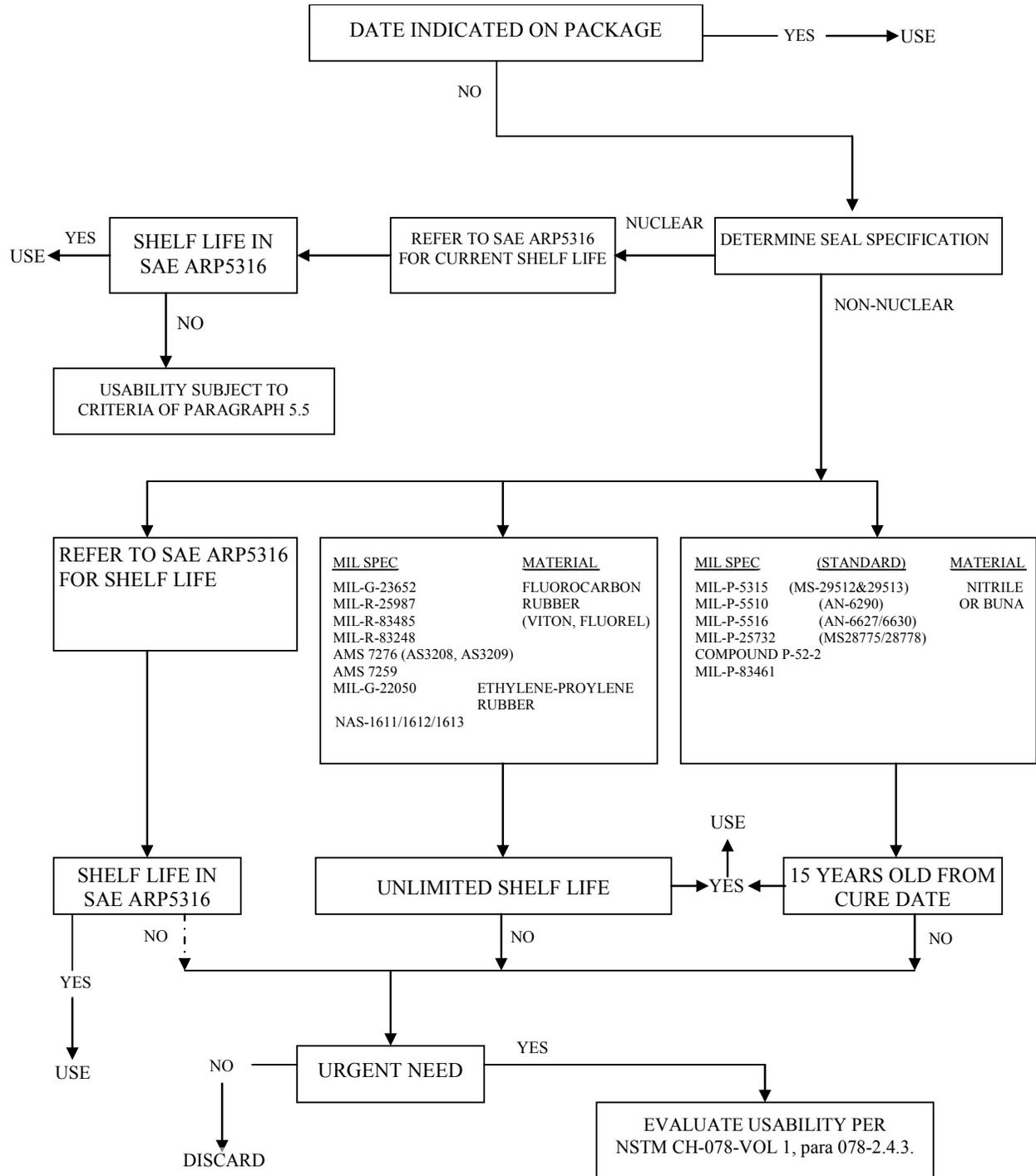
**APPENDIX A
DETERMINING SOFTWARE USABILITY**

**EXPIRATION DATE ON PACKAGE
(SHELF LIFE MANAGED)**



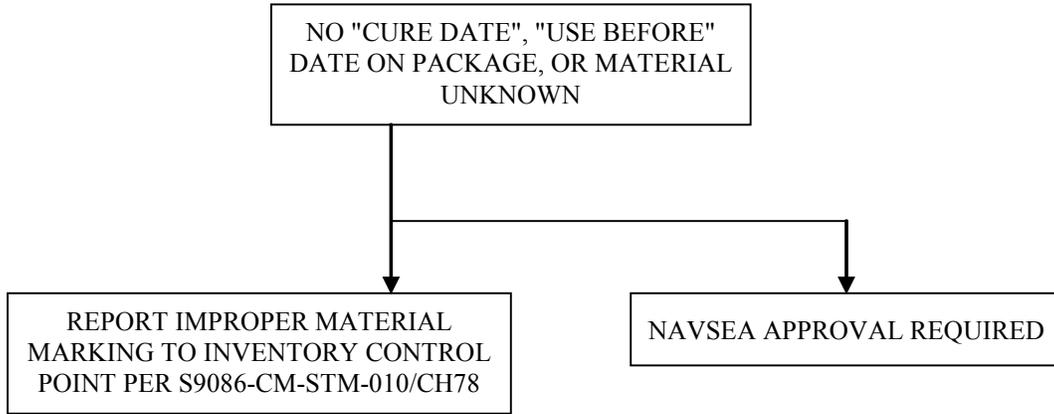
**REFERENCES: NAVSEA S9086-CM-STM-010/CH78
NAVSEA 0989-037-2000**

“USE BEFORE” DATE ON PACKAGE



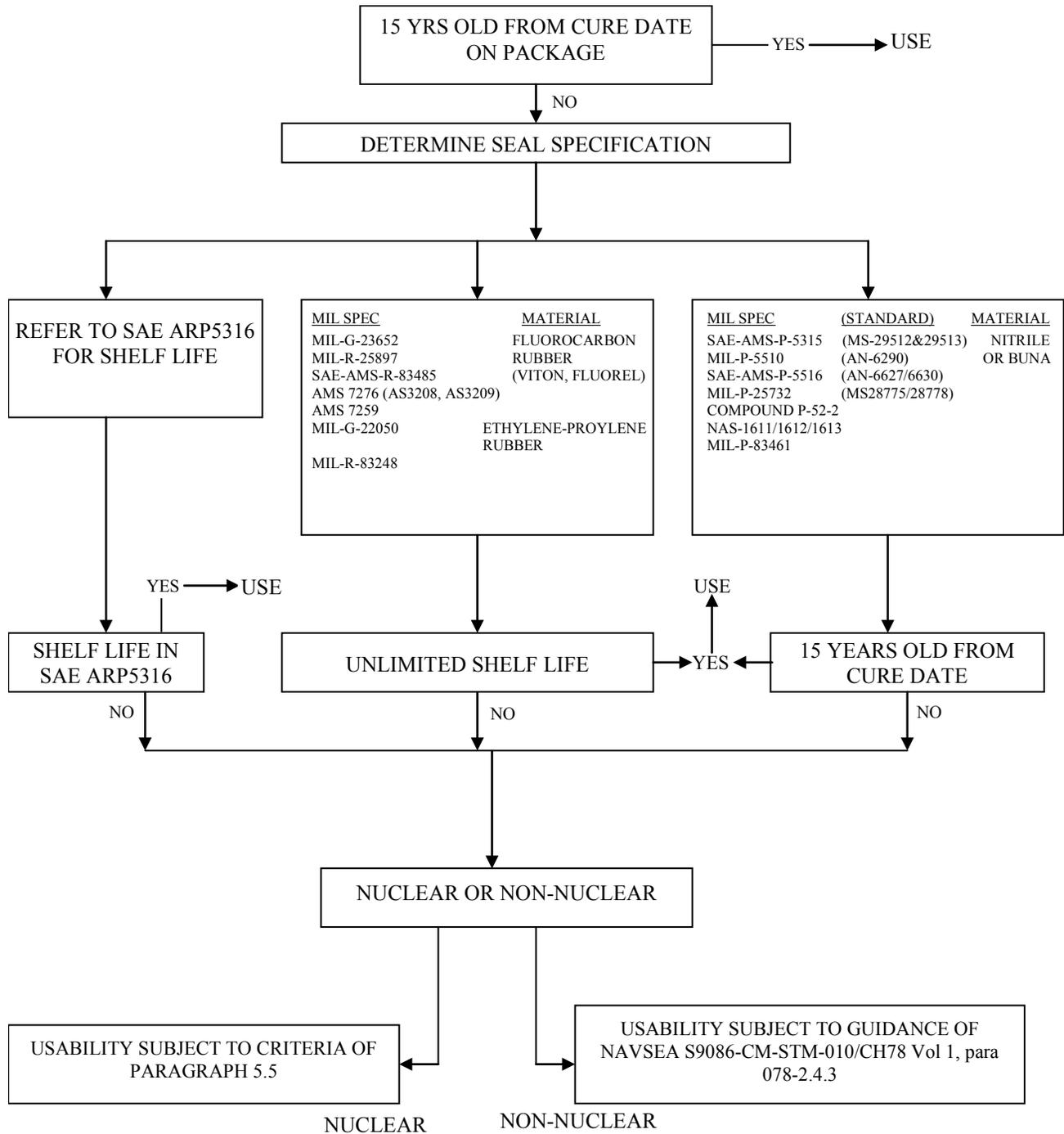
**REFERENCES: NAVSEA S9086-CM-STM-010/CH78
NAVSEA 0989-037-2000**

ITEM OF UNKNOWN AGE OR MATERIAL



**REFERENCES: NAVSEA S9086-CM-STM-010/CH78
NAVSEA 0989-037-2000**

CURE DATE ON PACKAGE



**REFERENCES: NAVSEA S9086-CM-STM-010/CH78
NAVSEA 0989-037-2000**

APPENDIX E

RPCCR COVER LETTER FOR SHIPALTS (SAMPLE)

9210
Ser CVN XX-RX/
DD MMM YY

NOFORN (When Filled in)

From: Commanding Officer, USS _____ (CVN XX)

To: Commander, Naval Sea Systems Command (NAVSEA 08P)

Subj: CHANGES TO REACTOR PLANT CONFIGURATION STATUS (SHIPALT)

Ref: (a) NAVSEA 0989-043-0000, Commissioned Surface Ship General Reactor
Plant Overhaul and Repair Specification (U)

Encl: (1) End of Availability Reactor Plant Configuration Change Letter

(2) RPCCR JCN _____

1. The following reactor plant SHIPALTs are hereby reported in accordance with reference (a) and the SHIPALT Approval Record.

| SHIPALT | BRIEF | COMPLETION STATUS |
|---------|-------|-------------------|
|---------|-------|-------------------|

2. Enclosures (1) through (X) attach a Reactor Plant Configuration Change Report for each change in the period _____ through _____ including each completed or partially completed SHIPALT.

3. Ship's Material History Records have been revised in accordance with NAVSEAINST 9210.37 to reflect these modifications and changes to onboard repair part support have been initiated.

X. X. XXXXXX

By direction

Copy to:

COMNAVAIRLANT/COMNAVAIRPAC (Code N9)

ANSTR, Pittsburgh

NAVICP, Mechanicsburg (Code 87)

A4W RPPY

RMO

(Place NOFORN statement)

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APPENDIX F

TECHNICAL MANUAL DEFICIENCY REPORT (TMDER)

| | | | |
|--|-------------|--|---|
| Ref: NAVSEAINST 4160.3A NAVSEA S0005-AA-GYD-030/TMMP | | | |
| NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER) | | | |
| <p>INSTRUCTIONS: Continue on 8 ½" x 11" page if additional space is needed.</p> <p>1. Use this report to indicate deficiencies, problems and recommendations relating to publications.</p> <p>2. For CLASSIFIED TMDERs see OPNAVINST 5510H for mailing requirements.</p> <p>3. For TMDERs that affect more than one publication, submit a separate TMDER for each.</p> <p>4. Submit TMDERs at web site https://nsdsa2.phdnswc.navy.mil or mail to: COMMANDER, CODE 310 TMDER BLDG 1389, NAVSURFWARCENDIV NSDSA, 4363 MISSILE WAY, PORT HUENEME CA 93043-4307</p> | | | |
| 1. PUBLICATION NUMBER | 2. VOL/PART | 3. REV/DATE OR CHG/DATE | 4. SYSTEM/EQUIPMENT ID |
| 5. TITLE OF PUBLICATION | | | 6. REPORT CONTROL NUMBER (6 digit UIC-YY-any four: xxxxxx-03-xxxx) |
| 7. RECOMMEND CHANGES TO PUBLICATION | | | |
| 7a. Page # | 7b. Para # | 7c. RECOMMENDED CHANGES AND REASONS | |
| | | | |
| 8. ORIGINATOR'S NAME AND WORK CENTER | 9. DATE | 10. ORIGINATOR'S E-MAIL ADDRESS | 11. TMMA of Manual (NSDSA will complete) |
| 12. SHIP OR ACTIVITY Name and Address (Include UIC/CAGE/HULL) | | 13. Phone Numbers: Commercial (___) ___-___ | |

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**APPENDIX G
FLEET COSAL FEEDBACK REPORT**

Fleet COSAL Feedback Report

[ANCHORDESK WEBSITE ?](#)

Request Nbr: NOT ASSIGNED Submitted: 05/27/2009 07:45 PM

Mandatory Fields in Red

| | | | |
|----------------------|----------------|---|----------------------|
| FROM: | name/activity | APL/AEL NUMBER: | APL DATE: |
| <input type="text"/> | | <input type="text"/> | <input type="text"/> |
| | address line 1 | TECHNICAL MANUAL NBR: | PAGE: |
| <input type="text"/> | | <input type="text"/> | <input type="text"/> |
| | address line 2 | REF/CIRCUIT SYMBOL NBR: | NSN: |
| <input type="text"/> | | <input type="text"/> | <input type="text"/> |
| | address line 3 | CAGE: JCN/JSN: | PART NUMBER: |
| <input type="text"/> | | <input type="text"/> <input type="text"/> | <input type="text"/> |

| | |
|---|---|
| TO: NAVSEALOGCEN Building 307 P.O. Box 2060 Mechanicsburg, PA 17055-0795 | NAMEPLATE DATA: (for material handling Equipment Include USN No) <input type="text"/> |
|---|---|

Fully describe the technical problem. Be specific, include Part Numbers and FSCM, RSNS/CSNS, NSN, and Item Name.

Identify Amplifying Documents Which Are Available

When practical, attach files of any amplifying documents, i.e., copies of Tech. manual pages, drawings, schematics, MRC cards, etc.

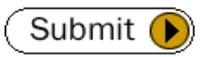
File1: File2: File3:

SUBMITTED BY:

| | | |
|---------------------------------|-------------------------|----------------------|
| Name , Rate, Work Center | Telephone Number | WC Supervisor |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Email Address | | |
| <input type="text"/> | | |

| | |
|----------------------|--|
| REVIEWED BY: | ORIGINATOR'S SERIAL/TRANSMITTAL NUMBER: |
| <input type="text"/> | <input type="text"/> |

This information resides on a DoD interest computer. Important conditions, restrictions, and disclaimers apply.
[Please read our Privacy Policy.](#)



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VOLUME V
PART I
CHAPTER 6
MATERIAL CONTROL

REFERENCES.

- (a) NAVSEA 0948-LP-045-7010 - Material Control Standard
- (b) NAVSEA SS800-AG-MAN-010/P-9290 - System Certification Procedures and Criteria Manual for Deep Submergence Systems
- (c) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (d) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (e) NASM 7838 - Bolts, Internal Wrenching
- (f) NAVSEA S9425-CF-STD-010 - Submarine Antenna/Periscope and Mast Materials
- (g) NAVSEA 0900-LP-016-7008 - Submarine Antenna Technical Documentation
- (h) NUSC 551 - Handbook for Submarine Antenna Systems
- (i) NAVICPINST 4355.5 - Receipt, Inspection, Storage and Issue of Level I/SUBSAFE Material
- (j) MIL-STD-792 - Identification Marking Requirements for Special Purpose Components

6.1 PURPOSE. To define responsibility and provide guidance for material control which includes procurement, receipt inspection, stowage, issue, in-process control, and records for controlled material used in maintenance.

6.1.1 Discussion. Controlled material is the term used in this manual to describe those materials designated for use in or removed from Submarine Safety (SUBSAFE), Level I (LI), Scope of Certification (SOC), Submarine Flight Critical Components (SFCC), and Nuclear LI systems which are in the custody of the end-user work center, division Controlled Material Petty Officer (CMPO) or are undergoing receipt inspection, have been certified for use and are tagged with the appropriate Quality Assurance (QA) forms of this manual. In this manual, material in the custody of the Naval supply system, which includes the supply departments onboard ships and Fleet Maintenance Activities (FMA), is identified as LI stock program materials or nuclear repair parts. Reference (a) provides the special administrative and technical requirements that are levied by Naval Sea Systems Command (NAVSEA) for materials from fabrication to final installation for non-nuclear and nuclear controlled material, respectively. Section 6.3 of this chapter for non-nuclear material control provides direction for implementation of higher authority requirements pertaining to material control. Reference (b) and Part III, Chapter 6 of this volume provide specific requirements for receipt inspection and control of SOC material.

6.2 NUCLEAR.

NOTE: INFORMATION ON THIS SUBJECT IS SAFEGUARDED IN ACCORDANCE WITH NAVSEAINST C5511.32.

6.3 NON-NUCLEAR.

6.3.1 Controlled Material Determination. This section describes the use of the specific references used to identify proper material for repair work. It is important that the difference between system and part Level of Essentiality be understood. A system may be LI, but this does not mean that every part in the system will be LI. This section also provides references and guidance necessary to obtain this understanding and to determine if controlled material is required, and if so, the proper level of control.

6.3.1.1 General Requirements. In order to determine the correct material to be installed in a ship and to properly certify the material prior to installation, the work center responsible for the specific area of the ship must first gather the appropriate reference material as follows:

- a. Drawings that specifically define the system and component.
- b. System/Component technical manual.

- c. Applicable Allowance Parts List (APL) from the ship's Coordinated Shipboard Allowance List (COSAL).
- d. Component replacement manuals, etc.
- e. Ship's SUBSAFE Certification Boundary Book.
- f. LI Boundary Book.
- g. Military Standards (MIL-STD).
- h. Applicable ship class Fly-By-Wire Ship Control System Certification Boundary Book, per reference (c).

6.3.1.1.1 Determination of Required Repair Parts. Using the above reference materials, the required repair parts will be determined by comparing the appropriate part numbers from the drawing to the part numbers/drawings listed in the APL and thereby obtaining the National Stock Number (NSN) with associated Special Material Identification Code (SMIC), if assigned or listed on the APL.

NOTE: THE USE OF LI STOCK PROGRAM MATERIALS AND CONTROLLED MATERIAL WILL BE RESTRICTED TO THOSE SPECIFIC APPLICATIONS WHERE REQUIRED.

6.3.1.1.2 Determination of Level of Control. The next step is to determine if the material identified by the NSNs in paragraph 6.3.1.1.1 of this chapter is certifiable, if required, as controlled material for the system or component. In order to determine level of control required for the parts, the Level of Essentiality for the system and component must be determined for non-nuclear systems:

- a. Controlled material is used in systems designated with a Level of Essentiality in accordance with reference (a) for LI. The definitions of LI systems and material in accordance with reference (a) are provided to the users of this manual as paragraph 6.3.1.3 and 6.3.1.4 of this chapter.
- b. The applicable LI material control boundary book provides an interpretation of the latest reference (a) requirements.

NOTE: A SMIC (E.G., S1, SB, LI, C1, VIRGINIA CLASS COMPONENT (VU), SEAWOLF CLASS COMPONENT (SW)), IS ADDED TO THE END OF THE NSN. IT IS ASSIGNED TO SELECTED COMPONENTS AND REPAIR PARTS BY THE NAVAL SUPPLY SYSTEM AND AIDS IN CONTROLLING THE ISSUANCE OF THESE COMPONENTS AND REPAIR PARTS WITHIN THE NAVY SUPPLY SYSTEM. SMIC IS AN ADMINISTRATIVE TOOL FOR THE SUPPLY SYSTEM. LEVEL OF ESSENTIALITY IS A TECHNICAL DESIGNATION APPLICABLE TO SPECIFIC PIPING SYSTEMS.

6.3.1.2 Non-Nuclear Material Level Determination. The crux of the controlled material program at the maintenance level is establishing the required Level of Essentiality for repair parts, to include determination of whether a specific part is LI. This is important for three reasons:

- a. To serve as a partial check that the supply system has provided the correct part.
- b. To determine record-keeping requirements. This is particularly important in the case of alterations, where drawings may provide no Level of Essentiality for the parts and systems involved, and also on older ships, where the drawings may reflect no Level of Essentiality information at all or may use previous revisions of references (a) or (d).
- c. To determine the correct SMIC in the case of non-nuclear repair parts where the COSAL and the applicable drawing conflict over the required Level of Essentiality.

6.3.1.2.1 Systems and Components. Paragraph 6.3.1.3 of this chapter provides the LI systems and paragraph 6.3.1.4 of this chapter provides the LI components of reference (a).

6.3.1.2.2 Emergent Situation Upgrading. Upgrading the Level of Essentiality of a repair part provided by the supply system may become necessary during the course of maintenance and can be done in emergent situations using the procedures specified in reference (a) and paragraph 6.3.5 of this chapter.

6.3.1.3 Non-Nuclear Level I Systems and Boundaries.

- a. Submarines.

For Flight Critical Components, ensure applicable SMIC marking is listed on supply documentation/component. CMPO/CMH

NOTE: MORE THAN ONE MIC NUMBER MAY BE ON A COMPONENT (E.G., VALVE BODY MAY HAVE ONE MIC NUMBER AND THE BONNET MAY HAVE ANOTHER MIC NUMBER). IF THE COMPONENT HAS A SHORTENED MIC MARKING, ENSURE THE FULL MIC MARKING IS AVAILABLE ON THE SHIPPING DOCUMENTS, TAGS, AND/OR PACKAGING. VERIFY THAT THE SHORTENED MIC MARKING IS CORRECT IN ACCORDANCE WITH PARAGRAPH 6.3.7 OF THIS CHAPTER AND REFERENCE (a).

For LI material, verify MIC number including proper "LI" markings. CMPO/CMH

Check that the MIC number is traceable to a NAVSEA authorized certifying activity, (e.g., Is there an "A" for Portsmouth Naval Shipyard?). See paragraph 6.3.6 of this chapter for list of authorized certifying activities and paragraph 6.3.7.2 of this chapter for additional guidance on MIC marking. CMPO/CMH

Check NSN on part and verify that it is the NSN ordered. CMPO/CMH

For oxygen clean material verify that the package is sealed and marked with a certified oxygen clean tag. CMPO/Cleanliness Inspector/CMH

Fill out QA form 1 and attach the shipping papers, if provided. CMPO/CMH

NOTE: QA FORM 1 IS NOT REQUIRED FOR SHIP'S FORCE WHEN PERFORMING RECEIPT INSPECTION OF MATERIAL TO BE IMMEDIATELY INSTALLED FOR A SPECIFIC JOB. IF ALL MATERIAL IS NOT UTILIZED IN THE ONGOING JOB, QA FORM 1 MUST BE FILLED OUT PRIOR TO PLACING THE MATERIAL IN A STOWAGE LOCKER/AREA.

NOTE: IF THE COMPONENT HAS A SHORTENED MIC MARKING, ENSURE THE FULL MIC MARKING FROM THE SHIPPING DOCUMENTS, TAGS, AND/OR PACKAGING IS ENTERED ON QA FORM 1 AND QA FORM 2.

Fill out and attach QA form 2 to each unit of issue accepted. CMPO/CMH

If material fails any of above steps reject and attach QA form 3. CMPO/CMH

Procedure Responsibility

Verify that the item is what is required for intended use and turn the material over to craftsman for fabrication and/or installation or stow in a controlled material storage area. CMPO/CMH

Forward QA form 1 to the QA office when the material has been issued for installation. CMPO/CMH

NOTE: LI MATERIAL RECEIVED FROM THE NAVY SUPPLY SYSTEM WITH PROPER MATERIAL MARKINGS DO NOT REQUIRE "H" PRESSURE TESTING AFTER RECEIPT INSPECTION.

r. FBW Diagnostic and Maintenance Computers (DMAC) will be receipt inspected in accordance with sub-paragraph q. of this paragraph. The following are unique requirements specific to the DMAC:

- (1) A QA form 1 will be used to document the DMAC receipt inspection.
- (2) A QA form 2 is not required for the DMAC during or after receipt inspection.

- (3) A QA form 3 is required for a DMAC that fails receipt inspection or is out of commission.
 - (4) The QA form 1 shall be completed in accordance with the QA form 1 instructions in Part 1 Chapter 11 of this volume. The QA form 1 shall be retained in the ship Re-Entry Control exception folder until superseded by a new DMAC receipt inspection.
- s. SFCCs may be downgraded for use in non-SFCC, however, the component shall not be subsequently reinstalled into any SFCC application if it was ever installed in a non-SFCC application. The SMIC markings on the SFCC shall be obliterated and the certification records for the item annotated to indicate the item is no longer a certified SFCC prior to being installed.

6.3.5 Receipt Inspection of Open Purchase (Non-Supply System) or Locally Manufactured Material or Upgrading Supply System Material to Level I (Fleet Maintenance Activity only).

6.3.5.1 Uncertified Material Required for Level I Applications. For uncertified material required for use in a LI application, the item must comply with the requirements of reference (a). Fleet activities shall not certify open purchase (non-supply system/no NSN) materials to LI requirements without specific authorization from TYCOM/NAVSEA. Additionally, unless authorized in advance, a major DFS in accordance with Part I, Chapter 8 of this volume must be processed.

- a. Uncertified material (supply system/NSN assigned) received or used as a starting material for a manufactured part for LI requirements must be receipt inspected in accordance with reference (a) by a certifying activity (e.g., shipyard, FMA).
- b. Upon completion of the requirements of reference (a) the following procedure will be used:

| <u>Procedure</u> | <u>Responsibility</u> |
|--|-------------------------------------|
| Review vendor data (if provided with material), MIL-STD, and/or FMA manufacturing and test data to ensure that it all matches. See note at end of this table regarding vendor data. | FMA Quality Assurance Officer (QAO) |
| Place certifying FMA MIC markings on the item. | FMA CMPO/CMH/QAI |
| Fasteners will be appropriately marked and color coded if required. | FMA CMPO/CMH/QAI |
| Fill out QA form 1 to document the receipt inspection. | FMA CMPO/CMH/QAI |
| File QA form 1 with all applicable documents. | FMA Quality Assurance Supervisor |
| Verify that the item is what is required for intended use and turn the material over to craftsman for fabrication and/or installation or stow in a controlled material storage area. | FMA CMPO/CMH/QAI |
| Forward QA form 1 to QA Office when the material has been issued for installation. | CMPO/CMH |

NOTE: VENDOR DATA - MATERIAL RECEIVED DIRECTLY FROM THE MANUFACTURER REQUIRES THE FOLLOWING CERTIFICATION DOCUMENTATION AS A MINIMUM:

- (1) CHEMICAL: QUANTITATIVE ANALYSIS FOR PRINCIPAL CONSTITUENT ELEMENTS IN ACCORDANCE WITH REFERENCE (a).
- (2) PHYSICAL: MECHANICAL PROPERTIES (YIELD STRENGTH, TENSILE STRENGTH, ELONGATION OR HARDNESS TESTING) AS SPECIFIED IN REFERENCE (a).

(3) FABRICATION: DOCUMENTED COMPLIANCE WITH FABRICATION PROCEDURES INCLUDING NDT (E.G., SEAMLESS CONDITION OF TUBING).

- c. If all testing required by reference (a) cannot be accomplished, then, as a minimum, a generic materials identity test, hardness test, and visual inspection will be accomplished and a major DFS must be processed in accordance with Part I, Chapter 8 of this volume.

6.3.5.2 Uncertified Material Required for SUBSAFE Applications. For uncertified material required for use in a SUBSAFE application and requiring an “LI” certification, the item must first comply with the requirements for LI discussed above and the requirements of reference (d). Fleet activities shall not certify non-level materials to SUBSAFE requirements without specific authorization from TYCOM/NAVSEA and, unless authorized in advance, a major DFS in accordance with Part I, Chapter 8 of this volume must be processed.

6.3.5.3 Uncertified Material Required for Submarine Flight Critical Component Applications. Fleet activities shall not install non-certified SFCC materials within the SFCC boundary without specific authorization from TYCOM/NAVSEA and, unless authorized in advance, a major DFS in accordance with Part I, Chapter 8 of this volume must be processed.

- a. Upon completion of the requirements of reference (c) the following procedure will be used:

| <u>Procedure</u> | <u>Responsibility</u> |
|--|----------------------------------|
| Fill out QA form 1 to document the receipt inspection | FMA CMPO/CMH/QAI |
| NOTE: QA FORM 1 IS NOT REQUIRED FOR SHIP’S FORCE WHEN PERFORMING RECEIPT INSPECTION OF MATERIALS TO BE IMMEDIATELY INSTALLED FOR A SPECIFIC JOB. IF ALL MATERIAL IS NOT UTILIZED IN THE ONGOING JOB, QA FORM 1 MUST BE FILLED OUT PRIOR TO PLACING MATERIALS IN A STORAGE LOCKER/AREA. | |
| File QA form 1 with all applicable documents | FMA Quality Assurance Supervisor |
| Verify that the item is what is required for intended use and turn the material over to craftsman for installation or stow in a controlled material storage area. | FMA CMPO/CMH/QAI |
| Forward QA form 1 to QA Office when the material has been issued for installation. | CMPO/CMH |

6.3.6 Authorized Material Certification Activities. This section provides a list of those activities that are currently authorized or have been authorized previously to receipt inspect and accept LI and SFCC controlled materials. This list is provided as a reference to be used in performance of receipt inspections of paragraph 6.3.4 of this chapter.

6.3.6.1 Currently or Previously Authorized Material Certification Activities.

- a. For material ordered from NAVICP by forces afloat for SUBSAFE/LI applications. The following activities are authorized to receipt inspect and stock material for the LI Stock Program:

| <u>Activity</u> | <u>Identification Code</u> |
|--------------------------------|----------------------------|
| Portsmouth Naval Shipyard | A |
| Naval Weapons Station Yorktown | YT |

- b. If material is not available through the activities listed in paragraph 6.3.6.1.a. of this chapter, NAVSEA has authorized the following activities to certify material as LI in accordance with reference (a) and this material may be used for SUBSAFE applications without further receipt inspection, other than normal receipt inspection of paragraph 6.3.4.5.q. of this chapter. The activities and their designator are:

| <u>Activity</u> | <u>Identification Code</u> |
|--|----------------------------|
| Newport News Shipbuilding | NN |
| Naval Undersea Warfare Systems Center - Newport (NUWC) | NUSC |
| Norfolk Naval Shipyard | N |
| Charleston Naval Shipyard | C |
| Puget Sound Naval Shipyard | S |
| Pearl Harbor Naval Shipyard | P |

- c. Listed below are some of the LI activity designators assigned by NAVSEA to various activities.

| <u>Activity</u> | <u>Identification Code</u> |
|-----------------------|----------------------------|
| <u>Naval Shipyard</u> | |
| Charleston | C |
| Long Beach | L |
| Mare Island | MS |
| Norfolk | N |
| Pearl Harbor | P |
| Philadelphia | H |
| Portsmouth | A |
| Puget Sound | S |

| | |
|-----------------------------------|-----|
| <u>Supervisor of Shipbuilding</u> | |
| Groton | SSG |

| <u>Activity</u> | <u>Identification Code</u> |
|---|----------------------------|
| <u>Naval Weapons Station</u> | |
| Naval Surface Warfare Center Division, Crane | WQC |
| Naval Surface Warfare Center Ordnance Station, Louisville | NSL |
| Naval Weapons Station, Yorktown | YT |

| | |
|--|--------------|
| <u>Other NAVSEA Activities</u> | |
| Other | JCR |
| SRF, Guam | SRFG |
| SRF, Yokosuka | SRFY |
| Naval Undersea Warfare Center Detachment, New London | NUWC |
| Naval Inventory Control Point (formerly Navy Ships Parts Control Center) | X |
| Naval Submarine Support Facility, NLON Submarine Base, Pearl Harbor | SFNL SBPH |

| <u>Activity</u> | <u>Identification Code</u> |
|-----------------------------------|---|
| TRIDENT Refit Facility, Kings Bay | TRFK |
| TRIDENT Refit Facility, Bangor | TRFB |
| SIMAs/Tenders | AS-32, 33, 34, 36, 37, 39, 40, 41, etc. |

- d. For Submarine Flight Critical Components, the following activities are authorized for testing and certification:

| <u>Activity</u> | <u>Identification Code</u> |
|---|----------------------------|
| General Dynamics/Electric Boat Division | G |
| Charles Stark Draper Laboratory, Inc. | QDF |

6.3.7 Marking of Level I Stock Program Material and Controlled Material.

6.3.7.1 General Requirements. LI Stock Program Material passes from the manufacturers into the Navy supply system by way of Navy receipt inspection activities, which examine the material and subject it to a number of tests. LI material which meets acceptance criteria is marked with a permanent MIC number. SUBSAFE material supplied by the shipyard as onboard repair parts during new construction is required to be MIC marked. On older ships, the SUBSAFE material supplied as onboard repair parts during new construction may not have been MIC marked, but will be listed on the Supervisor of Shipbuilding's letter of certified material.

- a. The purpose of MIC marking is four-fold:
- (1) To denote that the marked material has been inspected, verified and accepted.
 - (2) To verify the material in hand by comparing it to the applicable drawings, plans, ordering requirements, and installing documents.
 - (3) To provide traceability from the installed material to OQE.
 - (4) To preclude complete re-inspection of material accepted by an approved activity.
- b. Two problems arise in application that can defeat the purpose of the MIC marking:
- (1) Internal components of an assembly which is MIC marked on the exterior, are usually not marked individually, and can lose their identity as LI material, if separated during disassembly. Strict adherence to "bag and tag" requirements, using fleet QA forms, overcomes this problem. Any part that becomes separated from its QA form (a loss of traceability) must be treated as uncontrolled material.
 - (2) Reference (a) permits the use of shortened MIC numbers in cases where the entire marking cannot be applied due to space limitations. It is possible that some LI material will lack the traceability number providing the critical link to the OQE, which in turn serves as the basis for the designation "LI material or controlled material". This problem is circumvented by a tag affixed by the receipt inspection activity directly to the material or to its container, which lists the complete MIC number. The complete MIC marking is recorded during receipt inspection. Although the complete MIC marking would not be visible once the item was installed, traceability is maintained through the retained QA paperwork and tags associated with the job, which will list the full MIC number.
- c. SUBSAFE castings and aluminum bronze components receive a permanent LI marking.
- d. The MIC and SUBSAFE markings are in addition to the required manufacturer's marking.
- e. Altering of a MIC marking is prohibited except to make documented corrections.
- f. Method of marking controlled material. Physical marking methods are described in references (a) and (j).

- g. Items not physically capable of being marked. Items such as small parts are packaged in homogeneous lots (i.e., same heat, batch or melt; and same vendor traceability) and the package is marked. If the package is opened, the individual items removed must be tagged with QA form 2. The remaining items in the package will be controlled by the use of a single QA form 2 attached to the package.

6.3.7.2 Level I Material. LI material has a MIC marking affixed to it by the activities which certify the material for the Navy supply system. The activities are listed in paragraph 6.3.6 of this chapter. Authorized FMAs may apply a MIC marking to a component prior to installation in a ship. MIC markings will be applied in accordance with reference (a). The following paragraphs provide general guidance regarding MIC marks and marking:

- a. Elements of the MIC Marking. The normal MIC marking consists of three elements:
 - (1) Material designator. The material designation comes from Volume II of reference (a) with the two or three letter code (e.g., KMA).

NOTE: MIC MARKINGS ON OLDER STOCK PIPING MATERIAL, VALVES, FITTINGS, ETC., RECEIVED FROM THE SUPPLY SYSTEM MAY CONTAIN FOUR LETTER MATERIAL DESIGNATORS. FOUR LETTER MIC MARKING MATERIAL DEFINITIONS ARE CONTAINED IN VOLUME II OF REFERENCE (a).

- (2) Traceability number. The traceability number is used by the marking activity to relate the piece to inspection records and consists of the last two digits of the year, Julian date when the material was inspected, a hyphen and lot number (e.g., 89364-043).
 - (3) Certifying Activity Designator (CAD). The CAD denotes the activity that performed the certification testing and marking. The CAD indicates acceptance of the material. Only the government activities and private shipyards which are authorized by NAVSEA to certify inspect and mark LI material are assigned CADs. NAVSEA periodically issues a letter containing the list and identity code of government activities and private shipyards authorized to certify LI material. A listing of those activities authorized to certify LI material is provided in paragraph 6.3.6 of this chapter.
- b. If all the markings cannot be affixed because of space limitations, then they are affixed in accordance with reference (a).
- c. Sample MIC Markings. Three marking systems are in effect. Samples of MIC marks affixed to non-nuclear LI material from each of the marking systems follow:

- (1) CNB-91301-123 TRFB (LI material, new marking system)

| | | | |
|----------------|---------------|------------|-------------------|
| CNB | 91301 | 123 | TRFB |
| Material code. | Julian date | Inspection | Inspection |
| 70/30 copper | of inspection | lot number | Activity |
| nickel (from | | (3 digits | (TRIDENT Refit |
| the Material | | maximum) | Facility, Bangor) |
| Designator | | | |
| Catalog) | | | |

- (2) KMD-90204-123 A (LI material, new marking system)

| | | | |
|----------------|---------------|------------|-----------------|
| KMD | 90204 | 123 | A |
| Material code. | Julian date | Inspection | Inspection |
| K monel (from | of inspection | lot number | Activity |
| the Material | | (3 digits | (Portsmouth |
| Designator | | maximum) | Naval Shipyard) |
| Catalog) | | | |

- (3) 7150 001 A VBA (LI material, old marking system)

| | | | |
|------------------------------|--------------------------|--|---|
| 7150 | 001 | A | VBA |
| Julian Date of inspection | Inspection lot number | Inspection activity (Portsmouth Naval Shipyard) | Material code. Valve bronze alloy |

- (4) 7100 005 CNB (LI material, old marking system)

| | | |
|------------------------------|--------------------------|--|
| 7100 | 005 | CNB |
| Julian date of inspection | Inspection lot number | Material code. Copper nickel alloy |

- (5) SER 1991-921A LI (Marked by Portsmouth Naval Shipyard)

SER 1991-921A-061 LI (Marked by Naval Surface Warfare Center, Carderock Division (Submarine Antenna Engineering Directorate) (previously NAVSSES, Philadelphia))

- d. Examples of LI MIC marks for periscope and antenna parts marked prior to 31 July 1979:

- (1) NCD 8249-584 QQ LI

| | | | |
|---|------------------------------|---|---|
| NCD | 8249 | 584 | QQ |
| Material code Nickel copper alloy | Julian date of inspection | Inspection lot number (3 digits maximum) | Inspection Activity (Naval Surface Warfare Center, Carderock Division) |

- (2) SER 1991-921A-AS18

FMA marking applied to previously unmarked antenna, mast or periscope parts within the SUBSAFE boundary documented by receipt inspection record (QA form 1) as being received prior to 31 July 1979 or are parts removed from an antenna, mast or periscope from an in-service SUBSAFE certified submarine.

- (3) Fasteners are identified and color coded in accordance with Appendix C of reference (a).

6.3.7.3 Assignment of Material Identification and Control Numbers for Items Manufactured from Certified Raw Materials.

NOTE: HEADED FASTENERS (CAPSCREWS, BOLTS, MACHINE SCREWS, ETC.) MANUFACTURED FROM LI MATERIAL REQUIRE ADDITIONAL TESTING (i.e., WEDGE TENSILE OR AXIAL TENSILE TESTING AND HARDNESS TESTING).

- a. LI items manufactured using certified LI raw material (e.g., barstock, plate, forged shape) except fasteners with heads may be assigned the same MIC markings as the raw stock provided no work is done on the base material that would alter its chemical, physical or mechanical properties (machining and welding may be done).
- b. Headed fasteners will be assigned a unique MIC marking following local manufacture from existing LI material and satisfactory completion of certification testing. A DFS is required if certification testing is not completed.

NOTE: A NEW MIC MARKING SHALL BE ADDED WHENEVER LI MATERIAL IS HEAT TREATED OR WORKED IN SUCH A WAY AS TO ALTER CHEMICAL, PHYSICAL OR MECHANICAL PROPERTIES. THE NEW MIC NUMBER SHALL PROVIDE TRACEABILITY TO THE ORIGINAL MIC NUMBER AND RECERTIFICATION TEST REPORTS FOR CHEMICAL, PHYSICAL OR MECHANICAL PROPERTIES.

- c. The following procedures will be used by a FMA authorized to certify and assign MIC markings, in accordance with reference (a), to items manufactured from certified raw material that have had their chemical, physical or mechanical properties altered:
- (1) Prepare a new QA form 1 for each new item.
 - (a) Complete Blocks 1, 2, 5, and 6 of QA form 1.
 - (b) Blocks 7 and 8 of QA form 1 will be marked "NA".
 - (c) In Block 9 of QA form 1, check "no", then print name, sign and date.
 - (d) Enter the appropriate codes for the required tests and inspections in Block 10 of QA form 1.
 - (e) Enter signed and dated statements in Block 11 of the QA form 1 that provides:
 - 1 The MIC number of the raw material and CWP serial number used in manufacture, inspection and test of the item.
 - 2 The results of the tests and inspections designated in Block 10 of QA form 1
 - (f) Check the appropriate boxes in Blocks 12, 13 and 14, print name and sign Block 15 of QA form 1.
 - (g) If the item was found to be acceptable and certified to the appropriate Level of Essentiality, assign a new MIC number in the format shown in paragraphs 6.3.7.2.c.(1) or (2) of this chapter for non-nuclear material.
 - 1 Volume II of reference (a) should be consulted for the material designator since the fabrication processes may have altered the material.
 - 2 The date will be the date that the MIC number is assigned.
 - 3 Each item manufactured will be assigned a lot number and the appropriate test and inspection records for that item will be annotated with the lot number to ensure traceability.
 - (2) Complete the new QA form 2 using the new MIC number.
 - (a) Mark the certified material with the new MIC markings in accordance with paragraph 6.3.7.2 of this chapter. Block 5 of QA form 2 will be N/A.
 - (b) Remove the original QA form 2 with the raw stock MIC number. Enter a statement in the installation block that the item has been certified and the new MIC number that was assigned. The tag should then be filed with the new QA form 1.

6.3.8 Level I Submarine Flight Critical Component Stock Program Material Downgrading.

NOTE: MATERIAL CODED AS SS DOES NOT REQUIRE DOWNGRADING FOR USE IN LI APPLICATIONS.

6.3.8.1 Material Downgrading. Occasionally LI/SFCC Stock Program controlled material must be downgraded in order to support training or production work due to the non-availability of uncertified material. In order to maintain accountability of the end use of LI/SFCC Stock Program controlled material, the following procedure is required:

| <u>Procedure</u> | Responsibility |
|--|--|
| For LI/SFCC, obtain written authorization to downgrade the material from the QAO. | Leading Petty Officer/Work Center Supervisor |
| Remove all MIC markings from the LI material and SMIC markings from SFCC as well as controlled material tags and forms. The QA forms will be forwarded to the QAO (ship) or QA office (FMA) with the approved authorization. | CMPO/CMH |

6.3.9 Storage, Issue, and Handling of Level I/Scope of Certification/Submarine Flight Critical Component Stock Program Material.

6.3.9.1 Storage Requirements.

- a. The supply department onboard the FMA or a ship will stow, handle and issue LI/SOC/SFCC stock program material as required by the governing NAVSEA, NAVICP, or NAVSUP instruction.

NOTE: LI/SOC/SFCC STOCK PROGRAM MATERIAL BECOMES CONTROLLED MATERIAL, FOR THE PURPOSES OF THIS MANUAL, WHEN THE MATERIAL HAS BEEN RECEIVED BY THE CMPO OF THE WORK CENTER OR DIVISION.

- b. Controlled material in the custody of customers (ship or FMA work centers) will be segregated by a physical barrier, in clearly marked, dry, secure, clean stowage and handling areas.
- (1) Use of separate boxes, shelves, roped off or marked (e.g., painted lines) areas are acceptable methods of segregation/stowage, provided they are clearly marked, allowing separation of the following materials:
 - (a) Material within the SUBSAFE boundary.
 - (b) LI.
 - (c) SFCC.
 - (d) SOC MCD-A, MCD-B and MCD-C.
 - (e) Material undergoing receipt inspection.
 - (f) Rejected materials.
 - (g) Material staged for a specific job or process. Controlled materials of different Levels of Essentiality and non-controlled material may be co-located when staging materials for a specific job as long as all identification tags attached to the material are annotated with the same Job Control Number.
 - (2) These materials must be segregated from each other and from other materials. Segregation will be maintained from receipt through staging. Unidentified material or rejected material will be segregated from acceptable controlled material. Access to controlled material will be positively controlled.
 - (3) LI materials of different material types, grades or condition shall be segregated through physical separation unless readily differentiated by other attributes, such as size or physical appearance. When physical segregation cannot be accomplished, an alternative positive system of control shall be used. The method used shall assure that different materials that appear to be similar are not mixed (unless the materials are approved alternates for each other as indicated by part or stock number).
- c. Controlled material will be handled and stored in a manner to prevent damage and be sealed for cleanliness when applicable (e.g., Oxygen Clean).

- d. Material received, or modified after receipt, not meeting the receipt inspection requirements of paragraph 6.3.4 of this chapter will be rejected, tagged with QA form 3, and placed in segregated controlled stowage to await disposition. Disposition examples:
 - (1) Disposal.
 - (2) Repair.
 - (3) Retention of components for future use.
- e. Material awaiting receipt inspection will be segregated from material accepted or material rejected.
- f. CMPOs will inspect controlled material storage areas of their work center, semi-annually as a minimum to ensure:
 - (1) Material is in designated area.
 - (2) Material is properly identified.
 - (3) Material is properly marked and tagged.
 - (4) Material is protected from damage.
 - (5) Material is kept clean.
 - (6) Material is segregated as required.

6.3.9.2 Staging Requirements. Controlled materials of different Levels of Essentiality and non-controlled material may be co-located when staging material for a specific job provided that:

- a. All QA forms or identification tags attached to the material are annotated with the same Job Control Number.
- b. Material is segregated from material staged for other jobs or processes.

6.3.9.3 Issue of Level I/Scope of Certification/Submarine Flight Critical Component Controlled Material. LI/SOC controlled material issue will be restricted to those specific applications that have controlled material requirements. SFCC controlled material may be issued for non-Flight Critical applications without written authorization but must not be subsequently installed into components within the SFCC Certification Boundary.

6.3.9.4 Handling of Material. All controlled material received by a work center, whether received from the supply department as onboard stock, work center stores or from a tended ship must be controlled as required by reference (a) for LI, reference (b) for SOC or reference (c) for SFCC.

- a. Controlled material must at all times be in physical custody of either the work center CMPO, QAI, a craftsman or stowed in a work center controlled material stowage area.
- b. Lots of material (e.g., box of bolts) broken down for end use, will maintain the same identification and control as the parent controlled item using QA form 2 as appropriate.
- c. The QA form 2, and/or any other identification must stay with the material at all times until it is installed or reinstalled in the system or returned to the custody of Ship's Force.
- d. Transfer of a MIC marking during issue of barstock or pipe will be accomplished by transferring the MIC to a new location on the piece to be sectioned, and be verified by the work center CMPO/CMH or a QAI before the original marking is lost.
- e. If, during fabrication, the original piece must be broken down (such as cutting off a piece of barstock) or the MIC marking will be lost by machining, welding, etc., the proper material identification markings will be transferred to the piece(s) prior to cutting or to the container, in case of small parts, and QA form 2 will be attached to each new piece.
- f. On completion of shop/ship fabrication or assembly stage, the QAI will check the finished product against the attached material identification tags for required material markings. The QAI will inspect the finished product for conformance to specifications. If satisfactory and if the required marking is present the QAI will print name and sign the QA form 2.

- g. If for any reason at any time the product fails inspection, the QAI will reject the material, attach QA form 3 and inform the QAO.
- h. The lead work center will be responsible for installation and the final acceptance block on all QA forms associated with a particular product. Assist work centers or divisions will be responsible for control of material that they use on a job.
- i. Material consumed (e.g., welding electrode, brazing alloy) or installed (e.g., studs, valve ball) in the repair process must have its identity (MIC number, type or grade of the material) recorded on the appropriate QA form (e.g., QA form 18, QA form 20, QA form 34).
- j. For previously installed material in a SUBSAFE, LI, SOC or SFCC system which is removed and is to be re-installed, positive control and identification of the material shall be maintained from removal through reinstallation by use of a QA form 2. Non-controlled material will be tagged with a QA form 2 or other positive means of traceability until reinstallation.
- k. Damaged existing material removed from a SUBSAFE, LI, SOC or SFCC system which will not be repaired or reused, and is immediately disposed of as trash, does not require a QA form 2 or QA form 3 to be attached. All MIC markings on damaged material that meets this criterion shall be removed prior to disposal to prevent inadvertent reuse. If there is any potential for repair or re-use of the removed material, then paragraph 6.3.9.4.j applies and QA form 2 must be attached. Do not remove MIC numbers from controlled material that is required to be turned-in. Damaged controlled material that is required to be turned-in, such as depot level repairable items, shall be rejected using the QA form 3 process.
- l. All material, parts or components from controlled systems which are removed from the ship by Ship's Force, to be worked by the FMA, must have a QA form 2 properly filled out and attached. If it is necessary for the FMA to disassemble such components, identification must be retained on each part which is controlled material using additional QA form 2. The original QA form 2 will remain with the part or component until it is re-installed in the ship.
- m. Material control tags (i.e., QA forms 2) shall be used to positively identify controlled material in transit to avoid unauthorized movement, co-mingling and improper use.
- n. Each controlled component removed from a ship's system in order to allow repair/maintenance will be tagged with QA form 2 to maintain identification and traceability. Controlled components (e.g., periscopes, valves and valve bonnets, pumps, etc.) disassembled and reassembled in a temporary controlled jobsite (established in a work space or at a jobsite) do not require individual QA tags to be filled out and attached to each controlled component (controlled components are defined in reference (a)), provided that:
 - (1) Access to the temporary controlled jobsite is controlled by a physical boundary and is marked with a posted sign stating "Temporary Controlled Jobsite".
 - (2) Rejected material must be identified, tagged with QA form 3 and removed from the area.
 - (3) Work must be actively in progress and not be longer than a shift or one normal working day on a job site vice in a FMA repair shop.

6.3.9.5 Maintaining Accountability. All controlled material received by a work center and stored in a controlled material locker shall have an attached QA form 2 and may have an associated QA form 1. The following process shall be used when issuing material:

| <u>Procedure</u> | <u>Responsibility</u> |
|---|-----------------------|
| <u>Issuing a lot (single or multiple items) with no material remaining:</u> Update original existing QA form 2 to annotate the Name of the craftsman and workcenter or shop or organization the material is issued to. | <u>CMPO</u> |

| <u>Procedure</u> | <u>Responsibility</u> |
|---|-----------------------|
| <p>Update associated QA form 1 (if applicable) in accordance with QA form 1 instructions. Submit the associated QA form 1 with zero amount remaining to the QAO.</p> | <p>CMPO</p> |
| <p>Issuing a portion of a lot with material remaining: Initiate a new QA form 2 for each quantity less than the entire lot of material to be issued specifically annotating the amount to be issued. Annotate the Name of the craftsman and workcenter or shop or organization the material is issued to. Do not modify the original QA form 2.</p> | <p>CMPO</p> |
| <p>Update associated QA form 1 to annotate amount issued and amount remaining in accordance with QA form 1 instructions.</p> | <p>CMPO</p> |
| <p>When the last material of a lot is issued, destroy the original QA form 2 with zero amount remaining. Submit the associated QA form 1 with zero amount remaining to the QAO.</p> | <p>CMPO</p> |

VOLUME V
PART I
CHAPTER 7
TESTING REQUIREMENTS

REFERENCES.

- (a) NAVSEA 0387-LP-046-8000 - System Hydrostatic Test Requirements
- (b) NAVSEA S9505-AF-MMA-010 - Submarine Non-Nuclear Piping Systems Test Manual
- (c) NAVSEA S9086-RK-STM-010 - NSTM Chapter 505 (Piping Systems)
- (d) NAVSEA S9074-AR-GIB-010/278 - Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels
- (e) NAVSEA S9086-RJ-STM-010 - NSTM Chapter 504 (Pressure, Temperature and other Mechanical and Electromechanical Measuring Instruments)
- (f) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (g) NAVSEA S9221-C1-GTP-010/020 - Main Boiler Repair and Overhaul, Volumes I and II
- (h) NAVSEA 0989-LP-037-2000 - Commissioned Submarine General Reactor Plant Overhaul and Repair Specification
- (i) NAVSEA 0989-LP-043-0000 - Commissioned Surface Ship General Reactor Plant Overhaul and Repair Specification
- (j) NAVSEA S9086-XG-STM-010 - NSTM Chapter 700 (Shipboard Ammunition Handling and Storage)
- (k) NAVSEA 0924-062-0010 - Submarine Safety (SUBSAFE) Requirements Manual
- (l) NAVSEA 0902-018-2010 - General Overhaul Specifications for Deep Diving SSBN/SSN Submarines (DDGOS)
- (m) NAVSEA 0989-LP-058-0000 - AS/AD Tender Nuclear Support Facilities Preventive Maintenance Index
- (n) NAVSEA 0900-LP-001-7000 - Fabrication and Inspection of Brazed Piping Systems
- (o) NAVSEA 0989-150-0000 - Standard Naval Nuclear Valves and Auxiliary Equipment
- (p) MIL-STD-1330 - Standard Practice for Precision Cleaning and Testing of Shipboard Oxygen, Helium, Helium-Oxygen, Nitrogen and Hydrogen Systems
- (q) NAVSEA S9086-CN-STM-040 - NSTM Chapter 079 V4 (Damage Control; Compartment Testing and Inspection)
- (r) NAVSEA T9512-AC-TRO-010 SS/SSN/SSBN - Submarine Snorkel Systems
- (s) NAVSEA S9425-AW-PRO-010 - Submarine Pressure Test, Evacuation/Charge and Dew Point Test Procedures

LISTING OF APPENDICES.

- A Testing Requirements for Surface Ship Systems
- B Testing Requirements for Submarine Systems
- C SUBMEPP Product Feedback

7.1 GENERAL. Testing is a key element in the certification process of work accomplished by Ship's Force, Fleet Maintenance Activities (FMA), shipyards and private organizations on ships or submarines. It is the final physical check that the system or component has been returned to its normal operational state and will function as designed. Excessive re-testing of system components will cause unnecessary cycling stresses on system components and is not desired. Test only what you fix.

NOTE: THE PRESSURE TEST REQUIREMENTS FOR REACTOR PLANT FLUID SYSTEMS ARE DELINEATED IN REFERENCE (a).

7.1.1 Testing Requirements for Systems, Portions of Systems and Components. Research is necessary to determine all applicable test requirements prior to conducting repairs. It is important to note that all required tests may not be identified by a single source (e.g., a fitting or component that has been manufactured locally will have to satisfy both the testing required by the original manufacturing specifications as well as any installation tests). Unless specific guidance to the contrary is given, the following requirements will be followed:

- a. Shipboard (in place) testing. The following requirements apply:
 - (1) All valve lineups and operations necessary to meet the testing requirements and performance of the test will be accomplished by Ship's Force to include the generation and approval of a Formal Work Package detailing the test procedure.
 - (2) The FMA will provide the test equipment required for in place testing, if requested.
 - (3) For testing to recertify FMA work, the FMA will provide Ship's Force with the test requirements, Quality Assurance (QA) data forms for Controlled Work Packages (CWP) only, and list of affected joints (if applicable). The FMA will review the test records to verify the satisfactory accomplishment of the test(s) and maintain the original Objective Quality Evidence (OQE) in the FMA CWP for testing to re-certify work.
 - (4) The System Test Check List of Volume IV, Chapter 9 of this manual will be used in the preparation, conduct, and recovery from hydrostatic tests and tests above normal operating pressure when an external pressure source is required.
- b. Shop or bench testing. To the maximum extent possible, all components to be installed in a ship's system will be work center or bench tested and/or inspected prior to installation, when required. This includes weld joint radiography, strength tests of welds or manufactured pressure boundary parts, valve seat leakage tests, etc. This results in a reduced number of cyclic stresses on the systems. The applicable portions of the System Test Check List of Volume IV, Chapter 9 of this manual will be used in preparation, conduct, and recovery from shop hydrostatic testing. QA form 28 will be used to document the OQE for shop testing.
- c. Hydrostatic/pneumatic testing. A QA form 26 will be used to document the OQE that the hydrostatic/pneumatic testing was completed satisfactorily. Nuclear hydrostatic/joint/pneumatic testing will be in accordance with reference (a) and paragraph 7.5.1 of this chapter. Non-nuclear hydrostatic/joint/pneumatic testing will be in accordance with reference (b) and (c) and Section 7.2 of this chapter.
- d. Miscellaneous testing, such as operational testing, will be documented on a QA form 17 when higher test authority requires a record and for which there is no other QA form.
- e. Drop testing. Used to test the integrity of a system by applying pressure and holding for a specified time and correcting the pressure drop for temperature changes. A QA form 27 will be used to document the OQE that the drop test was completed satisfactorily.
- f. Nondestructive Testing (NDT). Used to determine the integrity of metals with no detrimental effects to the subject metal. Specific guidance on NDT and required OQE is contained in reference (d) and Part I, Chapter 11 of this volume.
- g. Test instrumentation. Test instrumentation will be in accordance with the source documents.
 - (1) Installed master/primary and backup test pressure gages, including shop hydrostatic test stands, must be calibrated for accuracy as required by references (a), (c) and (e). These references may not include special test gage requirements and other source documents (e.g., Reactor Plant Manual (RPM), special test procedures, maintenance and replacement instruction requirements) may have to be consulted.
 - (2) Non-nuclear test instruments will be in accordance with references (c) and (e). **Local exceptions to gage range and/or increments specified in references (c) and (e) will be approved by an individual with a technical warrant.**

- h. Duration of tests. The duration of a shop or shipboard test will normally be established by the applicable technical reference (e.g., Test Pressure Drawing (TPD), technical manual, RPM, maintenance and replacement instructions), references (b) and (c) for non-nuclear piping systems, or reference (a) for nuclear systems. The following are general guidelines for duration of tests:
- (1) Mechanical joint tightness tests. All operating pressure tests performed to verify the integrity of a remade mechanical joint, which has only software (e.g., flexitallic gasket, gasket, O-ring) replaced, a 30 minute soak period at test pressure prior to commencement of inspections is required to permit weepage or seepage to accumulate.
 - (2) Strength and porosity tests. Tests performed in accordance with references (a) or (b) and (c) to verify the integrity of untested pressure boundary parts (e.g., flanges, bonnets, valve cartridges) or newly brazed or welded joints shall be soaked at test pressure for a minimum of 30 minutes prior to commencement of inspections.
 - (3) Periodic system hydrostatic tests. Periodic hydrostatic tests performed to verify the integrity and leak tightness of entire systems shall be conducted in accordance with references (b) and (c), which require a minimum 30 minute soak at test pressure prior to commencement of inspections.
 - (4) Operational tests. All operational tests performed to assure that all items, components, controls and indications function as designed and in accordance with specifications will be conducted for as long as required to prove the operability of the item being tested.
 - (5) The pressurization time prior to commencing inspections for leakage may be reduced from the normal 30 minute period when pressurization for 30 minutes using installed system equipment is impractical or undesirable (e.g., to avoid generation of radioactive liquid waste or hazardous waste, to avoid undesirable start/stop cycling of the normal system pressure source). In such cases where no minimum pressurization time is specified or it is impractical, maintain pressure for at least five minutes before inspecting joints.
 - (6) When performing operating pressure tests on gas systems (e.g., air, oxygen, nitrogen) using a soap bubble leak test method, a 15 minute hold period at test pressure is required. If system configuration makes it impossible to pressurize the joints continuously for 15 minutes, they should be pressurized for as long as possible.
- i. Testing of valve stems. Replaced stems in non-nuclear valves do not require a strength/porosity test, but the re-assembled valves do require a mechanical joint tightness test after assembly as discussed in reference (c). This includes stems manufactured by an FMA from certified Level I barstock.
- j. Testing of new flanged valves received without drilled bolt holes. New valves (e.g., Submarine Safety (SUBSAFE), Level I, nuclear Ready for Issue, and other valves received with certification) without bolt holes in the flanges require only mechanical joint tightness and operational testing in system, not strength testing, following machining bolt holes into flanges.
- k. Following routine maintenance and repair work performed on submarine Fly-By-Wire Ship Control Systems in accordance with submarine class maintenance plan, testing shall be performed as identified in class Fly-By-Wire Ship Control System Technical Work Document and reference (f). Work impacting Unrestricted Operations/Maintenance Requirement Card 019 measured parameters shall invoke conduct of applicable portions of Unrestricted Operations/Maintenance Requirement Card 019.

7.2 TESTING.

7.2.1 Test Procedures. Non-nuclear testing will comply with the detailed system/component plans of the source documents. TPDs have been developed for some classes of ships and contain strength test pressures, designated as "H" on the TPD, and mechanical joint tightness test pressures, designated as "J" on the TPD, for all portions of piping systems. Revisions and modifications to TPDs are documented in the SUBMEPP Strength and Tightness Standardized Test Procedure between periodic revisions to the TPDs. The Test Procedure should be reviewed for changes to the TPD. If TPDs do not exist, and test pressures are not identified on applicable system drawings, particular attention must be devoted to system design pressures and configuration. Technical Repair Standard

(TRS)/Maintenance Standard (MS) provide requirements for testing of many piping system components and generally are the source document for testing of those components. General guidelines for use of TPD "H" or "J" pressures and Appendices A and B Column 1 or Column 2 pressures are:

- a. TPD "H" or Appendices A and B Column 1 pressure is used following:
 - (1) Major repairs.
 - (2) Installation of new piping, components or fittings that have not been previously strength tested. DO NOT assume that new uncontrolled material from the Navy Supply System has been previously strength tested. Exceptions to the strength test requirement exist only for reduced energy criteria systems, installation of approved mechanically attached fittings, seals (gaskets, including pressure seal rings and O-rings), fasteners, valve stems and material meeting the requirements of Note 1 below. A strength test is not required if the end user obtains adequate documentation that a strength test has been previously completed for a specific item.
 - (3) (Submarines only) Re-making the mechanical joint between the hull and hull valve.

NOTE: "H" PRESSURE TESTING FOR NEW MATERIAL IS NOT REQUIRED IF ALL THE FOLLOWING ARE MET:

- 1. MATERIAL IS SUBSAFE SPECIAL MATERIAL IDENTIFICATION CODE (SMIC) OR LEVEL I MATERIAL RECEIVED FROM THE NAVY SUPPLY SYSTEM PROPERLY MARKED.
 - 2. A SATISFACTORY RECEIPT INSPECTION IS COMPLETED BY THE END USER.
 - 3. MATERIAL IS RECEIVED IN THE CONFIGURATION REQUIRED FOR USE WITHOUT REQUIRING ADDITIONAL MACHINING, WELDING OR OTHER MAJOR REPAIR. (BAR, INGOTS, PLATE, FORGINGS, ETC., WHICH ARE MACHINED, WELDED OR HAVE A MAJOR REPAIR, REQUIRE AN "H" PRESSURE TEST TO CERTIFY THE COMPONENT.)
- b. TPD "J" or Appendices A and B Column 2 pressure is used following:
 - (1) Minor repairs.
 - (2) Re-made mechanical joints meeting requirements of reference (c).
 - (3) Repairs, replacements and modifications of piping, components and fittings in reduced energy criteria systems (those operating at 500 psig or less and 200°F or less); the work must meet all applicable specifications and requirements and satisfactorily pass all other required non-destructive testing.
 - (4) Installation of approved mechanically attached fittings meeting the requirements of reference (c).

7.2.2 Test Requirements. The following requirements pertain to non-nuclear testing:

- a. Reference (b), (c) and (e) contain the test rig, test gauges, and testing procedure requirements for performing non-nuclear testing. Additionally, ship or system specific manuals such as a Steam Plant Manual should be consulted where applicable. Test, Measuring and Diagnostic Equipment documentation for operating pressure tests is not required if normally installed system gages are used.
- b. When a test gauge is not listed in reference (e), a gauge where the test pressure falls within 50-90% of the gauge range will be used (not applicable for operating pressure tests using normally installed system gages).
- c. Portions of systems that are not designed for full test pressure will be isolated and provided with a relief or vent path to prevent over pressurization during testing.
- d. Hydrostatic/pneumatic test results will be documented on a QA form 26 and system drop tests will be documented on a QA form 27. Miscellaneous testing will be documented on a QA form 17.

- e. Where test requirements cannot be met, a Departure from Specification (DFS) will be processed in accordance with Part I, Chapter 8 of this volume.
- f. Shop test of replacement components will be conducted in accordance with reference (c).
- g. Renewal or replacement of non-nuclear mechanical joint fasteners. If mechanical joint fasteners are removed and re-installed or replaced one at a time, torqued in accordance with an approved procedure and using approved thread lubricants, the integrity of the mechanical joint has not been violated and a test for strength or tightness is not required. For submarines, this applies to joints both within and outside of hull integrity areas. Replacement shall be controlled by a Technical Work Document.

7.2.3 Test Pressure Source References. Mechanical joint tightness tests are performed to test work performed on piping systems and components. The following list provides typical documents used to determine test pressures and operational requirements:

- a. TPD. The applicable TPD, if promulgated for a particular class of ship, can be found through the use of the TPD Index or Ship's Drawing Index or referenced in the Record of Shipboard Tests.
- b. RPM.
- c. Steam and Electric Plant Manual Maintenance and Replacement Instructions requirements.
- d. Component technical manual.
- e. Ship valves technical manual.
- f. Ship System Manual.
- g. Naval Ships' Technical Manual (NSTM) chapter dealing with the appropriate system.
- h. Record of Shipboard Tests.
- i. Standardized Class Shipboard Test Procedures.
- j. System diagrams/drawings.
- k. Vendor drawings.
- l. Submarine MSs.
- m. Steam Plant Manual.
- n. Boiler Repair Manual (reference (g)).
- o. References (a), (b), (c), (d), (h), (i), (j), (k) and (l) of this chapter. In each case, every effort should be made to conform to the latest applicable specifications and detailed test requirements.

7.2.4 Non-Nuclear Pressure Drop Tests. (Submarines only)

7.2.4.1 General Instructions.

- a. When accomplishing pneumatic mechanical joint tightness tests on air/compressed gas systems, tanks and/or compartments as specified by the procedure, pressurize the space/system with the test medium (air, nitrogen, etc.) to the pressure specified. Isolate the test rig from the test area and allow the system to stabilize and remain isolated for the specified amount of time. The actual drop in test pressure corrected for temperature change must be calculated.
- b. This method of testing may also be used when testing valves for tightness/seat tightness using water. When test pressure is reached, lock in test pressure and isolate the pressure source from the test rig, and allow the system to stabilize and remain isolated for the specified amount of time. Acceptance criteria is no drop in pressure over the specified time (unless a specific drop in pressure is specified). Test duration shall be as specified in the TWD. Generally calculations for correction due to temperature changes are not required.

7.2.4.2 Calculations.

a. METHOD: Pressure Drop, (psi) Temperature Corrected =
$$\frac{(P_1 + 14.7)(T_2 + 460)}{(T_1 + 460)} - (P_2 + 14.7)$$

WHERE:

T₁ = Initial Measured Temperature °F

T₂ = Final Measured Temperature °F

P₁ = Initial Measured Pressure, psig from Test Gage

P₂ = Final Measured Pressure, psig from Test Gage

14.7 = Atmospheric Pressure, psi (added to gage pressure to convert to absolute pressure)

460 = Absolute Temperature Scale (added to Fahrenheit temperature to convert to absolute temperature)

- b. The temperature value used for calculations must be the net effective temperature for the tested volume. For a submarine high pressure air system under test, most of the system gas is in the flasks located in the main ballast tanks. Therefore, temperatures most nearly representing the flask(s) internal temperature(s) are required. The net effective temperature of a high pressure air system on a waterborne submarine is calculated by a weighted average of temperatures using a weighing factor of nine (9) for sea water temperature and one (1) for average compartment temperature.

$$T_{net} = \frac{(\text{SEA WATER TEMP} \times 9) + (\text{COMPARTMENT TEMP})}{10}$$

7.2.4.3 Example. This paragraph provides a typical example of a Pressure Drop Test corrected for a temperature change:

Ships Air Bank Initial Pressure 4500 psig

* Sea Water Temperature Outside
Ballast Tank at Start of Test 44°F

* Sea Water Temperature Outside
Ballast Tank at End of Test 50°F

** Ship's Compartment Air
Temperature at Start of Test 70°F

Ship's Compartment Air
Temperature at End of Test 72°F

Ship's Air Bank Final Pressure 4520 psig

Allowable Pressure Drop in 24 Hours at 1 % 45 psi

$$\text{Actual Pressure Drop} = \frac{(P_1 + 14.7)(T_2 + 460)}{(T_1 + 460)} - (P_2 + 14.7)$$

$$T_1 \text{ Net} = \frac{(44 \times 9) + (70 \times 1)}{10} + 460 = 507$$

$$T_2 \text{ Net} = \frac{(50 \times 9) + (72 \times 1)}{10} + 460 = 512$$

$$\frac{(4500 + 14.7) (512)}{(507)} = 4559.2$$

- (3) Identify the at-sea testing requirements, acceptance criteria and restrictions, if any, for unsatisfactory testing. Generally, failed testing of work on a non-SUBSAFE system does not result in depth limitations.
- b. (Submarines only) If a Maintenance Certification Record/Re-Entry Control is closed by transferring at sea testing to a DFS (e.g., controlled dive to test depth for test of a periscope hull gland, controlled dive for test of a sea connected system (e.g., Main Sea Water (MSW), Auxiliary Sea Water (ASW)) in lieu of joint tightness test to “J” pressure of TPD), the ship will be restricted to the requirements of Part I, Chapter 5, Section 5.6.5a of this volume until satisfactory completion of a controlled deep dive per Volume VI, Chapter 26 of this manual.
- c. (Submarines only) If work on a non-controlled system requires an exception/alternative retest and/or at sea testing, the work shall be performed as follows:
 - (1) A Formal Work Package in accordance with Part I, Chapter 2 of this volume, (e.g., PMS Maintenance Requirement Card, technical manual pages, detailed maintenance outline), will be used to control and document all work performed.
 - (2) If a controlled assembly is required, the QA form 34 shall be retained per Part I, Chapter 10 of this volume. Controlled assembly requirements are:
 - (a) Verification that surface finishes of gasket/o-ring sealing surfaces are in accordance with applicable specifications.
 - (b) Verification that fastener material and installation is in accordance with applicable specifications.
 - (c) Verification that gaskets/o-rings are properly installed and in accordance with applicable specifications.
 - (d) Assembly is documented on a QA form 34.
 - (e) Inspected by a Quality Assurance Inspector or Quality Assurance Supervisor.
 - (3) If certification of the maintenance associated with the exception/alternative retest requires a controlled deep dive test in lieu of a joint tightness test to “J” pressure of TPD, the DFS will:
 - (a) Identify completion of the controlled assembly (if required).
 - (b) Identify results of the exception/alternative testing.
 - (c) Identify the at sea testing requirement(s) and acceptance criteria and restrictions, if any, for unsatisfactory testing. Generally, failed testing of work on a non-SUBSAFE system does not result in depth limitations.

7.4.2 Exemptions/Alternatives to Test Requirements (Non-Nuclear unless Specifically Addressed in Nuclear Technical Documents).

NOTE: 1. “H” PRESSURE TESTING FOR NEW MATERIAL IS NOT REQUIRED IF BOTH THE FOLLOWING ARE MET:

- 1. MATERIAL IS SUBSAFE SMIC OR LEVEL I MATERIAL RECEIVED FROM THE NAVY SUPPLY SYSTEM PROPERLY MARKED.
- 2. A SATISFACTORY RECEIPT INSPECTION IS COMPLETED BY THE END USER.

NOTE: 2. MATERIAL IS RECEIVED IN THE CONFIGURATION REQUIRED FOR USE WITHOUT REQUIRING ADDITIONAL MACHINING, WELDING OR OTHER MAJOR REPAIR. (BAR, INGOTS, PLATE, FORGINGS, ETC., WHICH ARE MACHINED, WELDED OR HAVE A MAJOR REPAIR, REQUIRES A “H” PRESSURE TEST TO CERTIFY THE COMPONENT.)

- a. Mechanical joints. For minor repairs on those mechanical joints previously strength tested (e.g., an “H” test has been conducted on the pressure boundary parts in the past) including hull joints, where system configuration makes mechanical joint tightness testing impractical, the following is considered a satisfactory alternate testing method.

- (1) Perform a controlled assembly of the joint(s).
 - (2) Visually inspect the joint for leakage during first system pressurization to nominal/system operating pressure and document on a QA form 17.
 - (3) (Submarines only) For submarine sea connected systems, initiate a minor DFS to document the lack of retest. Clearance will require joints to be visually inspected at each incremental depth during the first controlled dive. No leakage is allowed.
- b. Valve test. Following the in place repair of valves where configuration precludes mechanical joint tightness testing or seat tightness testing after minor repairs, the following is considered a satisfactory alternate testing method.

NOTE: (SUBMARINES ONLY) EXCEPT FOR EMERGENCY MAIN BALLAST TANK (EMBT) PARKER CHECK VALVES, THE FOLLOWING EXEMPTIONS DO NOT APPLY TO SUBMARINE HULL AND BACKUP VALVES OR ASSOCIATED HULL INTEGRITY JOINTS OUTBOARD OF THE BACKUP VALVE.

- (1) For lack of seat tightness testing, measure and document the following as applicable:
 - (a) A seat blue check for non-ball valves (100% contact required).
 - (b) For soft seated valves, such as Parker check valves, where a blue check is not practical, re-assemble the valve, perform the appropriate mechanical joint tightness test, and applicable portions of the Unrestricted Operation Maintenance Requirement Card (if applicable). A minor DFS is required to document the lack of seat tightness testing and the requirements to conduct inspections during a controlled dive to test depth to verify seat tightness.
 - (c) Dimensional verification/stack height for ball valves (satisfactory seat compression required).
 - (d) For welded or brazed in-line SUBSAFE valves (hull and backup valves are specifically excluded) and all non-nuclear, non-SUBSAFE valves repaired in place, no DFS is required.
 - (e) For bolted-in SUBSAFE valves repaired in place, initiate a major DFS to the Type Commander in accordance with Part I, Chapter 8 of this volume to document the lack of seat tightness test.
 - (2) For lack of mechanical joint tightness testing for valves in submarine sea connected systems, perform a controlled assembly of the valve(s) mechanical pressure boundary joints and initiate a minor DFS to document the lack of test. Clearance will require that the affected joints be visually inspected during the first controlled dive.
- c. Welded joint options. Reference (c) contains options for testing welded joints.

NOTE: ELECTION TO INVOKE THE OPERATING PRESSURE TEST OPTION REQUIRES A CLEAR UNDERSTANDING OF THE SYSTEM OPERATING, TEST AND INSPECTION REQUIREMENTS OF REFERENCES (c), (d) AND APPLICABLE TEST METHODS. CONSIDERATION MUST BE GIVEN TO SAFETY, MAINTENANCE COST, TIME AND THE SPECIFIC SYSTEM UNDERGOING REPAIR. THE OPERATING PRESSURE TEST OPTION MUST BE PART OF THE PRE-PLANNED REPAIR PROCESS INCORPORATED INTO THE TECHNICAL WORK DOCUMENT.

- d. Nuclear interface systems. Nuclear interface systems should be tested in accordance with reference (a).
- e. Brazed joints.
- (1) A hydrostatic test is not required after brazed repairs or replacements if all of the following criteria are met:

- (a) System is a reduced energy system. (Normal operating pressure 200 psig or less and normal operating temperature 200 degrees F or less). Joints are not in “lethal” system as defined in reference (n). Joints are not in sea water or sea connected systems or portions thereof, which are subject to submergence pressure below 200 feet or to sections of piping that pass through sea pressure rated bulkheads and which are rated for submergence pressures greater than 200 feet.
 - (b) All applicable NDT on brazed joints is performed.
 - (c) Visually inspect for leakage during the first system pressurization to normal operating pressure.
- (2) When a brazed joint of a system and/or component cannot be strength tested due to configuration, the following is considered to be an acceptable alternative:
- (a) Initiate a major DFS to document the lack of strength test.
 - (b) Visually inspect the joint for leakage during first system pressurization to nominal/system operating pressure and document on a QA form 17.
- f. Mechanically attached fittings are not welded or brazed fittings. They must meet all QA requirements as specified in the applicable Uniform Industrial Process Instruction or Process Instruction for mechanically attached fitting installation per reference (c). Election of the operating pressure test option will not require a DFS if pre-planned into the repair process to ensure all original QA requirements and additional NDT required by reference (c) are performed.
- g. (Submarines only) When post deep dive passive/pre-energize testing is required by system specific Technical Manuals or Maintenance Index Pages/Maintenance Requirement Cards, outboard electrical connections subject to full submergence sea pressure will be documented on a QA form 12 as a minor departure to accomplish post deep dive passive/pre-energize testing. The departure will also indicate if a controlled assembly was performed.
- h. (Submarines only) For lack of mechanical joint tightness testing following replacement of BPS-16 upper RADAR mast seals, perform a controlled assembly of the mast mechanical pressure boundary joints and initiate a minor DFS to document the lack of test. Clearance will require that the affected joints be visually inspected during the first controlled dive.

7.5 REACTOR PLANT AND NUCLEAR SUPPORT FACILITY TESTING.

7.5.1 Hydrostatic/Pneumatic Tests or Drop Tests. A QA form 26 and QA form 27, will be used to document the OQE that the hydrostatic/pneumatic or drop testing was completed satisfactorily.

- a. When unable to accomplish the required test, a Liaison Action Request will be initiated in accordance with Part I, Chapter 8, of this volume.
- b. When unable to satisfactorily test repaired valves due to out of specification seat leakage, Part I, Chapter 8, of this volume describes the procedure to defer work and close out the CWP.
- c. Reference (a) contains the hydrostatic test requirements for reactor plant fluid systems and portions of systems. It contains requirements for test rigs, test gauges, and test precautions.
- d. Some reactor plant fluid systems have specific system hydrostatic test instructions and special test requirements in the RPM. Others must have local procedures prepared based on the requirements of reference (a) and the RPM.
- e. The Immediate Superior in Command will review Ship’s Force test procedures for FMA accomplished nuclear work and will resolve questions or problems with test requirements.
- f. The System Test Check List in Volume IV, Chapter 9 of this manual will be used in preparation, conduct and recovery from test.

7.5.2 Mechanical Joint Fasteners.

- a. When mechanical joint fasteners are removed and re-installed or replaced one at a time and torqued in accordance with an approved procedure, refer to reference (a) to determine the extent of test required.

- b. Test requirements for mechanical fasteners within the reactor plant SUBSAFE boundary are contained in Appendix 8 of reference (h).
- c. Replacement of fasteners shall be controlled by a CWP in accordance with Part I, Chapter 2, of this volume, for hydrostatic tests and tests above normal operating pressure when an external source is required.

7.5.3 Valve Seat Leak Tests. Periodically and following any repair which affects seat tightness, installed valves (i.e., valves repaired in-place) seat leak tests shall be performed in accordance with reference (o), in conjunction with the cognizant RPM. The necessity for seat tightness testing of replaced valves (with or without Ready for Issue) should be determined using the requirements of reference (o) and the cognizant RPM. Prior to installation or recertification as Ready for Issue, valves removed from the system for overhaul or refurbishment shall be tested in accordance with the applicable component technical manual. Fleet Maintenance Support Branch Quality Engineering Division Note 18 provides information for troubleshooting and leak testing reactor plant valves.

7.6 SUPPLEMENTAL TEST CRITERIA (NON-NUCLEAR).

7.6.1 Purpose. This section is provided along with section 7.4 of this chapter to identify test requirements that may be used when more authoritative requirements are not available, or are incomplete. The performance of tests in accordance with these requirements will constitute satisfactory testing. A DFS will not be required unless specifically required as part of the alternative test. The applicable ship class source documents take precedence over Appendices A and B. Notes in the appendices also provide testing guidance that is to be applied even when the testing requirements are specified by TPD or other authoritative guidance. Appendix A applies to Surface ships systems and Appendix B applies to Submarines.

- a. Appendices A and B are intended as a general guide for testing where specific guidance is not provided. All portions of a given system may not necessarily be tested to the pressure specified (e.g., the 30 psig portions of a submarine Fuel Oil Filling, Transfer, and Compensating Water System should not be tested to 150% of test depth pressure).
- b. For component testing where a TRS/MS has been used for restoration or overhaul, TRS/MS testing requirements should be followed. TRS/MS requirements may differ from the test specifications on the drawing for the component. The drawing specifications are generally intended as manufacturing acceptance tests. Though no specific guide to precedence can be made, good engineering judgment and conservative approach to testing should prevail. If only part of a TRS/MS was used in component maintenance, the testing requirements in the TRS/MS may not apply. The use of submarine TRS/MS in the testing phase of maintenance has, in the past, required an inordinate amount of work during submarine upkeep and refit periods. Where only minor repairs (as defined in the glossary) are accomplished using a TRS/MS, only the applicable test requirements should be accomplished.

APPENDIX B

TESTING REQUIREMENTS FOR SUBMARINE SYSTEMS

| System | Column 1 | Column 2 | Special Notes |
|--|--|---|---|
| Note 1 | Strength and Porosity Test Pressure | Mechanical Joint Tightness Test Pressure | |
| | Notes 2, 3 and 4 | Notes 3, 4 and 5 | |
| Steam | 135% system design pressure | 100% nominal operating pressure | |
| Non-Nuclear structural tanks | | | Notes 13 and 18 |
| Feed and condensate | 135% system design pressure | 100% nominal operating pressure | |
| Fuel oil service | 135% system design pressure | 100% nominal operating pressure | |
| Lube oil fill, transfer, and service | 135% system design pressure | 100% nominal operating pressure | Note 3 |
| Oxygen (except surface ship divers' life support systems) | 135% system design pressure | 100% nominal operating pressure | Notes 10, 11 and 12 |
| Nitrogen | 135% system design pressure | 100% nominal operating pressure | Note 11 |
| Fresh water cooling, chilled water, potable water | 135% system design pressure | 100% nominal operating pressure | |
| Fuel oil filling and transfer | 135% system design pressure (135% test depth pressure for those portions of submarine systems exposed to submergence pressure) | 100% nominal operating pressure (100% test depth pressure for those portions of submarine systems exposed to submergence pressure) | |
| Compressed air including EMBT blow (except surface ship divers' life support systems, bleed air, and starting air) | 135% system design pressure | 100% nominal operating pressure. For submarines, this is up to the pressure hull cutout valve if the airline penetrates the pressure hull | Notes 6, 8 and 24 |
| Hydraulic (e.g., ship service, steering and diving, windlass, flood control) | 135% system design pressure | 100% nominal operating pressure | Notes 3, 23 and 24 |
| Hull glands, cables, shafts, masts | | | Notes 13, 25, 26 and 29 |
| Escape trunks, hatches (including missile tube muzzle hatches on SSBN/SSGN Class Submarines), watertight bulkhead doors, Sonar Spheres | | | Notes 14, 21, 27, 28, 29, 32, 33 and 34 |
| Periscopes | | | Note 16 |

| System Note 1 | Column 1 Strength and Porosity Test Pressure Notes 2, 3 and 4 | Column 2 Mechanical Joint Tightness Test Pressure Notes 3, 4 and 5 | Special Notes |
|---|--|---|------------------------|
| Antennas | | In accordance with NAVSEA 0900-LP-016-7007 and SS-404-1971420 | Note 31 |
| Diesel Sea Water (DSW) | | | Notes 6 and 9 |
| Hydrogen | 135% design pressure | 100% nominal operating pressure | Note 11 |
| Hovering/depth control, sea water circulating (e.g., ASW, MSW, Air Conditioning Seawater) | 150% test depth plus pump shutoff pressure | 100% test depth pressure | Notes 6, 7, 24, and 30 |
| Plumbing system subjected to submergence pressure | 150% test depth | 100% test depth pressure | Note 6 |
| Trim and drain systems subjected to submergence pressure | 150% test depth pressure | 100% test depth pressure | Notes 6, 7 and 24 |
| Torpedo tube system, including the entire SUBSAFE portion of the system | 100% test depth pressure plus 90 psig | 100% test depth pressure plus 90 psig | Notes 17 and 24 |
| Signal ejectors | | | Notes 20, 24 and 32 |
| SSBN/SSGN bulkhead penetrator holes/covers | | | Note 22 |
| Snorkel induction and exhaust lines | | | Notes 15 and 32 |
| Cable plugs to EHF's, EHPs, antennas, masts, radars and other component connection/joint exposed to submergence sea pressure (excluding photonics, shore power connectors and pressure proof caps used on EHF's and EHPs) | | | Notes 31 and 34 |
| SONAR Hydrophone, Transducer, Projectors and Outboard Components | | | Note 35 |

NOTE 1: Testing requirements for submarine ship piping and for submarine pressure hull envelope systems and components not specified above will be 135% of system design pressure where repairs meet the criteria of a major repair.

NOTE 2: Strength and porosity test - Where a major repair is accomplished on the pressure boundary of a piping system or component, that portion of the system or component will be pressure tested as indicated in the applicable TPD. The strength and porosity test pressure is identified on a TPD as the "H" pressure. In the absence of specific test pressure direction on a TPD, test pressure shall be per Note 1. Strength and porosity test duration is 30 minutes unless otherwise specified in a technical reference.

- a. Strength and porosity test pressure shall be not less than 50 psig unless otherwise specified in the TPD.
- b. New mechanical joints (as defined in the Glossary of Terms) are subjected to a strength and porosity test.

NOTE 3: Test fluid.

- a. If the test fluid for a mechanical joint tightness test is not specified, either clean fresh water or system fluid shall be used. System fluid shall be used for hydraulic and lubricating oil systems. Compressed gases may be used for mechanical joint tightness tests provided they can be used safely.
- b. Observe safety precautions for air, industrial gases, and hydraulic systems found in NSTM, as well as notes below, if system fluid or gas is used.

NOTE 4: Exceptions/alternatives to hydrostatic test requirements are provided in Section 7.4 of this chapter.

NOTE 5: Mechanical joint tightness test duration is 30 minutes unless otherwise specified on a component, system, or TPD. The mechanical joint tightness test pressure is indicated on a TPD as the "J" pressure or nominal operating pressure if performing an operational pressure test. Zero visual external leakage is normally the tightness acceptance criterion.

- a. Re-made mechanical joints (as defined in the glossary) are subjected to a mechanical joint tightness test.
- b. The tightness test must be performed with the thermal insulation removed from mechanical joints to be examined.
- c. This note does not apply to submarine hull and backup valves. (See NOTE 6 of this appendix)

NOTE 6: Where hull valves and backup valves are repaired or replaced, they will be tested as follows:

- a. Valves removed for repair. Hull valve and/or backup valves that are removed completely from the system for repair and/or maintenance will be tested as follows:
 - (1) Prior to installing in the system:
 - (a) Conduct a strength and porosity test to column 1 requirements with the valve ball/disc positioned such that the unproven pressure boundary parts and disturbed joints are exposed to test pressure.
 - (b) With the valve shut, test from seaside to column 1 requirements to test for seat leakage.
 - (c) If a mechanical joint leaks at column 1 pressure, decrease to column 2 pressure and verify no leakage.
 - (d) For minor repairs, test as in steps a.(1) (a) through a.(1) (c) of this Note, but to column 2 requirements.
 - (e) Where valve internals can be visually inspected for leakage, seat tightness test pressure need only be maintained for three minutes unless specified otherwise in the applicable maintenance document.
 - (2) After re-installation in system, test disturbed mechanical joints as follows:
 - (a) Apply test pressure of column 1 requirements to all mechanical joints to which major repairs were conducted and not strength tested prior to valve installation.
 - (b) Apply external (seaside) test to column 1 requirements of all mechanical joints between hull valve and hull. For other disturbed mechanical joints, test to column 2 requirements.
 - (c) For hull joints where testing is not feasible, controlled assembly followed by a controlled dive in accordance with paragraph 7.4.2 a of this chapter is a satisfactory alternative to the test.
- b. Valves repaired in place.
 - (1) If major repairs have been accomplished:
 - (a) Conduct a strength test to column 1 requirements with the valve ball/disc positioned such that the unproven pressure boundary parts and disturbed joints are exposed to test pressure.

- (b) With the valve shut, test from seaside to column 1 requirements to test for seat leakage.
- (c) If a mechanical joint leaks at column 1 pressure, decrease to column 2 pressure and verify no leakage.
- (2) If minor repairs have been accomplished, test as in step b.(1) of this Note, but to column 2 requirements. If test to column 2 requirements is not possible, controlled assembly followed by a controlled dive in accordance with paragraph 7.4.2 of this chapter, is a satisfactory alternative to the test.
- (3) For those mechanical joints in sea connected systems where testing is not feasible, controlled assembly followed by a controlled dive in accordance with paragraph 7.4.2 a. of this chapter, is a satisfactory alternative to the test.
- c. Operational test. In addition to the hydrostatic testing required by steps a. or b. of this Note, after repairs have been completed on the valve and/or hydraulic actuator, in-place operational testing of Emergency Flood Control hydraulic components or EMBT Blow valves will be conducted by performing applicable portions of the operational Unrestricted Operation.
- d. Trash Disposal Units (TDU). The TDU is a special purpose device which requires tests beyond those normally required of hull and/or backup valves. The specific testing required for the re-certification of the TDU after maintenance must be determined from MSs or other reference documentation. A good reference to ensure adequate testing is the Index of Submarine Maintenance Engineering, Planning and Procurement (SUBMEPP) Standardized Test Procedures SSN/SSBN/SSGN Submarines.

NOTE 7: For testing work performed on portions of the sea connected systems including the joint between the hull and hull valve, tests shall be conducted for strength and porosity and mechanical joint tightness to the pressures specified on the applicable ship/class drawing. In some instances the pressures specified will not reflect those on the individual TPDs provided to the ship. For SSN 688 and SSBN/SSGN 726 Class ships, the applicable TPDs shall be used. The applicable ship/class drawings listed below should be used if TPDs are not available.

| Ship/Class | Drawing | Strength | Tightness |
|---------------|-------------|----------------------|-----------|
| SSN 21 | 830-6404016 | #Item 18 plus 50 psi | Item 1 |
| SSN 688 | 845-4456141 | Item 3 | Item 6 |
| SSBN/SSGN 726 | 845-4640418 | *Item 11 | Item 1 |
| SSN774 | 801-6984058 | **Item 12 | Item 18 |

Except for SSN23 LDT hull insert for TD-704 and 705 valve assembly which is tested to Item 1 of NAVSEA Dwg 830-6404016.

* Except valves TD-2021 and TD-2022 and associated piping which are tested to Item 2 of NAVSEA Dwg 845-4640418.

** Except valves TD-116, TD-138 and TD-554 and associated piping which are tested to Item 2 of NAVSEA Dwg 801-6984058.

Errors in any TPD should be reported to SUBMEPP via SUBMEPP Feedback Form provided as Appendix C of this chapter.

CAUTION: CRYSTALLIZATION/MELTING OF MAIN BALLAST TANK HULL STOP VALVE SEATS AND DOWNSTREAM EMBT BLOW VALVE SEATS MAY RESULT FROM RAPID PRESSURIZATION OF THE EMBT BLOW PIPING AGAINST SHUT MAIN BALLAST TANK HULL STOP VALVES.

NOTE 8: 4500 psig air system hull stop and bank stop valves will not be used as a boundary for hydrostatic test pressures greater than 4500 psig unless valve seats and software are replaced after the test and a mechanical joint tightness is performed.

NOTE 9: For repairs to the DSW system, inboard of the hull and backup valve, the column 1 test pressure is 122 psig and the column 2 test pressure is 88 psig. This is to prevent damaging the attached DSW pump.

NOTE 10: Where oxygen piping or system components are re-installed by mechanical joints, these portions of the system will be tested to 100% operating pressure using nitrogen in accordance with reference (p). System fluid (oxygen) may be used in at-sea situations when use of nitrogen is not practical. The test pressure will be held for a minimum of 15 minutes plus the time required to conduct inspection of joints under test.

NOTE 11: Refer to reference (p) for testing requirements and procedures for oxygen, nitrogen, and hydrogen systems.

NOTE 12: Before testing oxygen stop valves with Kerotest Co. cartridges in accordance with Kerotest Drawing 72594765, ensure the valve is assembled in accordance with Kerotest Instruction K-673 and that the union is torqued to 160 - 170 ft.-lbs. This is necessary to ensure the cartridge is not damaged.

CAUTION: WHEN TESTS INVOLVE NUCLEAR BOUNDARIES, REFER TO REFERENCE (h), REFERENCE (q), AND THE APPLICABLE RPM BEFORE TESTING.

NOTE 13: When packing glands, stuffing tubes, manhole covers, etc., in hull envelope boundary tanks are entered and remade, the assembled unit will be tested by conducting a 12 psig air tightness test. With 12 psig air within the tank, apply soap solution to the work area and inspect for leakage. No leakage is allowed.

NOTE 14: Escape trunk penetrations not exposed to sea pressure during normal ship operation, escape and access lower hatches, and watertight bulkhead doors require only a completion test. The completion test is a 12 psig air test with no pressure drop allowed in 10 minutes. If unable to accomplish the completion test, perform an alternate test per note 25 of this Appendix. No inspection following the controlled dive is required.

NOTE 15: Where repairs are performed on the snorkel induction or exhaust piping or valves, refer to reference (r) for test requirements.

NOTE 16: Submarine Periscope Pressure testing, evacuation/charge and dew point testing will be in accordance with reference (s).

NOTE 17: Where minor repairs have been accomplished on torpedo tubes (including attached piping) and/or impulse tanks, the applicable portion of the system will be tested by performing sub-paragraph a., b. or c. below.

NOTE: WHEN REMOVAL OF THE TORPEDO TUBE SIGHT GLASS (SSN688/SSB(G)N726 CLASS) OR LIGHT PIPE (SSN21 AND 774 CLASSES) ASSEMBLIES IS REQUIRED TO INSTALL TEST INSTRUMENTATION, REINSTALLATION OF THE SIGHT GLASS SHALL INCLUDE A VISUAL INSPECTION OF THE GLASS (CHECK FOR CHIPPING, CRACKS, ETC.) AND/OR IF THE SIGHT GLASS HAS BEEN REMOVED FOR REPAIRS (LEAKS, BROKEN GLASS, STRIPPED THREADS, ETC.), TESTING SHALL BE ACCOMPLISHED PER SUB-PARAGRAPH b. BELOW.

- a. "J" pressure hydrostatic test pierside.
- b. Controlled assembly of components exposed to sea pressure, completion test and a water tight integrity test.
 - (1) For Torpedo Tubes and piping: The affected joints shall be assembled as a controlled assembly and subjected to a 12 psig air tightness test for 10 minutes. Accomplish a soap bubble test of the affected joints. In addition, a minor DFS will be used to document requirement for inspections during a controlled dive in order to verify re-establishment of the watertight integrity for those repaired joints.
 - (2) If air soap test is impractical, or if the affected joint is inaccessible, a drop test may be conducted by pressurizing to 12 psig air, allowing time for pressure/temperature to stabilize. Hold for 30 minutes, pressure drop shall not exceed 10 oz. A minor DFS and inspection during controlled dive is required.
- c. For Impulse Tank: The affected joints shall be assembled as a controlled assembly and subjected to a drop test by pressurizing to 12 psig air. Allow time for pressure/temperature to stabilize, hold for 10 minutes. No drop allowed. In addition, a minor DFS will be used to document requirement for inspections during a controlled dive in order to verify re-establishment of the watertight integrity for those repaired joints.

- (1) When drop test is conducted in drydock, record the highest pressure held. Minimum pressure shall be 5 psig. No drop allowed. Repeat at 12 psig when waterborne.
- (2) In lieu of drop test, the affected joints shall be assembled as a controlled assembly and the tank subjected to a 12 psig air tightness test for 10 minutes. Accomplish a soap bubble test of the affected joints. A minor DFS and inspection during controlled dive is required.

CAUTION: WHEN PERFORMING TESTING OF TANKS, COMPLY WITH REFERENCE (q), SECTIONS 50 THROUGH 54.

NOTE 18: NAVSEA drawing 126-5792666 provides the detailed requirements and guidance for tank testing.

NOTE 19: DELETED

NOTE 20: Signal ejectors/launchers are special purpose devices, which require tests beyond those normally required of hull and/or backup valves. The specific testing required for the re-certification of signal ejector or launcher after maintenance must be determined from ship's plans and/or other reference documentation. A good reference to ensure adequate testing is the Index of SUBMEPP Standardized Test Procedures SSN/SSBN/SSGN Submarines.

NOTE 21: Upper escape and access hatches (including missile tube muzzle hatches on SSBN/SSGN Class Submarines) and escape trunk penetrations exposed to sea pressure during normal ship operation require a completion test and a controlled dive to test depth. The completion test is a 12 psig air test conducted per Note 25 of this Appendix for 10 minutes. In addition, a minor DFS will be used to document the requirement to inspect for leakage by opening the escape trunk drain at depths for hull valve cycling in accordance with NAVSEA Instruction C9094.2B to verify re-establishment of the watertight integrity for the repaired items.

NOTE 22: Bulkhead penetration hole covers will be tested using the air hose test alternative of Note 25, step c. of this appendix. Upon successful completion of the air hose test, document test on a QA Form 17 and submit to the ship's Quality Assurance Officer. A DFS is not required.

CAUTION: CARE MUST BE EXERCISED WHEN HYDRAULIC OIL IS USED AS A TEST LIQUID TO PREVENT SPRAY OR LEAKAGE FROM BECOMING A FIRE OR CONTAMINATION HAZARD.

NOTE 23: Where shop pre-tested hydraulic system components or hydraulic system piping are reinstalled by mechanical joints, those portions will be tested to column 2 requirements using hydraulic oil as the test fluid.

NOTE 24: For maintenance involving a system or component monitored under the Unrestricted Operation Maintenance Requirement Card program, partial or full performance of in-periodicity operational Unrestricted Operation Maintenance Requirement Cards may be required as a retest. Consult NAVSEA 0924-062-0010, Submarine Safety Requirements Manual, Section 6.4.5 for additional information. Perform applicable portions of Unrestricted Operation-Maintenance Requirement Card 025. For "O" and "I" level activities, when a component in the Emergency Flood Control System is disturbed, the retest shall consist of testing the entire Emergency Flood Control System, e.g., if a component in the Engine Room was disturbed, a retest of the entire Engine Room is required. If a component in the Forward Emergency Control System is disturbed, a retest of the entire Emergency Flood Control System in the Forward compartment is required.

NOTE: NAVSEA DRAWING 126-5792666 ALSO CONTAINS INFORMATION REGARDING TESTING OF SUBMARINE TANKS AND COMPARTMENTS.

NOTE 25: Hull Glands (e.g., cable stuffing tubes, shaft/mast packing glands, electrical/electronic hull fittings excluding the inboard packing assembly and pressure proof caps screwed onto EHF cable connection). Hull glands require a completion test (12 psig compartment test) and an acceptance/structural watertight integrity test (where the joint is exposed to full submergence depth pressure). If the structural watertight integrity test will be accomplished by performing a controlled dive to test depth, the work is required to be accomplished using a controlled assembly, and a minor DFS for the controlled deep dive is required. The affected joints will be inspected during the first controlled dive. Performance of alternate completion tests are acceptable in lieu of a 12 psi compartment test and do not require a DFS. In the event that a 12 psig compartment test or an alternate completion test cannot be

accomplished and the structural watertight integrity test will be accomplished by performing a controlled dive to test depth, the work is required to be accomplished using a controlled assembly and a major DFS for the controlled deep dive is required. The affected joints will be inspected during the first controlled dive. If required, perform one of the following alternate completion test methods when a 12 psi compartment test is not scheduled or practical.

a. Cofferdam Test Method.

- (1) A pressure cofferdam can be used to verify the tightness of hull or bulkhead patches or components after re-installation where it is physically possible to cover the item. A simple cofferdam can be constructed from six inch diameter or larger pipe with length determined by item to be tested. One end of the pipe is capped and the other fitted with a suitable gasket to provide a seal. Sufficient pipe threaded penetrations should be provided for air supply, gauge, and relief valve fittings.
- (2) Cofferdam tests, used in lieu of 12 psig compartment air tests, will be performed as follows:
 - (a) Install the cofferdam over joint/fittings to be tested so that the pressure differential will be in the same direction as a full compartment or tank test. Secure the cofferdam by use of shores and wedges or hydraulic jacks braced against sound structure. Attach air supply and non-isolable gauge and relief valves.
 - (b) Pressurize the air space inside the cofferdam to the test pressure specified for the test of the applicable tank or compartment, as shown in the ship's test drawing.
 - (c) Apply a soapy solution to the opposite side of the structure and inspect for leakage.
 - (d) Acceptance criteria for cofferdam tests will be no evidence of leakage.
 - (e) Where the opposite side of the structure is inaccessible, an alternate method of providing tightness is to measure the drop in pressure within the cofferdam over a ten minute period. The gasket and fittings in the cofferdam should be checked for leakage using a soapy solution.
 - (f) Acceptance criteria for this alternate cofferdam test will be no drop in pressure.

b. Vacuum Box Test Method.

- (1) A vacuum box can be used to test the same items tested by the cofferdam method. However, since the pressure differential is now in the opposition direction, it may be used in many locations where a cofferdam is not suitable. Several portable vacuum pumps capable of pulling a vacuum in a small displacement test vessel are commercially available. An air eductor can be used to pull a vacuum for testing penetrations through the deck over a submarine battery space.
- (2) Vacuum box tests used in lieu of 12 psig compartment air tests, will be performed as follows:
 - (a) Apply a soapy solution to the joint to be tested.
 - (b) Install the vacuum box over the joint or fitting to be tested so that the pressure differential will be in the same direction as a full compartment or tank test.

CAUTION: PROVIDE SUPPORT FOR THE VACUUM BOX WHERE A CHANGE IN THE INTERNAL PRESSURE COULD CAUSE THE BOX TO FALL.

- (c) Draw a vacuum to obtain a pressure differential comparable to the test pressure specified in the ship's test drawings.
- (d) Inspect the joint or fitting for leakage by observing through the Plexiglas cover of the vacuum box for the formation of bubbles which would indicate leakage.
- (e) Acceptance criteria for vacuum box tests will be no evidence of leakage.
- (f) An alternate test method of proving tightness with the vacuum box is to measure the rise in pressure within the vacuum box over a ten minute period.

NOTE: A SOAPY SOLUTION SHOULD BE APPLIED TO THE GASKET, COVER, AND FITTINGS INSIDE THE VACUUM BOX. FORMATION OF BUBBLES ON THE INTERIOR OF THE VACUUM BOX INDICATES A LEAK IN THE BOX.

(g) Acceptance criteria for this alternate vacuum box test will be no rise in pressure.

c. Air Hose Test Method.

(1) An air hose test may be used to verify the tightness of piping or electrical penetrations directly accessible on both sides of the bulkhead or pressure hull for observation. Extreme caution will be used when this method is used to test periscopes, hydraulic control rods or other movable cylinders that penetrate bulkheads or the pressure hull due to the possibility of blowing abrasive material into the seals. Also, ensure that openings exist to prevent ambient pressure buildup.

(2) Air hose tests will be performed as follows:

(a) The air hose nozzle shall be about 3/8 inch in diameter and the pressure at the nozzle shall be about 90 psig.

(b) Apply a soapy solution to the structure on the side opposite from the side the stream of air is to be applied. Communications are to be established to ensure air hose nozzle position and soap test are being accomplished at the same location (i.e., top, bottom, port, starboard).

WARNING: HIGH VELOCITY AIR IS A PERSONNEL HAZARD. ALL NON-ESSENTIAL PERSONNEL WILL BE CLEARED FROM THE AREA BEING TESTED. SAFETY GLASSES WILL BE WORN AT ALL TIMES. CARE MUST BE TAKEN SO THAT THE AIR STREAM IS NOT DIRECTED TOWARD ANY PERSONNEL.

(c) The air hose shall be located so as to produce a pressure differential in the same direction as would occur if a full compartment or tank test were performed. Hold the nozzle as close as possible, within two inches, if possible, to the joint/fitting under test and direct the air stream in the manner most likely to reveal leakage. The test shall be accomplished for a minimum of 30 to 45 seconds on each quadrant/area.

(d) Inspect the soapy solution for the formation of bubbles during the test, which would indicate leakage.

(e) Acceptance criteria for air hose tests will be no evidence of leakage.

d. Pressurized Water Testing Method for Submarine Main Propulsion Shaft Primary Seals (Shaft Seal Cavity Testing in advance of Controlled Deep Dive).

(1) Conduct pressurized water testing of the shaft seal cavity following assembly of any seal repaired in accordance with applicable tech manual or maintenance standard.

(2) If no pressurized water test procedure is available,

(a) Pressurize the repaired shaft seal cavity with fresh water to 100 (95 to 105) psig.

(b) Measure leakage rate past the affected seal into the ship. Allowable leakage is 16 oz/minute maximum. Test pressure must be held for 30 minutes minimum.

NOTE 26: For steering and diving penetrations (and other hull V-Ring packing installations including associated o-rings), perform a controlled assembly and initiate a minor DFS to document the requirement for inspections during a controlled dive to test depth in order to verify re-establishment of the watertight integrity for those joints.

NOTE 27: Removable Logistics Escape Trunks and Logistics Plug Trunks require an inter seal tightness test and a controlled dive to test depth. The inter seal tightness test will be accomplished using air or nitrogen to 100% test depth pressure with no pressure drop allowed in 10 minutes. In addition, immediately following the first controlled dive to test depth, enter the trunk and remove the cleanliness cap from the

drain/test connection and verify no leakage has occurred. A minor DFS will be used to document the requirement to inspect for leakage immediately following the dive to verify re-establishment of the watertight integrity for the reinstalled trunk.

NOTE 28: The Sonar Sphere requires a completion test and a controlled dive to test depth. The completion test is a 12 psig air test with no pressure drop allowed in 10 minutes. If unable to accomplish the completion test, perform an alternate test per note 25 of this Appendix. In addition, immediately following the first controlled dive to test depth, enter the sonar sphere and inspect for evidence of leakage. A minor DFS will be used to document the requirement to inspect for leakage immediately following the dive to verify re-establishment of the watertight integrity.

NOTE 29: Electrical/electronic hull fitting pressure proof caps manufactured in accordance with MIL-C-24231/12, 13 or 14 are not Level I or boundaries within the SUBSAFE Systems and do not require REC or testing when installed or operated.

NOTE 30: For preventative maintenance (e.g., PMS) to inspect and replace seawater heat exchanger pencil and disc type zinc anodes closed with an o-ring threaded plug with a nominal diameter of 1-5/8" or less (outside of a major availability) accomplished without additional testing, the following conditions must be met:

- a. Work will be performed using a CWP within the SUBSAFE boundary and a Formal Work Package when performing work outside the SUBSAFE boundary.
- b. The joint will be assembled as a controlled assembly and documented on QA form 34.
- c. Complete a surfaced condition maximum operating pressure test with zero leakage for 5 minutes. Operate seawater pumps at maximum speed without causing cavitations or violating operating procedure restrictions.
- d. List "SURFACED" as the actual pressure on QA forms.
- e. No new pressure boundary parts are installed (excluding software).

CAUTION: APPLYING POWER TO ANTENNA CONTROL CABLES OR TRANSMITTING ON RADIO FREQUENCY CABLES THAT HAVE NOT HAD THE ELECTRICAL CHECKS COMPLETED CAN SIGNIFICANTLY DAMAGE EQUIPMENT/COMPONENTS. IF THE APPROPRIATE ELECTRICAL CHECKS CANNOT BE COMPLETED, CONSIDERATION OF AN EQUIPMENT TAG-OUT MAY BE APPROPRIATE.

NOTE 31: Submarine SubHDR and Photonics systems outboard cable removal and replacement.

- a. Insert plugs with new O-ring each time the cable is unplugged and assemble using a controlled assembly. The QA form 34 is required to be retained until the availability is complete or if accomplished outside of an availability, the QA form 34 will be retained until the package is closed and reviewed by the Quality Assurance Officer.
- b. After performing a deep dive, 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 to ensure the system is not grounded prior to use.
- c. Controlled Assembly Process used for Re-Entry Control (REC) Exceptions or Exception to Retest Requirements for Mechanical Joints consists of:
 - (1) Verification that surface finishes of gasket/O-ring sealing surfaces are in accordance with applicable specifications.
 - (2) Verification that fastener material and installation is in accordance with applicable specifications.
 - (3) Verification that gaskets/O-rings are properly installed and in accordance with applicable specifications.
 - (4) Assembly is documented on a Quality Assurance (QA) form 34.

- (5) Inspected by a Quality Assurance Inspector (QAI) or Quality Assurance Supervisor (QAS).

NOTE 32: A partial salvage inspection shall be accomplished in accordance with Volume IV, Chapter 18 of this manual for any item worked during an availability (i.e., hatches, salvage air valves, etc.).

NOTE 33: Repairs of SSGN Class Lockout Chamber and SSN 774 Class Lockout trunks and hatches within the certified Scope of Certification boundary require an 89 psig completion test. Minor repairs, in addition to an 89 psi completion test, require a minor DFS for a controlled dive to test depth to certify structural watertight integrity. Major repairs require a hydrostatic test at "H" pressure or an 89 psi completion test and a major DFS to perform a controlled dive to test depth to certify structural watertight integrity. Hydrostatic testing at "H" pressure satisfies all mechanical joint testing requirements for minor repairs.

NOTE 34: Specific repair and acceptance criteria for submarine water tight doors and hatches is defined in the following SUBMEPP Maintenance Standards:

- a. 1000-081-774
- b. 1000-081-726
- c. 1000-081-688
- d. 1000-081-021

NOTE 35: Post installation testing shall be conducted in accordance with the applicable SUBMEPP Maintenance Standard or Combat System Test Procedure. Post deep dive testing shall be accomplished in accordance with the applicable Combat System Test Procedure or Maintenance Requirement Card. For transducer or hydrophone replacements for spherical arrays (excluding SSBNs), a dental chart, or equivalent test, performed in accordance with the applicable technical manual or Maintenance Requirement Card shall be performed prior to getting underway.

VOLUME V**PART I****CHAPTER 8****DEPARTURE FROM SPECIFICATION****(DFS/WAIVERS/NUCLEAR LIAISON ACTION REQUEST/STEAM PLANT ACTION REQUESTS)**REFERENCES.

- (a) NAVSEAINST 5400.95 - Waterfront Engineering and Technical Authority Policy
- (b) NAVSEA 0989-LP-037-2000 - Commissioned Submarine General Reactor Plant Overhaul and Repair Specification
- (c) NAVSEA 0989-LP-043-0000 - Commissioned Surface Ship General Reactor Plant Overhaul and Repair Specification
- (d) NAVSEA 0989-LP-058-1000 - Destroyer Tender and Submarine Tender Nuclear Support Facilities Overhaul and Repair Specification
- (e) NAVSEA S9086-T4-STM-010 - NSTM Chapter 589 (Cranes)
- (f) NAVSEA T9044-AD-MAN-010 - Requirements Manual for Submarine Fly-By-Wire Ship Control Systems
- (g) NAVSEAINST C9210.4 - Changes, Repairs and Maintenance to Nuclear Powered Ships
- (h) NAVSEA SL720-AA-MAN-010 - Fleet Modernization Program (FMP) Management and Operations Manual

LISTING OF APPENDICES.

- A Departure From Specification Request Message Format
- B Departure From Specification Clearance/Cancellation Report Message Format

8.1 PURPOSE. To establish standard procedures to be used by the Fleet and all maintenance activities for reporting, requesting approval and clearance, at the earliest opportunity, of all non-conforming/departable conditions, Departures from Specification (DFS).

8.1.1 Background. Specifications are engineered requirements such as type of materials, dimensional clearances, vibration levels, flow rates, and physical arrangement to which ship components are purchased, installed, tested, and maintained. All ships are designed and constructed to specific technical and physical requirements. It is imperative that every effort be made to maintain all ship systems and components to their designed specifications. There are occasions when the applicable specifications cannot be met. In these cases, the non-conformance to specifications is controlled with a DFS.

8.1.2 Terminology.

- a. A DFS is the mechanism used to document and resolve a lack of compliance with any authoritative document, plan, procedure, instruction, etc.
- b. Authorized Technical Authority. An Authorized Technical Authority is a representative designated by reference (a) to act for Naval Sea Systems Command (NAVSEA) in dispositioning non-conformance issues. They are also charged with providing technically sound maintenance alternatives to the Fleet upon which maintenance and operational decisions can be made.
- c. The terms deviation and waiver are often used synonymously. The principle difference being that deviations are requested prior to conducting work that will result in a non-conformance and waivers are requested after a non-conformance has been discovered.

8.1.3 Specification. Technical specifications originate from a variety of sources. When a conflict exists between specifications the governing requirement has to be determined on a case by case basis. The following listing is provided to assist in determining the governing specification. This listing may not be exact for a particular case and all pertinent technical documents will require review:

- a. Non-Nuclear listing of specifications which may be consulted when determining the governing specification:
 - (1) Volume V (Quality Maintenance) of the Joint Fleet Maintenance Manual.
 - (2) Fleet/Type Commander (TYCOM) Technical Notes.
 - (3) Ship's plans/drawings, NAVSEA Standard and Type drawings, and approved Technical Repair Standard or Maintenance Requirement Procedure, or Maintenance Standard.
 - (4) NAVSEA letters and Liaison Action Requests (LAR).
 - (5) The Military Standard (MIL-STD) and Military Specification (MIL-SPEC) series. MIL-SPEC for specific components being procured or manufactured, MIL-STD for specific processes being performed.
 - (6) NAVSEA approved component technical manuals.
 - (7) NAVSEA 0902-018-2010; General Overhaul Specifications for Deep Diving SSBN/SSN Submarines.
 - (8) TYCOM Instructions.
 - (9) Naval Ships' Technical Manuals and Technical Specifications.
 - (10) NAVSEA Instructions.
 - (11) NAVSEA S9AA0-AB-GOS-010; General Specifications for Overhaul of Surface Ships.

NOTE: WHERE THIS MANUAL IS MORE RESTRICTIVE THAN OTHERS, THIS MANUAL WILL TAKE PRECEDENCE UNLESS SPECIFICALLY STATED THAT IT PROVIDES GUIDANCE ONLY. UNRESOLVED QUESTIONS ON PRECEDENCE SHOULD BE REFERRED TO THE TYCOM FOR RESOLUTION. IN SOME INSTANCES A SPECIFICATION OF LESSER PRECEDENCE MAY MODIFY OR SUPERSEDE A MORE SENIOR SPECIFICATION, I.E., A NAVSEA LETTER OR LAR RESPONSE COULD SPECIFICALLY MODIFY A TECHNICAL STANDARD PENDING REVISION.

- b. Nuclear listing of specifications which may be consulted when determining the governing document:
 - (1) Reactor Plant Manual.
 - (2) Reactor plant component technical manuals.
 - (3) NAVSEA technical manuals (e.g., NAVSEA 250-1500-1 Welding Standard).
 - (4) Reference (b).
 - (5) Reactor Plant Drawings.
 - (6) NAVSEA instructions.
 - (7) TYCOM instructions.
 - (8) Reference (c).
 - (9) Reference (d).

8.2 **DEPARTURE FROM SPECIFICATION.** A DFS (non-nuclear only) is a lack of compliance with any authoritative document, plan, procedure, instruction, etc. General guidance regarding DFS is as follows:

NOTE: FOR SURFACE FORCE SHIPS AND AIRCRAFT CARRIERS, THE TYCOM WILL PERFORM THE IMMEDIATE SUPERIOR IN COMMAND (ISIC) FUNCTIONS OF THIS CHAPTER.

- a. During a maintenance action, including temporary repairs, a DFS is required for lack of compliance with cognizant documents, drawings, etc. For "as found" conditions during maintenance, the ISIC, ship and Fleet Maintenance Activity (FMA) (if involved) must evaluate the non-compliance using the guidance of paragraph 8.2.4 and 8.2.5 of this chapter.

- b. For “as found” conditions or equipment failures during operations that result in non-compliance with cognizant documents, drawings, etc., the ship and/or ISIC (if in port) must evaluate the condition or failure using the guidance of paragraph 8.2.4 and 8.2.5 of this chapter to determine if the non-conforming condition meets the criteria as a Major DFS. Non-conformances meeting the criteria as a major DFS shall be submitted to the ISIC for adjudication when in a port with a FMA and shall be approved by the Commanding Officer if at sea or in a port without an FMA. Excluding Fly-by-Wire and Scope of Certification (SOC) systems and components, if the non-conformance is determined to be minor, no DFS is required and the non-conforming condition will be entered in the ship’s Current Ship’s Maintenance Project (CSMP). If at sea, the guidance of paragraph 8.3.8 of this chapter will be followed.

8.2.1 Reporting Departures from Specification. It is incumbent upon ships, FMAs, and ISICs to discuss potential DFS as early as possible (prior to the work close out or component assembly if possible) to determine direction of actions, and alternatives to the DFS. Every effort must be made to correct each deficiency prior to equipment/system operation or underway of the ship. If a DFS has to be submitted, the request for it must be processed as soon as possible to enable a technical evaluation of the DFS request and final adjudication from the TYCOM.

8.2.2 Types of Departures from Specification. A DFS is classified as either Major or Minor depending on its significance. Major DFS are described in paragraph 8.2.4 of this chapter. Minor DFS are described in paragraph 8.2.5 of this chapter. Care must be exercised in evaluating and determining the type of DFS. All submarine DFS must be approved prior to ship’s underway for submerged operations.

8.2.3 Permanent and Temporary Approval of Departure from Specification. DFSs are approved as either permanent or temporary depending on the nature of the non-compliance and technical determination of whether the condition needs to be repaired.

- a. A temporary DFS requires subsequent action to correct the non-compliance and is approved with specific direction regarding duration and actions necessary to clear. A Major DFS accepting a temporary repair or condition is approved by the TYCOM following concurrence by an Authorized Technical Authority. A Minor DFS accepting a temporary repair will be approved by the TYCOM or ISIC as specified in paragraph 8.2.5 of this chapter.
- b. Temporary deviation/waivers initiated by the Authorized Technical Authority per reference (a) require TYCOM concurrence prior to approval.
- c. A permanent DFS requires no additional repair effort and is approved by NAVSEA. Technical Authority within NAVSEA for approval of a permanent DFS is specified in reference (a). As an exception, a permanent DFS may be approved only by the TYCOM or ISIC as specifically allowed in paragraph 8.2.5.a. of this chapter when previously approved precedent setting documentation that directly applies to the DFS exists. The specific NAVSEA precedent must be referenced in the DFS approval.

NOTE: PARAGRAPH 8.2.4 OF THIS CHAPTER DOES NOT APPLY TO THE CATEGORY OF DFSs FOR CRANES COVERED UNDER REFERENCE (e). REFERENCE (e) LISTS THE CATEGORY REQUIREMENTS AND LEVEL OF APPROVAL FOR CRANE RELATED DFSs.

NOTE: AN OUT-OF SPECIFICATION PARAMETER IN A SUBMARINE FLY-BY-WIRE SHIP CONTROL SYSTEM FUNCTION MEASURED BY URO/MRC 019 IS ALSO CONSIDERED A MAJOR NON-CONFORMANCE WHETHER OR NOT THE URO/MRC IS DUE FOR ACCOMPLISHMENT. URO MRC 019 PROVIDES THE REQUIREMENTS FOR PROCESSING URO MRC RELATED NON-CONFORMANCES.

NOTE: THE BELOW LISTING IS NOT ALL INCLUSIVE AND SITUATIONS MAY ARISE WHERE DEFICIENCIES NOT LISTED MAY BE OF SUCH A NATURE TO WARRANT A MAJOR DFS. FOR EACH DEFICIENCY DETERMINED TO DIRECTLY INVOLVE SAFETY OF SHIP, SAFETY OF PERSONNEL, OR CAUSE A REDUCTION IN THE INTEGRITY OR OPERABILITY OF EQUIPMENT ESSENTIAL TO SHIP’S MISSION, A MAJOR DFS SHALL BE ISSUED.

8.2.4 Major Departure from Specification. A major DFS is one that affects (a) performance; (b) durability; (c) reliability or maintainability; (d) interchangeability; (e) effective use or operation; (f) weight or appearance (where a factor); (g) health or safety; (h) system design parameters such as schematics, flow, pressures, or temperatures; or (i) compartment arrangements or assigned function. The following list identifies some deficient conditions which require a major DFS:

NOTE: IN SOME INSTANCES, THESE MAJOR DEPARTURES MAY SUBSEQUENTLY BE RECATEGORIZED BY THE LOCAL TECHNICAL AUTHORITY FROM MAJOR TO A MINOR IN ACCORDANCE WITH REFERENCE (a).

- a. Use of unapproved joint design or additional joints.
- b. Non-conformances to plan specifications that result in a change in configuration. Examples are:
 - (1) Non-conformances to plan specifications resulting in a change in configuration or dimensions to pressure boundary parts or components. Examples would be "as found" dimensional or clearance differences from plan requirements for a Submarine Safety (SUBSAFE) valve bonnet and no authorization (e.g., Ship Alteration, Alteration and Improvement, Engineering Change Notice or NAVSEA letter) is available.
 - (2) Non-conformances to plan specification resulting in a change in configuration considered to be a permanent repair to pressure boundary parts. An example would be replacement of a failed valve of older design with one of more recent design because valves of the older design are no longer available and no authorization (e.g., Ship Alteration, Alteration and Improvement, Engineering Change Notice, NAVSEA letter) is available.
- c. Failure to meet all applicable standards for major repairs unless other alternatives are authorized by this volume. Examples are linear indications, failed tightness test, hydrostatic test, use of unqualified welder/brazer, failed radiography, inadequate bond during brazing, etc.
- d. Pipe or component wall thickness below minimum specification without restoration. Epoxy and shim methods for ball valve repairs are not considered restorations of component wall thickness.
- e. Manufacture of a part or component without use/availability of applicable technical documentation (e.g., manufactured per sample due to non-availability of detailed drawings), regardless of whether the repair is considered temporary or permanent. A DFS is not required if the part or component is non-level and in a non-controlled system, it is fabricated from the correct material and the lack of technical documentation does not affect: performance, durability, reliability or maintainability, interchangeability, use or operation, weight or appearance (where a factor), health or safety, or system design parameters.
- f. Failure to complete required retest of a SUBSAFE/Level I/Submarine Flight Critical Component (SFCC) component or system.
- g. Leakage from a SUBSAFE/Level I hull fitting, piping system, or component as follows:
 - (1) Hull valve/fitting to hull flange leakage.
 - (2) Leakage or weepage through a component body or pipe wall. Completion of temporary repairs (e.g., plastic pipe patch) does not negate the requirement for a DFS.
 - (3) Leakage or weepage from a welded or brazed joint. Completion of temporary repairs (e.g., plastic pipe patch) does not negate the requirement for a DFS.
 - (4) Leakage upper escape and access hatches, leakage from hull glands (e.g., cable stuffing tubes, shaft/mast packing glands, electrical/electronic hull fittings excluding the inboard packing assembly and pressure proof caps screwed onto Electrical Hull Fitting cable connection) that is in excess of the allowable specification that cannot be repaired, immediately, by a packing adjustment or greasing.
- h. Installation of new pressure boundary parts which do not meet all applicable material certification requirements. The following are some departable conditions:

- (1) (Submarines only) Non-Level I valve internals (e.g., ball, disc, poppet, flapper) installed in seawater or sea-connected hull valves and backup valves.
 - (2) Non-Level I weld rod, insert material, brazing filler, etc. installed in a SUBSAFE/Level I system welded or brazed joint.
 - (3) Non-Level I pressure boundary parts (e.g., stem, bonnet, studs, nuts) installed in or on SUBSAFE or Level I components or systems.
- i. (Submarines only) For any Unrestricted Operation (URO) Maintenance Requirement Card (MRC) measured parameter found out of tolerance and not restored, whether the MRC is due or not.
 - j. (Submarines only) Failure to complete any URO MRC within required periodicity.
 - (1) Non-conformance requests that result in a change of the URO MRC inspection periodicity (not authorized by the MRC), a change in a URO MRC technical requirement, or deferral of required work require NAVSEA approval. TYCOM or Authorized Technical Authority approval is not authorized for these non-conformances.
 - (2) To support operational commitments, TYCOMs may authorize temporary periodicity extensions (not authorized by MRC) after consultation with NAVSEA 07T. The periodicity extensions should be limited to the next availability or in port period, where a submarine maintenance activity is available, and shall be documented by a major DFS. The DFS shall then be submitted to NAVSEA for approval.
 - (3) When a URO/MRC periodicity becomes due during a maintenance availability, a DFS is not required when the TYCOM/ISIC takes positive actions to restrict submerged operations. Prior to the ship conducting submerged operations, all URO/MRC requirements must be complied with or a Major DFS must be approved.
 - k. (Submarines only) For all submarine hatch (Logistics Escape Trunks, Lock Out Chambers, Logistic Plug Trunks, etc.) deficiencies which will not be repaired prior to ships underway involving the following:
 - (1) Non-operational submarine access hatch. (Upper Hatch Operability and Remote Operating Devices)
 - (2) Hatch clearance reading out of specification. (Hatch-to-Seat Clearance)
 - (3) Locking ring hatch lug alignment out of specification. (Coaming Lugs and Locking Rings)
 - (4) Locking ring hatch/trunk coaming lug metal to metal contact out of specification. (In Service Lug Engagement)
 - (5) Hatch gasket groove and hatch trunk seating surface out of specification. (Gasket and seating surface inspection)
 - l. (Submarines only) Non-operational Emergency Main Ballast Tank Blow Valve, seawater system hull or backup valve, Modified After Signal Ejector/signal ejector muzzle ball valve, salvage air valve, etc.
 - m. (Submarines only) Failure to complete any category "A" Alteration and Improvement.
 - n. (Submarines only) A fault condition or unsatisfactory test within the SFCC Boundary indicates a deficiency with a safety critical function per reference (f) and shall be classified as a Major non-conformance under the following conditions:
 - (1) When the system design employs more than two redundant SFCCs and a deficiency degrades the redundancy to only two remaining SFCCs.
 - (2) When the system design employs two redundant SFCCs or a non-redundant SFCC and a deficiency results in the loss of a SFCC.

- o. Headed fasteners locally manufactured from Level I material (i.e., capscrews, bolts, machine screws, etc.) which have not been certified by tensile and hardness testing specified in MIL-DTL-1222 (Studs, Bolts, Screws and Nuts for Applications Where a High Degree of Reliability is Required; General Specification for) or FF-S-86 (Federal Specification, Screw, Cap, Socket Head) as applicable.
- p. (Submarines only) All high pressure compressed gas flasks designed to MIL-F-22606 specifications shall be recertified at intervals not to exceed 20 years for SSN 688, SSN 21 and SSN 774 Classes and 21 years for SSBN/SSGN 726 Class. High pressure air moisture separator flasks shall be recertified at an interval not to exceed ten years for SSN 688, SSN 21, SSBN/SSGN 726 and SSN 774 Classes. All oxygen and gas management separator flasks designed to MIL-F-24032 specifications shall be recertified at an interval not to exceed nine years for SSN 688 and SSN 21 Classes and SSBN/SSGN 726 Class. A major DFS, approved by NAVSEA, is required for any flask that will exceed the recertification periodicity.
- q. (Submarines only) Propulsion shafts shall be replaced at intervals not to exceed six years for SSBN/SSGN 726 Class, seven years for SSN 688 and SSN 774 Classes and ten years for SSN 21 Class. A major DFS, approved by NAVSEA, with supporting operating information, including shaft turn count since shaft installation is required for shafts that will exceed planned replacement periodicity.

8.2.5 Minor Departure from Specification. A DFS which is not a Major DFS as defined in paragraph 8.2.4 of this chapter is considered to be a Minor DFS. All permanent Minor (and Major) DFSs will be approved by NAVSEA except those identified in paragraph 8.2.5.a. of this chapter, which may be dispositioned by the TYCOM or the ISIC. Temporary Minor DFSs identified in paragraph 8.2.5.b. of this chapter may also be dispositioned by the TYCOM or the ISIC. All other temporary Minor DFSs will be approved by the TYCOM. Paragraphs 8.2.5.a. through e. below identify some deficient conditions which require a Minor DFS:

- a. Any condition which could be considered a Major DFS except for the fact that specific and definite (TYCOM or NAVSEA) guidance is available based on documented action for another identical (same component, same application, and same class ship) request in which no restriction was imposed. An example would be a previous DFS which was approved as a precedent setting DFS.
- b. Any condition which is associated with exemptions/alternatives to non-nuclear retest requirements in Section 7.4 of Part I, Chapter 7, of this volume on testing, except where noted. Examples are:

NOTE: IF A MAINTENANCE CERTIFICATION RECORD/RE-ENTRY CONTROL IS CLOSED BY TRANSFERRING AT SEA TESTING TO A DFS (E.G., CONTROLLED DIVE TO TEST DEPTH FOR RETEST OF A PERISCOPE HULL GLAND, CONTROLLED DIVE FOR RETEST OF A SEA CONNECTED SYSTEM (E.G., MAIN SEAWATER, AUXILIARY SEAWATER) IN LIEU OF JOINT TIGHTNESS TEST TO "J" PRESSURE OF TEST PRESSURE DRAWING (TPD)), THE SHIP WILL BE RESTRICTED IN DEPTH AS REQUIRED IN PART I, CHAPTER 5, PARAGRAPH 5.6.5 OF THIS VOLUME.

- (1) (Submarines only) DFS for controlled dive following re-installation of a periscope.
- (2) (Submarines only) DFS for controlled dive following work on a hatch exposed to sea pressure.
- (3) (Submarines only) DFS for controlled dive following work on an Electrical/Electronic Hull Fitting.
- c. Associated with a temporary repair to a system or component not involving ship or personnel safety or not involving integrity or operability of equipment essential to ship's mission.
- d. For any material deficiency discovered during a maintenance action that will not be corrected prior to the ship's underway, and is not categorized as a Major DFS in accordance with paragraph 8.2.4 of this chapter.
- e. (Submarines only) Material deficiencies in the SUBSAFE boundary that were discovered outside a regularly scheduled FMA upkeep (excluding voyage repair and planning availability). These deficiencies will be tracked with a CSMP entry and scheduled for repair during the next regular upkeep after the discovery of the non-conforming condition. Deferral of the repair past the next upkeep will

require a Minor DFS with proper justification as to why the condition was not corrected during the upkeep and any supply information for outstanding repair parts that were not repaired during subsequent regularly scheduled availability (excluding voyage repair and planning availability).

- f. (Submarines only) **A Major DFS is required to document missing or damaged Special Hull Treatment removed from external structure only when the coating system beneath the Special Hull Treatment is missing or delaminated resulting in bare metal that is not repaired. Missing or damaged Special Hull Treatment removed from external structure is to be tracked using the CSMP process as long as the remaining coating system is intact or repaired (i.e., no bare metal) when the following conditions are met:**
- (1) The submarine is not currently in a Depot Level Availability.
 - (2) **Temporary repairs are performed** in accordance with the requirements of the class specific hull treatment repair and maintenance manual.
 - (3) **The CSMP item is scheduled to be cleared no later than the next scheduled Depot Level Availability.**

8.3 DEPARTURE FROM SPECIFICATION PROCEDURES.

NOTE: FOR SURFACE FORCE SHIPS AND AIRCRAFT CARRIERS, THE TYCOM WILL PERFORM THE ISIC FUNCTIONS OF THIS CHAPTER.

8.3.1 General Administrative Requirements. The following requirements pertain to all DFSs:

- a. Requests for DFS will be submitted, approved and cleared in accordance with paragraph 8.3.7 or 8.3.8 of this chapter. The Web Based Electronic Departure from Specification (eDFS) program is acceptable for use unless directed otherwise by the respective TYCOM.

NOTE: THE FORMS (QUALITY ASSURANCE (QA) FORM 12, QA FORM 12A) MENTIONED IN THE FOLLOWING DISCUSSION ARE COMPLETED ELECTRONICALLY WHEN USING eDFS.

NOTE: WHEN USING A NAVAL MESSAGE TO REQUEST A DFS OR REPORT A COMMANDING OFFICER APPROVED DFS THE EXACT FORMAT SHOWN IN APPENDIX A WILL BE USED. EACH PARAGRAPH IN THE NAVAL MESSAGE WILL HAVE A PARAGRAPH NUMBER, THE PARAGRAPH TITLE AND A COLON. ANY DEVIATION IN THE FORMAT MAY CAUSE A PROBLEM WITH THE AUTOMATIC DFS PROCESSOR. IF THE SHIP IS UNABLE TO CONNECT TO EDIFS, A DEPARTURE MAY BE REQUESTED BY NAVAL MESSAGE USING THE FORMAT OF APPENDIX A.

- b. Requests for DFS will be normally submitted on a QA form 12. The approval of the DFS will normally be made on the QA form 12. If unable to use QA form 12, use the message format of Appendix A. Surface ships that are not able to generate a DFS using eDFS have the option of generating DFS per existing message based system or Command E-mail. The Command E-mail shall be approved by the ship's Commanding Officer or his designated representative.
- c. The ship is responsible for all approved DFS relating to its systems/components until cleared or canceled. When a DFS is approved as a temporary repair requiring rework to correct the discrepancy, a CSMP entry for correction of the discrepant condition will be initiated by the ship or ISIC. The ship's Quality Assurance Officer (QAO) will ensure that this action is done. Verify an active Job Control Number (JCN) exists for all active temporary DFSs at the completion of all scheduled Fleet maintenance activity availabilities, major or minor, Chief of Naval Operations availabilities or at least quarterly and maintain an auditable record of the verification until superseded.
- d. The ISIC is responsible for all DFSs which have been approved or forwarded to TYCOM for approval until the DFS is cleared, canceled or formally transferred to another TYCOM. The ISIC is also responsible for ensuring that the CSMP entry is annotated on the DFS for temporary repairs.

- e. All DFS must be reported and controlled. Each activity must have an auditable system for reporting and controlling DFS. Deviation/waivers will be retained and tracked in an auditable fashion within the DFS system by Ship's Force and the ISIC/TYCOM until permanent documentation is confirmed to reflect the specific non-compliance. Use of the Web Based eDFS program will facilitate meeting these requirements.
- f. When work performed results in a DFS and requires future action (e.g., re-inspection, repair), the ship will submit an OPNAV 4790/2K (or equivalent) with a new Job Sequence Number. The CSMP Job Sequence Number will be included in Block 17 of the DFS. This Job Sequence Number will be added to the DFS prior to submission to the ISIC. The DFS or waiver will be retained in an auditable fashion with the DFS file. DFSs and waivers written exclusively to transfer accountability for testing do not require an OPNAV 4790/2K (or equivalent) with a new Job Sequence Number.
- g. To preclude last minute ship's operational delays, DFS should be processed as early as possible. Any request for approval for a DFS must contain all pertinent information on materials, processes, testing and procedures used, so that a complete and educated engineering evaluation can be made by the TYCOM, Local Technical Authority or System Command.
 - (1) (Carriers and Surface Force Ships) DFS serial numbers for Ship's Force initiated departures will be automatically supplied by eDFS (0000 series). For departures initiated by a depot level activity, the serial numbers will be automatically supplied by eDFS (1000 series). All outstanding departures must be submitted to the TYCOM for evaluation by a Local Technical Authority prior to a ship's underway. However, if the Local Technical Authority evaluation is not complete prior to the underway, the ship is responsible to ensure adequate temporary precautions and/or standing orders are in effect until the DFS evaluation is complete. For temporary departures expiring during an underway, as discussed in paragraph 8.3.9 of this chapter, the extension request shall be made sufficiently in advance to allow the evaluation process to be completed before the expiration date and preferably prior to the underway in which the DFS expires.
 - (2) (Submarines only) DFS serial numbers will be issued from the Ship's Force hand written log and entered into the ship's eDFS stand alone program (and delivered to ISIC in either electronic or hard copy format). DFS serial numbers for work performed by NAVSEA managed activities, to include Public and Private shipyards and/or activities directed by TYCOM, shall use 1000 series DFS numbers auto initiated by the eDFS software.
- h. The activity originally requesting the DFS will track the DFS until it is approved/disapproved.
- i. For any DFS, Non-Conformance, deviation or waiver that has been adjudicated, the approving activity is required to provide a copy of the DFS, Non-Conformance, deviation or waiver to the ship's QAO for retention and tracking per paragraph 8.3.1e. of this chapter.
- j. (Submarines only) All departures shall be adjudicated prior to the ship getting underway for submerged operations.

8.3.2 Review of Outstanding Departures from Specification. Commands responsible for tracking approved DFS will review them prior to each upkeep to establish FMA/shipyard work requirements to clear the DFS. DFSs should be cleared as soon as possible based on:

- a. Approval as a permanent repair.
- b. Condition has been corrected.
- c. Condition is no longer applicable as a result of an alteration.
- d. Condition is no longer applicable as a result of a change in the specification that originally resulted in the DFS request.

8.3.3 Clearing of Departure from Specification by Exposing Sea Connected Systems and Hull Integrity Boundary Items to Submergence Pressure (Submarines only). SUBSAFE certified submarines will submerge to 95% of design test depth, as a minimum, as measured to the keel, for clearing certain “Controlled Dive” DFSs. Satisfactory completion of the test and clearance of the DFS will be in the format of QA form 12A. If unable to use QA form 12A, use message format of Appendix B.

8.3.4 Incorporation of Departure from Specification in Selected Record Drawings/Data or Technical Variance Documentation.

- a. Those DFSs for a change in configuration which NAVSEA accepts as a permanent repair will be maintained in an auditable file by the ship and the ISIC until reflected in ship’s selected record drawings/data or technical variance documentation. Examples are:
 - (1) An oversized shaft and bushing.
 - (2) A seal welded mechanical joint.
 - (3) Addition of piping joints or fittings.
 - (4) Different style/type valve.
- b. For DFS approved as a permanent repair for material/component substitution, the ship will ensure that a Ship’s Configuration Change Report (OPNAV 4790/CK) and a Fleet COSAL Feedback Report (NAVSUP 1371) are submitted to ensure accurate configuration accounting and technical/supply support are maintained.
- c. The activity causing or discovering the non-conformance/departable condition that the DFS approved as a permanent repair, and affects selected drawings and records, will provide a copy of the marked up drawing to Ship’s Force prior to underway and will forward a copy of the applicable portions of the work package and a marked up copy of the affected drawing or record to the planning yard as soon as practical. The ship and accomplishing activity will maintain a copy of the correspondence until the technical variance documentation or selected record drawing is issued.

8.3.5 Preparations for Correction of Departure from Specification and Clearance During Depot Level Availabilities. The following procedures will be used to schedule DFS for correction and report correction of DFS in depot level availabilities:

- a. Ship’s Force and/or the parent ISIC will provide copies of DFS outstanding at the Availability Planning Conferences for incorporation into the work package as required by the Availability Baseline Work Package.
- b. DFS deferred to a Depot Availability for correction must be cleared by the submission of a QA form 12A as the shipyard accomplishes the work or upon completion of shipyard period, provided that the shipyard “scope of work” corrected the DFS. Completion reports from shipyards are not required. These forms are submitted by Ship’s Force to the ISIC. If unable to use a QA form 12A, use the message format of Appendix B.

8.3.6 Numbering of Departures from Specification. All DFSs will be identified by a unique sequential number issued by the affected ship. The sequential number will consist of the ship’s designation and hull number, a hyphen, the sequential number portion, a hyphen, and the last two digits of the year (e.g., SSN 674-13-90, CVN 70-30-94). DFSs already assigned a number under another numbering system will be retained, as there is no intent to revise the numbers already used. DFSs established using the Web Based eDFS program will use the numbering conventions of those systems. Approved temporary departures requiring extension will not be assigned new Departure numbers.

8.3.7 Submission and Approval of Departures from Specification. The activity finding or causing a DFS will normally report the DFS to the appropriate approval authority using either a QA form 12, a naval message or electronically using the eDFS program. The DFS Request will be completed in accordance with the instructions. If unable to use QA form 12 or the electronic web based programs, use the naval message request format of Appendix A.

NOTE: IN THE FOLLOWING SECTION, IF USING eDFS, WHEN IT IS DIRECTED THAT THE QA FORM 12 IS SIGNED, AN ELECTRONIC SIGNATURE IS IMPLIED. ISIC AND UNITS ASSIGNED TO TYCOMs UTILIZING THE eDFS SYSTEM WILL SUBMIT DFSs TO THE TYCOM VIA THE eDFS PROGRAM. THIS PROGRAM REQUIRES A USER IDENTIFICATION AND PASSWORD SUPPLIED BY THE TYCOM. THE FOLLOWING PROCESSES WILL BE EXECUTED UNDER THE eDFS PROGRAM USING THE ELECTRONIC VERSION OF THE QA FORM 12 AND QA FORM 12A. THE SIGNATURES WILL BE ONLY THE PRINTED NAME AND TITLE OF THE INDIVIDUAL. SHIPS WITHOUT UNCLASSIFIED INTERNET ACCESS MAY SUBMIT DFSs AND DFS CLEARANCES TO THE ISIC VIA A MANUALLY PREPARED QA FORM 12/QA FORM 12A, THE STAND-ALONE MS ACCESS DATABASE FORMAT OR MESSAGE FORMAT IF AT SEA.

- a. The Work Center Supervisor/Leading Petty Officer/Craftsman/Quality Assurance Inspector will fill out the applicable portion of the QA form 12, ensuring the extent of the DFS and the recommendation for repair/re-certification must be clearly and completely stated, and deliver, after review by the cognizant division officer, to:
 - (1) For ship initiated DFS, the Ship's QAO or in his/her absence the Ship's Duty Officer.
 - (2) For FMA initiated DFS, the FMA QAO or in his/her absence the FMA Repair Duty Officer.
- b. The QAO or designated representative will:
 - (1) Review the QA form 12 for technical adequacy, accuracy, and completeness.
 - (2) Determine the latest time the answer must be received in order to carry out the ship's schedule, obtain and enter the next consecutive number from the affected ship's DFS log. For aircraft carriers, the numbering convention assigned by the Web Based eDFS program when submitting the DFS will be used.
 - (3) Deliver/forward to Department Head (ship)/Repair Officer (FMA).
- c. For ship initiated DFS, Ship Department Head (in his/her absence Ship's Duty Officer) will:
 - (1) Review the QA form 12 for technical adequacy, accuracy, and completeness.
 - (2) Sign the QA form 12 and deliver/forward to the cognizant ISIC QAO (in his/her absence ISIC Duty Officer).
- d. For FMA initiated DFS, FMA Repair Officer (in his/her absence his/her designated representative) will:
 - (1) Review the QA form 12 for technical adequacy, accuracy, and completeness.
 - (2) Sign the QA form 12 and deliver/forward it to the cognizant ISIC QAO (in his/her absence ISIC Duty Officer).
- e. For Depot initiated temporary waivers and deviations, responsible Depot personnel will:
 - (1) Review the waiver or deviation for technical accuracy, adequacy, and completeness.
 - (2) Utilize, prepare and sign a QA form 12 or eDFS to document, attach the QA form 12 to the waiver or deviation and deliver/forward it to the cognizant ISIC representative QAO (in his/her absence the ISIC Duty Officer) for review and concurrence prior to approval. For a DFS initiated by a depot level activity, the ISIC will provide the JCN and the DFS serial number to the depot level activity when requested. For carrier repair activities, eDFS will automatically supply the next open DFS serial number. See paragraph 8.3.1g.(1) of this chapter for carriers and surface force ships and paragraph 8.3.1g.(2) of this chapter for submarines for a description of the current process for assigning DFS serial numbers.

- (3) The ISIC representative QAO will review and concur with the waiver or deviation by signing the ISIC block of the QA form 12 or electronically signing in eDFS prior to Depot approval and return the waiver or deviation to the Depot. For temporary waivers and deviations, the ISIC representative will contact the Ship's Maintenance Planner or the Ship's QAO for a JCN and a Departure serial number (if required) prior to returning the waiver or deviation to the Depot.
- f. The cognizant ISIC QAO (in his/her absence his/her designated representative) will:
 - (1) Review the QA form 12 for technical adequacy, accuracy, and completeness.
 - (2) Issue instructions regarding clearance and approve/disapprove and return QA form 12 to the Department Head (Ship)/Repair Officer (FMA) for action and/or filing in QA files.
 - (3) Deployed Ships ISICs will ensure parent ISIC is an information addressee on all QA form 12s.
- g. Approval/disapproval of a DFS by the TYCOM or NAVSEA will be noted on the QA form 12.
- h. Upon completion of corrective action, the DFS will be cleared by the ship using the format of QA form 12A. The TYCOM will be informed by copy of QA form 12A or via message, when a major temporary DFS is cleared. The NAVSEA or TYCOM approval of a permanent repair requires no further administrative action.

NOTE: DO NOT DELETE ANY INFORMATION FROM AN eDFS ITEM THAT HAS RECEIVED TEMPORARY APPROVAL FROM EITHER THE ISIC, TYCOM OR AUTHORIZED TECHNICAL AUTHORITY.

NOTE: THE ABILITY TO ADD COMMENTS TO AN APPROVED DFS IS LIMITED BY THE ELECTRONIC SYSTEM'S ASSIGNED LEVEL OF ACCESS (I.E., ISICs CAN ADD COMMENTS ONLY TO THE ISIC PORTION OF THE DFS FORM).

8.3.8 Departure from Specification Approval and Reporting for Ships While at Sea or at a Port Without a Fleet Maintenance Activity.

8.3.8.1 Evaluation. The Commanding Officer will evaluate any DFS and approve the corrective action to be taken including any necessary restrictions. The Commanding Officer will issue directions regarding clearance and approve/disapprove the DFS and return the QA form 12 to the Department Head for action and/or filing. For any Commanding Officer approved DFS, a report of the condition and intended action will be made at the first opportunity to the ship's ISIC/TYCOM utilizing either a naval message in the "EXACT" format of Appendix A or the eDFS program.

8.3.8.2 Condition not Corrected. If the condition is not planned to be corrected or cannot be corrected during the next inport period (a port with a fleet maintenance facility), the Commanding Officer approved DFSs must be submitted to the applicable approval authority for adjudication prior to getting underway.

- a. (Submarines only) All departures shall be adjudicated prior to the ship getting underway.
- b. (Aircraft Carriers and Surface Force Ships only) In the event the DFS evaluation is not completed prior to the ship's underway, the Commanding Officer approved DFS will remain in effect until the evaluation is completed and disposition provided.

NOTE: AN EXTENDED DEPARTURE WILL NOT BE ASSIGNED A NEW DEPARTURE NUMBER THAT CANCELS AND/OR SUPERSEDES THE ORIGINAL DEPARTURE NUMBER.

8.3.9 Extending a Temporary Departure. In the event that a departed condition will not be corrected by the expiration date, the Ship's QAO is responsible to submit the departure(s) to the ISIC requesting an extension. The extension request will explain why the departure will not be corrected. The extension request shall be made sufficiently in advance to allow the evaluation process to be completed before the expiration date. The Departure extension will be routed to the same level of approval authority as the original Departure.

- a. Non-conformances are expected to expire. It is acceptable for non-conformances to expire while the ship or Deep Submergence System (DSS)/SOC asset is in a scheduled availability.

- b. (Submarines/DSS/SOC assets only) Expired non-conformances must be adjudicated prior to at sea operation and/or prior to manned use for DSS/SOC systems/assets.
- c. Extension requests via the eDFS program shall be accomplished using the Request Extension feature accessed by clicking the associated button at the top of the QA form 12 for the most recent approved active DFS extension. Changes to an existing non-conformance in the eDFS program that do not affect the expiration date shall be accomplished by submittal of an "UPDATE" as directed in paragraph 8.3.10.c of this chapter.

8.3.10 Electronic Non-Conformance Administration.

- a. User access requires TYCOM or initiating agencies Point Of Contact (POC) approval for all levels of access.
- b. All attachments to the electronic non-conformances are preferred to be in Adobe Acrobat PDF format. If another format is used, ensure it is one that is readily available on government computers, such as Microsoft Word or Excel format. Non-conformances with attachments that cannot be opened by the ISIC or TYCOM will be rejected.
- c. Changes to an existing electronic non-conformance is normally accomplished by submittal of an "UPDATE" to the QA form 12.
 - (1) To enter changes, the initiator of the change will enter the current calendar date and the word "UPDATE": in the user's comment block followed by the relevant information and ending the comments with the user Name, Rank (if applicable) and Title. Do not write over any existing comments, Names or dates in the comment block.
 - (2) Changes or Updates shall be disseminated via an e-mail alert.
 - (3) Deletion of QA form 12s will not be supported. Clear or cancel QA form 12s with a QA form 12A.
- d. Naval Sea Logistics Center (NAVSEALOGCEN) assistance is required to change an archived non-conformance. NAVSEALOGCEN will use the following process to change an electronic non-conformance:
 - (1) Database non-conformance changes (change to a QA form 12) will only be accomplished if requested by the TYCOM or the initiating agencies POC.
 - (2) Archived non-conformances requiring changes which were signed by multiple TYCOMS and/or multiple initiating agencies:
 - (a) Requires e-mail concurrence of all POC signatory users to the non-conformance prior to NAVSEALOGCEN making database changes or unarchiving the non-conformance (i.e., Supervisor of Shipbuilding/TYCOM/NAVSEA signed QA form 12).
 - (b) If a non-conformance is unarchived to allow TYCOMs or agency users to make changes, change will be accomplished in accordance with the requirement cited in paragraph 8.3.10.c. above.
 - (c) Each signatory level user should indicate their concurrence to the change in accordance with the requirement cited in paragraph 8.3.10.c. above.
 - (3) Archived non-conformances requiring change which were signed by a single TYCOM and/or single initiating agency:
 - (a) Requires e-mail concurrence of the POC signatory user to the non-conformance prior to NAVSEALOGCEN making database changes or unarchiving the non-conformance (i.e., Supervisor of Shipbuilding/TYCOM/NAVSEA signed QA form 12).
 - (b) If a non-conformance is unarchived to allow a TYCOM or agency user to make changes, change will be accomplished in accordance with the requirement cited in paragraph 8.3.10.c. above.

8.4 NUCLEAR COGNIZANT AREAS. Request for DFS for nuclear systems will be neither requested nor approved. If a ship or FMA has a question, problem, or is unable to comply with nuclear specifications, request for technical resolution will be made using a LAR. Formal resolution of the LAR is required prior to reactor plant or propulsion plant startup.

8.4.1 Nuclear Powered Surface Ships. A memorandum of agreement exists between NAVSEA Nuclear Propulsion Directorate (08) and NAVSEA PMS 312/335 that details the division of responsibilities within the propulsion plants of nuclear powered ships. This may be useful to Forces Afloat as an aid in directing inquiries and correspondence and has been distributed to all nuclear surface ships as a NAVSEA letter Ser 08J/C90-5873, dated 7 AUG 90.

8.4.2 Reactor Plant Systems. If a nuclear powered ship or nuclear capable FMA is unable to comply with specifications for reactor plant systems or components listed in enclosure (1) to reference (g) and also those systems identified as nuclear by the appropriate nuclear/non-nuclear interface diagram (references (b) and (c)), then a review of NAVSEA 08 requirements shall be requested. In general, technical resolution to questions or problems for reactor plant systems or components requires use of a liaison inquiry according to the requirements of references (b) and (c).

- a. References (b) and (c) provide the requirements on submission of LARs for nuclear powered surface ships and submarines.

NOTE: LARs SUBMITTED MUST CONTAIN ALL INFORMATION REQUIRED BY REFERENCE (b) AND REFERENCE (c) TO ENSURE A RAPID, ACCURATE RESPONSE.

- b. Reference (d) provides the requirements on submissions of LARs for nuclear support facilities.
- c. A LAR should not be submitted for cases of out of specification seat leakage of nuclear valves after repairs. The Reactor Plant Planning Yard and Reactor Plant Prime Contractors do not have the authority to waive valve leakage specifications. When valve seat leakage exceeds reactor plant manual specification after attempted Ship's Force/FMA repairs, the following method may be used to defer rework and close out the Controlled Work Package (CWP):

NOTE: THIS ALTERNATIVE TO SATISFACTORY COMPLETION OF RETEST IS APPLICABLE ONLY TO VALVE SEAT LEAKAGE.

- (1) The ship must inform TYCOM (via squadron/group for submarines) by message with an info copy to NAVSEA 08. The message must include a description of the initial problem, repairs conducted, seat leakage rate, leak specification, dates of next availability, status of paragraphs (2) through (5) below, and request for authorization to continue operation with out-of-specification seat leakage.
 - (2) All hydrostatic and tightness test requirements must be satisfactorily completed.
 - (3) All other portions of the CWP must be properly completed.
 - (4) A new maintenance deferred action must be submitted to the ISIC for repair of the valve seat leakage at the next FMA availability.
 - (5) The valve seat leakage must not constitute an operational problem (for submarines, Group/Squadron's determination and justification statement required).
 - (6) Based on Ship's justification statement, TYCOM will respond by message to all concerned regarding deferral of corrective maintenance. After satisfactory final review, close-out of the CWP can be made with an approved deferral of corrective maintenance in lieu of a satisfactory seat leakage test.
- d. A liaison action file, with a sequential index and containing all submitted Nuclear LARs, shall be maintained by the originating activity. The file shall contain a copy of LARs submitted. A copy of the liaison action shall be kept with liaison requests in the Answered LARs section and in the CWP/Formal Work Package if applicable.
 - e. Request for DFS for nuclear systems will be neither requested nor approved. If a ship, FMA or shipyard has a question, problem or is unable to comply with nuclear specifications, request for technical resolution will be made using an LAR or Trouble Record.

8.4.3 Propulsion Plant Systems (Aircraft Carriers only). If a ship or FMA has a question, problem or is unable to comply with non-nuclear specifications, technical assistance is available from the Propulsion Plant Engineering Activity (PPEA). The PPEA was formed to provide an additional technical resource for assisting operational aircraft carriers with technical or operational issues not associated with Ship Alteration installation and configuration control. PPEA Liaison services are requested using the Steam Plant Action Request (SPAR). The SPAR allows the Fleet and overhaul activities to submit requests to the PPEA for technical assistance on non-Ship Alteration related issues; the SPAR is not intended to replace the LAR process described above or non-nuclear LARs submitted to the Hull Planning Yard in accordance with reference (h). The PPEA can request information, disseminate technical information associated with the Steam Plant to the Fleet/overhaul activities, or direct work that does not require a drawing change or affect system configuration control using the Steam Plant Liaison Inquiry. Procedures for preparing SPARs are discussed in reference (c).

- b. The QAO will maintain controlled material records as outlined below. These records should be included in the appropriate CWP to the maximum extent practical. Retain material certification files for all Nuclear Level I, SFCC and Level I material installed.
 - (1) RFI tags for Nuclear Level I items installed.
 - (2) For any Nuclear Level I items received and installed without a RFI tag retain all OQE used to certify.
 - (3) All OQE used to upgrade material for non-nuclear "Level" use.
 - (4) All QA forms 3 for any rejected items accepted for use.
 - (5) A file of QA forms 1 with certification documentation.

10.5.4 Qualification Records. The QAO will maintain a master list of qualified Work Center Supervisors and Maintenance Planners, Controlled Material Petty Officers (CMPO), Cleanliness Inspectors, Quality Assurance Inspectors (QAI), Quality Assurance Supervisors (QAS), Oxygen Clean Workers and Oxygen Clean Instructors. The records will be retained for the duration the individual is onboard. **Records in the case of re-qualifications shall consist of a written plan and sub-paragraphs a. through d. below, as applicable, based upon the plan defined by the QAO or Department Head.** The file will consist of:

- a. Date Personnel Qualification Standard completed. For Oxygen Clean Workers and Oxygen Clean Instructors, the date the required course of instruction is completed.
- b. Qualification test results. This includes a copy of the examination cover sheet. In addition, a copy of the examination given with answers shall be available either in electronic medium or hard copy. For Oxygen Clean qualifications, this entry is not required.
- c. A copy of the signed Final Qualification Page from the Personnel Qualification Standard.
- d. Copy of the signed oral interview sheets for each qualification record.
- e. (Submarines only) A master list of qualified Oxygen Clean Workers shall be retained for the life of the ship.

10.5.5 Departure from Specification Records.

- a. Outstanding DFS Files.
 - (1) An index that reflects the DFS unique serial number assigned, date approved, system or component including brief description, annotation for SUBSAFE and status.
 - (2) A copy of each outstanding DFS and all applicable correspondence.
- b. A copy of cleared DFS with an index will be retained for 24 months.
- c. A copy of all DFS approved as permanent repairs, with an index, will be retained until they are reflected in the ship's selected records and drawings or technical variation documents.

10.5.6 Assessments, Evaluations and Audits. The QAO will retain records of assessments, evaluation and surveillance for the past 24 months (unless otherwise stated). The records will consist of:

- a. QA form 14 index log that has the item numbers, work center responsible to correct and estimated date corrective action is due.
- b. Copy of last higher authority assessment and the corrective action for all items.
- c. Results of all Audits and Surveillances of the QA Program, including the root cause, immediate and permanent corrective action. (This may be kept with the rest of the monitor program records).
- d. Last annual QA Program evaluation performed.
- e. Maintain an auditable record of the most current Job Control Number to DFS verification.

10.5.7 Training.

- a. Training records will be retained in accordance with TYCOM instructions.

- b. (Submarines only) The ship shall maintain a record of completion for each member of the crew indicating the date of completion for annual SUBSAFE Awareness, Fly-by-Wire Awareness and SOC Awareness Training, as applicable.

10.6 ADDITIONAL SUBMARINE/NUCLEAR UNIQUE QUALITY ASSURANCE RECORD RETENTION REQUIREMENTS.

10.6.1 Submarine Safety/Nuclear/Level I/Submarine Flight Critical Component/Scope of Certification/Other Certification. The ship will retain the following records for the life of the ship or as indicated below:

10.6.1.1 Reactor Plant Work Accomplishment Report (Submarines only). A copy of all completed Reactor Plant Work Accomplishment Reports.

10.6.1.2 Submarine Safety Material Certification (Submarines only). Copy of the TYCOM and NAVSEA SUBSAFE Material Certification message from new construction, DMP or overhaul until the ship's current status is reflected in reference (e). When the ship's current status is reflected in the notice, the messages may be destroyed, and the current notice will be retained.

10.6.1.3 End of Fleet Maintenance Availability Certification (Submarines only). Retain the last end of FMA Availability letter from the FMA.

10.6.1.4 Certification Continuity Reports (Submarines only). Retain the last certification continuity report sent by the ship.

10.6.1.5 Industrial Activity Certification Reports (Submarines only). A copy of all industrial activity/shipyard certification letters or messages from all SRA conducted between overhauls. In addition, a copy of the ISIC audit of SUBSAFE work performed by the industrial activity should also be kept. These may be disposed of at the next Extended Refit Period/SRA/DMP/EOH/ERO/RFOH/ROH.

10.6.1.6 Other Certification Reports (Submarines only). A copy of any other correspondence or messages that affect the certification of the ship or hull integrity should be retained until:

- a. Resolved via inspection/maintenance or DFS as required or
- b. As defined within the applicable correspondence/message.

10.6.1.7 Controlled Material (Submarines only). **Except for Fly-By-Wire Diagnostic and Maintenance Computers (DMAC), Ship's Force is not required to use a QA form 1 to document receipt inspection of Level I/SFCC/SOC material to be immediately installed for a specific maintenance action. A QA form 2 will be used to document receipt inspection of material to be immediately installed. DMACs require a QA form 1 to document receipt inspection but do not require a QA form 2. The QA form 1 for the DMAC will be retained in the ship REC exception folder.**

10.6.1.8 Nuclear Records. Nuclear records will be retained as required by reference (b). Reference (b) defines which nuclear records must be retained and length of retention as well as specifies requirements for retention of existing records. It is not intended to create new records for record retention requirements, if they do not already exist.

10.6.1.9 Nuclear Propulsion Plant Operator Welder Records (Submarines only). The Main Propulsion Assistant will retain the following qualification records in accordance with reference (f), for each welder as long as the welder is qualified onboard.

- a. Documentation certifying original weld school completion.
- b. QA form 20 for most current proficiency welds and qualification welds (the four most recent test assemblies).
- c. Copy of current eye examination report.

10.6.1.10 Re-Entry Control/Maintenance Certification Record Exception Objective Quality Evidence and Other Controlled Assembly Records. Retain a file of the most recent QA form 34 generated for each component or system assembled as a controlled assembly and performed as a REC/MCR exception per Part I, Chapter 5, paragraph 5.6.7, Note 3, Part I, Chapter 2, paragraph 2.2.5, Note 2 and Part III, Chapter 5, paragraph 5.11.6.1.b of this volume. Retain a file of the most recent QA form 34 record generated per Part I, Chapter 7, paragraph 7.4.1.c of this volume for non-controlled systems or components until the system or component testing is completed satisfactory.

10.6.1.11 Scope of Certification (Submarines only). Retain a copy of the NAVSEA and TYCOM, if applicable, Scope of Certification and/or Sustaining Survey Certification letter or message.

10.6.1.12 Unrestricted Operations (Submarines only). Retain records related to the Unrestricted Operations Program as defined by Volume VI, Chapter 25 of this manual.

10.7 FLEET MAINTENANCE ACTIVITY QUALITY ASSURANCE RECORD RETENTION.

10.7.1 Submarine Safety/Nuclear/Level I/Scope of Certification/Other Certification. The QAO or designated officer will retain material certification (SUBSAFE, Nuclear, Level I, Scope of Certification and CWP category "Other") records for the life of each tended ship.

10.7.2 Reactor Plant Work Accomplishment Report (Submarines only). The Nuclear Repair Officer will retain a legible copy of all FMA generated Reactor Plant Work Accomplishment Reports.

10.7.3 Controlled Work Package Log. The QAO will maintain a CWP log, using the QA form 11, for the life of the ship. Re-copying or consolidation of this log is not to be done.

10.7.4 Completed Controlled Work Packages. All CWPs (retain onboard per paragraph 10.2.2 of this chapter), which includes:

- a. MCR/REC (QA forms 9 and 10).
- b. References unique to this task (e.g., NAVSEA letters, Liaison Action Requests) will be retained with the CWP unless specifically identified to allow recall, if necessary.
- c. All enclosures documenting the OQE (e.g., QA forms and RFI tags (NAVSEA 9210/2 and 9210)) will be retained.
- d. FWPs executed as the core of a CWP shall be retained with the CWP. After three years when CWPs are moved ashore or placed in storage, the FWP portion of the CWP may be discarded.

NOTE: MATERIAL CONTROL RECORDS (E.G., QA FORM 2s) ARE NOT REQUIRED TO BE RETAINED FOR REMOVED AND REINSTALLED CONTROLLED MATERIAL AFTER THE CWP IS CLOSED.

10.7.5 Controlled Material Records. Controlled material records will be maintained with the associated CWP. Those records not associated with a CWP will be maintained on file by the QAO. The QAO will maintain controlled material records as outlined below. These records should be included in the appropriate CWP to the maximum extent practical. Retain material certification files for all Nuclear Level I, SFCC, Level I and SOC material installed.

- a. RFI tags for nuclear Level I items installed.
- b. For any Nuclear Level I items received and installed without a RFI tag retain all OQE used to certify the material for installation.
- c. All OQE used to upgrade material for non-nuclear "Level" use.
- d. All QA forms 3 for any rejected items accepted for use.
- e. A file of QA forms 1 with certification documentation.
- f. All material control records from receipt inspection through installation will be maintained throughout the life of Deep Submergence Systems.

10.7.6 Assessment, Audits, Surveillance and Evaluations. The QAO will retain records for the past 18 months (unless otherwise stated). The records will consist of:

- a. Last year and present year internal audit schedule.
- b. Completed audit plans/guides and results (Associated QA forms 14 or other discrepancy reports).
- c. QA form 14 index log that has the item numbers, work center responsible to correct and estimated date corrective action is due.
- d. Copy of last higher authority assessment, surveillance and the corrective action for all items.

- e. Schedule and results of internal surveillance of the QA Program, including the corrective action. (This may be kept with the rest of the monitor program records).
- f. Last two semi-annual QA Program evaluations.
- g. Two years worth of records for calibration laboratory spot checks/sampling of outgoing work.
- h. Two years worth of records for Field Calibration Activity spot checks/sampling of outgoing work, as applicable.

10.7.7 End of Fleet Maintenance Activity Certification Report to Tended Submarines (Submarines only). The QAO will retain a copy of the last End of Fleet Maintenance Activity Certification Report to tended submarines issued per Part I, Chapter 5, paragraph 5.6.8.b. or Part III, Chapter 5, paragraph 5.11.7.b of this volume, as applicable.

10.7.8 Nuclear/Submarine Safety/Scope of Certification Work. The master lists of qualified CMPO/Controlled Material Handler, Cleanliness Inspector/Certifier, QAI and QAS (if assigned), will be maintained by name, for the duration the individual is assigned to the repair activity.

NOTE: AT A FMA, CIVILIAN EMPLOYEE CONTINUING TRAINING KNOWLEDGE EXAMINATION QUESTIONS AND ANSWERS WILL BE RETAINED FOR TWO YEARS.

10.7.9 Qualification Record. The QAO will maintain a master list of qualified CMPOs/Controlled Material Handlers, Cleanliness Inspectors, QAIs, QASs, Oxygen Clean Workers and Oxygen Clean Instructors and a qualification file on each CMPO/Controlled Material Handler, Cleanliness Inspector, QAI and QAS. The records will be retained for the duration the individual is onboard. The file will consist of:

- a. Date Personnel Qualification Standard completed. For Oxygen Clean Workers and Oxygen Clean Instructors, the date the required course of instruction is completed.
- b. Qualification test results. For Oxygen Clean qualifications, this entry is not required.
- c. A master list of all qualified Oxygen Clean Workers shall be retained for the life of the FMA.

QA FORM 9 INSTRUCTIONSMAINTENANCE CERTIFICATION RECORD/RE-ENTRY CONTROLPURPOSE:

NOTE: "N/A" ALL UNUSED BLOCKS.

1. This form is used to authorize and certify maintenance within SUBSAFE, Nuclear Level I, Level I, SOC or SFCC boundaries and is used as a CWP cover sheet.
2. The instructions are broken down into two separate situations.

SITUATION 1. CONTROLLED WORK/SUBSAFE RE-ENTRY CONTROL BY SHIP'S FORCE ONLY.

- a. The following instructions contain the minimum information and controls necessary to maintain certified systems on board ship when work is performed by Ship's Force on a certified ship.
- b. Each block number on the Maintenance Certification Record (MCR)/Re-Entry Control (REC), QA form 9 corresponds to the same number below. The number identifies the purpose and use of the entry on the MCR/REC.
- c. Each block will be filled in/signed by the personnel assigned or their authorized representatives. Such authorized representatives will be designated in writing in an approved ship's instruction.

BLOCK 1 - PAGE 1 OF

Enter the total number of pages (QA form 9 plus any QA form 10 used as a supplement, should normally be 1 of 2).

BLOCK 2 - SUBSAFE/REC NUCLEAR LEVEL I SCOPE OF CERTIFICATION
 SFCC OTHER

Check or "X" the appropriate block(s) and, if "OTHER" is checked, will enter the appropriate level of control (e.g., P-1, P-3a, P-LT).

BLOCK 3 - SHIP HULL NO.

Enter ship's name and hull number.

BLOCK 4 - CWP SERIAL NO.

Obtain the next CWP serial number from the ship's QAO and enter in the block. Revision "-"(dash) will be entered on the initial version of all MCR/RECs. When a revision is required, enter the next revision letter. If necessary, prepare a new MCR/REC using the original numbers plus the next revision letter. Upon issuance of each REC revision, all prior revisions are canceled and superceded and shall be so annotated and retained as OQE. A REC revision must go through the same approval process as the original REC. REC Supplement or continuation sheets (QA-10) shall not be used as an alternate to revision of the REC.

BLOCK 5 - J.O./JCN

Enter the JCN for the maintenance action.

BLOCK 6 - ASSOCIATED CWP(s)/REC(s)

Shipyard use only.

BLOCK 7 - ORIGINATOR

Enter the name (and badge/grade/rank) of the person preparing the CWP.

BLOCK 8 - ORGANIZATION

Enter the division of the person preparing the CWP.

BLOCK 9 - SYSTEM REPAIRED/RE-ENTERED

Enter the system(s) being repaired/re-entered.

BLOCK 10 - REPAIR/RE-ENTRY LOCATION

Enter the physical location of the work.

BLOCK 11 - COMPONENT(S)

Enter the noun name of the component(s) being repaired/re-entered.

BLOCK 12 - JID MAP/DWG WITH REV

- a. Enter the number and revision of the appropriate mapping drawing(s) for the work. If no mapping drawing is available, list the most appropriate arrangement or component drawing or diagram. For component repair, enter the applicable document (Standard Navy Valve Drawing, Vendor Drawing, etc.) which depicts the disturbances of the item (work in place or shop work). Based on the scope of work planned, several drawings may need to be referenced. If necessary, local sketches are authorized.
- b. The general order of precedence for entering Joint Identification (JID) is:
 - (1) JID number from the SUBSAFE Joint Mapping Plan, if there is one.
 - (2) JID number from the Joint Index Drawing, ship or class, for welding.
 - (3) Joint description/JID from Assembly or Arrangement/Installation Drawing. The drawing chosen must adequately portray the joints to be broken.
 - (4) Drawings/diagrams from technical manual.
 - (5) A locally prepared sketch where other alternatives do not adequately describe the joints to be broken. Since the sketch will not be retrievable elsewhere, it must be kept in the REC package as OQE.

BLOCK 13 - WORK AND TESTING TO BE PERFORMED AND WORK AND TEST REFERENCE DOCUMENTS

Enter the total scope of work and testing required for certification of this repair/re-entry (e.g., ripout, repair, restore, replace, reinstall). Enter the work and test description and make positive reference to the TWD, which contains the detailed work procedure, material requirements, testing and certification to be performed. If additional space is needed to properly identify all elements, then a QA form 10 will be used to supplement this block. The information provided in Block 6 does not need to be repeated in Block 13. The description of work on each REC revision shall detail the total revised Scope of Work. Cumulative partial descriptions do not satisfy this requirement.

BLOCK 14 - APPLICABLE JOINT NO(S), OR, IF NOT SUPPLIED, SPECIFIC BOUNDARIES

Enter the JID to be repaired/re-entered. If joint numbers are not supplied, specify boundaries in specific terms (e.g., body to bonnet joint of valve ASW-29) or assign local joint numbers. If local joint numbers are assigned, the sketch used to identify the joints must be included as OQE in the completed CWP. Listing of work boundary "end points" in lieu of listing discrete individual joints does not satisfy this requirement.

BLOCK 15 - PRIME APPROVAL SIGNATURE

- a. BLOCK 15A. The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date indicating the package is technically correct.
- b. BLOCK 15B. The Department Head will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date granting permission for work to be conducted. **No work can start prior to this signature.**
- c. BLOCK 15C. For nuclear system work, the ship's Commanding Officer (Reactor Officer for CVNs) will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date granting permission for work to be conducted in accordance with Part I, Chapter 2, Appendix D of this Volume. No nuclear work can start prior to this signature. The Immediate Superior In Command (ISIC) Material Officer will counter sign and enter his/her badge/grade/rank to indicate review for testing of repair activity accomplished nuclear work in accordance with Part I, Chapter 2, Appendix D of this Volume. For oxygen, SUBSAFE, Scope of Certification or Safety of Flight Critical Component work, the ship's

Engineer Officer (Chief Engineer for CVNs) will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, granting permission for work to be conducted in accordance with Part I, Chapter 2, Appendix D of this Volume. **No nuclear, oxygen system, SUBSAFE, Scope of Certification or Safety of Flight Critical Component work can start prior to this signature.**

- d. BLOCK 15D. The Officer Of the Deck/Duty Officer or Engineering Officer of the Watch/Engineering Duty Officer, depending on the work to be performed, will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date authorizing the work to start. The signature establishes the work and CWP start date and signifies that the system/component is in a condition to accomplish the work.

NOTE: COMPLETE BLOCKS 16, 17 AND 18 BEFORE PERFORMING ANY SHIPBOARD TESTING. IF REWORK BECOMES NECESSARY AS THE RESULT OF SHIPBOARD TESTING, THE REQUIREMENTS OF PART I, CHAPTER 2, PARAGRAPH 2.3.7.2 OF THIS VOLUME SHALL BE FOLLOWED. FOR SHIP-TO-SHOP MAINTENANCE, BLOCKS 16, 17 AND 18 DO NOT NEED TO BE COMPLETED FOR IN-PROCESS TESTING IDENTIFIED AS PART OF THE CWP "PROCEDURE" SECTION. AFTER COMPLETING THE PROCEDURE AND BEFORE PERFORMING THE CWP "TESTING AND INSPECTION" SECTION, COMPLETE BLOCKS 16, 17, AND 18.

BLOCK 16 - **SUPPORTING DOCUMENTATION**

The Lead Work Center (LWC) Division Officer will identify all supporting documentation required and generated as established by the CWP. For example, a typical entry would be: QA2(3), QA12(1), QA26(1), QA34(1), RFI Tag(1), LAR(2). List only QA form 2s for new material installed in the system or component. The cumulative documentation (OQE) shall be listed on the most current revision.

BLOCK 17 - **VERIFICATION OF WORK COMPLETION**

The LWC Division Officer will sign, legibly print or stamp his/her name (and badge/grade/rank) and enter the date certifying that the production work described by the MCR/REC has been accomplished in accordance with the specified instructions and that the required documentation for the production work as described in Block 16 has been completed, reviewed and is correct. When rework is identified following signing blocks 17 and 18, new signature/date blocks for blocks 17 and 18 shall be documented on a QA form 10.

BLOCK 18 - **CERTIFICATION OF DOCUMENTATION OF PRODUCTION WORK**

The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date certifying that all documentation for the production work specified in Block 16 has been reviewed for accuracy and completeness and is complete and accurate. When rework is identified following signing blocks 17 and 18, new signature/date blocks for blocks 17 and 18 shall be documented on a QA form 10.

BLOCK 19 - **CERTIFICATION OF TESTING RESULTS**

The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date certifying that the testing invoked for this MCR/REC has been completed satisfactorily. The test documentation specified in Block 16 has been completed, has been reviewed, and is complete and accurate.

BLOCK 20 - **FINAL MCR/REC CLOSEOUT CERTIFICATION**

The Department Head will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date certifying that all documentation related to this MCR/REC has been reviewed for accuracy and completeness and is complete and accurate. For oxygen, SUBSAFE, Scope of Certification or Safety of Flight Critical Component work, the ship's Engineer Officer (Chief Engineer for CVNs) shall perform this certification and sign, legibly print or stamp his/her name and badge/grade/rank and enter the date.

BLOCK 21 - **SHIP'S COMMANDING OFFICER SIGNATURE**

The ship's Commanding Officer (Reactor Officer for CVNs) will sign, legibly print or stamp his/her name and grade/rank and enter the date acknowledging that the MCR/REC has been closed by the Department Head in accordance with Part I, Chapter 2, Appendix D of this Volume.

SITUATION 2. CONTROLLED WORK (NUCLEAR/LEVEL I/SOC/OTHER)/SUBSAFE REC BY REPAIR ACTIVITY AND SHIP OR REPAIR ACTIVITY ONLY.

- a. The following instructions contain the minimum information and controls necessary to maintain certified systems on board ship, or to document new work for eventual certification when work is performed by Ship's Force and a repair activity or by a repair activity only on a certified ship or component.
- b. Each block number on the MCR/REC, QA form 9 corresponds to the same number below. The number identifies the purpose and use of the entry on the MCR/REC.
- c. The planner will fill in Blocks 1 – 14. All other blocks will be filled in/signed by the personnel assigned or their authorized representatives. Such authorized representatives will be designated in writing in an approved ship's/activity's instruction.

BLOCK 1 - **PAGE 1 OF**

Enter the total number of pages (QA form 9 plus any QA form 10 used as a supplement).

BLOCK 2 - **[] SUBSAFE/REC [] NUCLEAR [] LEVEL I [] SCOPE OF CERTIFICATION [] SFCC [] OTHER**

Check or "X" the appropriate block(s) and, if "OTHER" is checked, will enter the appropriate level of control (e.g., P-1, P-3a, P-LT).

BLOCK 3 - **SHIP HULL NO.**

Enter ship's name and hull number.

BLOCK 4 - **CWP SERIAL NO.**

- a. For Ship's Force and FMA work, obtain the next CWP serial number from the ship's QAO and enter it in the block. For controlled or SUBSAFE work to be performed by the repair activity only (in repair activity shops and the repair activity does no work onboard the ship, examples include ship to shop work; rotatable pool assets) obtain the next CWP serial number from the FMA QAO and enter it in the block. Revision "-" (dash) will be entered on the initial version of all MCR/RECs. When a revision is required, enter the next revision letter. If necessary, prepare a new MCR/REC using the original numbers plus the next revision letter.
- b. For FMA work on a SUBSAFE system, the REC number will be obtained from the ship's QAO and entered after the CWP number (e.g., CWP/REC number). Upon issuance of each REC revision, all prior revisions are canceled and superseded and shall be so annotated and retained as OQE. A REC revision must go through the same approval process as the original REC. REC Supplement or continuation sheets (QA-10) shall not be used as an alternate to revision of the REC.

BLOCK 5 - **J.O./JCN**

Enter the JCN for the maintenance action.

BLOCK 6 - **ASSOCIATED CWP(s)/REC(s)**

Shipyards use only.

BLOCK 7 - **ORIGINATOR**

Enter the name (and badge/grade/rank) of the person preparing the CWP.

BLOCK 8 - **ORGANIZATION**

Enter the division of the person preparing the CWP.

BLOCK 9 - **SYSTEM REPAIRED/RE-ENTERED**

Identify the system(s) being repaired/re-entered.

BLOCK 10 - REPAIR/RE-ENTRY LOCATION

Identify the physical location (i.e., ship or shop) of the work.

BLOCK 11 - COMPONENT(S)

Identify the noun name of the component(s) being repaired/re-entered.

BLOCK 12 - JID MAP/DWG WITH REV

- a. Enter the number and revision of the appropriate mapping drawing(s) for the work. If no mapping drawing is available, list the most appropriate arrangement or component drawing or diagram. For component repair, enter the applicable document (Standard Navy Valve Drawing, Vendor Drawing, etc.) which depicts the disturbances of the item (work in place or shop work). Based on the scope of work planned, several drawings may need to be referenced. If necessary, local sketches are authorized.
- b. The general order of precedence for entering JID is:
 - (1) JID number from the SUBSAFE Joint Mapping Plan, if there is one.
 - (2) JID number from the Joint Index Drawing, ship or class, for welding.
 - (3) Joint description/JID from Assembly or Arrangement/Installation Drawing. The drawing chosen must adequately portray the joints to be broken.
 - (4) Drawings/diagrams from technical manual.
 - (5) A locally prepared sketch where other alternatives do not adequately describe the joints to be broken. Since the sketch will not be retrievable elsewhere, it must be kept in the REC package as OQE.

BLOCK 13 - WORK AND TESTING TO BE PERFORMED AND WORK AND TEST REFERENCE DOCUMENTS

Enter the total scope of work and testing required for certification of this repair/re-entry (e.g., ripout, repair, restore, replace, reinstall). Enter the work and test description and make positive reference to the TWD, which contains the detailed work procedure, material requirements, testing and certification to be performed. If additional space is needed to properly identify all elements, then a QA form 10 will be used to supplement this block. The information provided in Block 6 does not need to be repeated in Block 13. The description of work on each REC revision shall detail the total revised Scope of Work. Cumulative partial descriptions do not satisfy this requirement.

BLOCK 14 - APPLICABLE JOINT NO(S), OR, IF NOT SUPPLIED, SPECIFIC BOUNDARIES

Enter the JID to be repaired/re-entered. If joint numbers are not supplied, specify boundaries in specific terms (e.g., body to bonnet joint of valve ASW-29) or assign local joint numbers. If local joint numbers are assigned, the sketch used to identify the joints must be included as OQE in the completed CWP. Listing of work boundary "end points" in lieu of listing discrete individual joints does not satisfy this requirement.

BLOCK 15 - PRIME APPROVAL SIGNATURE

- a. BLOCK 15A. The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date indicating the package is technically correct. **No work can start prior to this signature.**
- b. BLOCK 15B. The Department Head will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date granting permission for work to commence. **No SUBSAFE work can start prior to this signature.**
- c. BLOCK 15C. For nuclear, oxygen, SUBSAFE, Scope of Certification or Safety of Flight Critical Component work, the ship's Engineer Officer (Reactor Officer for CVNs) will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, granting permission for work to be conducted. **No nuclear, oxygen system, SUBSAFE, Scope of Certification or Safety of Flight Critical Component work can start prior to this signature.**

- d. BLOCK 15D. The Officer Of the Deck/Duty Officer or Engineering Officer of the Watch/Engineering Duty Officer, depending on the work to be performed, will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, authorizing the work to start. This signature establishes the work and CWP start date and signifies that the system/component is in a condition to accomplish the work. This signature is not required for repair activity generated MCR/RECs to repair ship to shop items from tended ships (e.g., periscopes, relief valves, antennae).

NOTE: COMPLETE BLOCKS 16, 17, AND 18 BEFORE PERFORMING ANY SHIPBOARD TESTING. IF REWORK BECOMES NECESSARY AS THE RESULT OF SHIPBOARD TESTING, THE REQUIREMENTS OF PART I, CHAPTER 2, PARAGRAPH 2.3.7.2 OF THIS VOLUME SHALL BE FOLLOWED. FOR SHIP-TO-SHOP MAINTENANCE, BLOCKS 16, 17, AND 18 DO NOT NEED TO BE COMPLETED FOR IN-PROCESS TESTING IDENTIFIED AS PART OF THE CWP "PROCEDURE" SECTION. AFTER COMPLETING THE PROCEDURE AND BEFORE PERFORMING THE CWP "TESTING AND INSPECTION" SECTION, COMPLETE BLOCKS 16, 17, AND 18.

BLOCK 16 - SUPPORTING DOCUMENTATION

- a. The LWC Division Officer will identify all supporting documentation required and generated as established by the CWP. For example, a typical entry would be: QA2(3), QA12(1), QA26(1), QA34(1), RFI Tag(1), LAR(2). List only QA form 2s for new material installed in the system or component. The cumulative documentation (OQE) shall be listed on the most current revision.
- b. For activities using the Task Group Instruction (TGI) process. Deficiency Logs (DL) do not have to be listed in this block since DLs are integral to the TGI. The TGI should be cited in Block 16 if not already cited in Block 13. QA forms and other individual OQE records must be listed.

BLOCK 17 - VERIFICATION OF WORK COMPLETION

The LWC Division Officer will sign, legibly print or stamp his/her name (and badge/grade/rank) and enter the date, certifying that the production work described by the MCR/REC has been accomplished in accordance with the specified instructions and that the required documentation for the production work as described in Block 16 has been completed, reviewed and is correct. When rework is identified following signing blocks 17 and 18, new signature/date blocks for blocks 17 and 18 shall be documented on a QA form 10.

BLOCK 18 - CERTIFICATION OF DOCUMENTATION OF PRODUCTION WORK

The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, certifying that all documentation for the production work specified in Block 16 has been reviewed for accuracy and completeness and is complete and accurate. When rework is identified following signing blocks 17 and 18, new signature/date blocks for blocks 17 and 18 shall be documented on a QA form 10.

BLOCK 19 - CERTIFICATION OF TESTING RESULTS

The QAO will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, certifying that the testing invoked for this MCR/REC has been completed satisfactorily. The test documentation specified in Block 16 has been completed, reviewed, and is complete and accurate.

BLOCK 20 - FINAL MCR/REC CLOSEOUT CERTIFICATION

The Department Head will sign, legibly print or stamp his/her name and badge/grade/rank and enter the date, certifying that all documentation related to this MCR/REC has been reviewed for accuracy and completeness and is complete and accurate.

BLOCK 21 - SHIP'S COMMANDING OFFICER SIGNATURE

For "Ship's Force and FMA" MCR/REC, the ship's Commanding Officer (Reactor Officer for CVNs) will sign, legibly print or stamp his/her name and grade/rank and enter the date, in accordance with Part I, Chapter 2, Appendix D of this Volume, acknowledging that the MCR/REC has been closed by the Repair Officer. For "FMA ONLY" MCR/REC, this block is marked N/A.

WELDING IN PROCESS CONTROL/NONDESTRUCTIVE TEST RECORD

QA FORM 20 (FRONT)

◆ PAGE 1 OF

When the form is used for production welding, the blocks marked with a ◆ shall be completed by the planner.

| | | | | | | | |
|---|------------------------|-----------------------|---|--|---------------------------|---|--|
| ◆ 2. SHIP HULL NO. | ◆ 3. JCN | ◆ 4. CWP/REC SER. NO. | | | ◆ 5. LWC | ◆ 6. DATE | |
| ◆ 7. SYSTEM | ◆ 8. COMPONENT | ◆ 9. DWG NO. | | | ◆ 10. CWP STEP NO. | | |
| ◆ 11. JOINT ID | | ◆ 12. JOINT DESIGN | | 13. INST LOCATION: <input type="checkbox"/> STBD COMPT: <input type="checkbox"/> C/L FR: <input type="checkbox"/> PORT | | 14. WELDED LOCATION: <input type="checkbox"/> SHOP <input type="checkbox"/> FIELD | |
| BASE MATERIAL DATA | | | | | | | |
| 15. COMP DATA | 16. MATERIAL | 17. SIZE | 18. THICKNESS | 19. MATL SPEC | 20. MIC NO. | | |
| COMPONENT A: | | | | | | | |
| COMPONENT B: | | | | | | | |
| 21. <input type="checkbox"/> SEAL RING <input type="checkbox"/> BACK RING/STRIP | 22. MATERIAL | 23. SIZE | 24. THICKNESS | 25. MATL SPEC | 26. MIC NO. | | |
| WELDING MATERIAL SPECIFICATIONS AND DATA | | | | | | | |
| 27. TYPE OF FILLER(S) | 28. SIZE | 29. MATL | 30. MIL-SPEC | 31. MIC NO. | | | |
| | | | | | | | |
| | | | | | | | |
| WELD HISTORY | | | | | | | |
| ◆ 32. WELDING STANDARD: | 33. WELDING PROCEDURE: | 34. DATA SHEET | 35. POSITION: <input type="checkbox"/> VERT <input type="checkbox"/> FLAT <input type="checkbox"/> FIXED <input type="checkbox"/> 45 DEG <input type="checkbox"/> HORZ <input type="checkbox"/> OVHD <input type="checkbox"/> ROLLED | | | | |
| 36. ACCESSIBILITY: <input type="checkbox"/> 12" OR LESS <input type="checkbox"/> UNRESTRICTED | 37. PREHEAT TEMP | 38. PREHEAT METHOD | | 39. POST HEAT. TEMP REQD: | START TIME: STOP TIME: | | |
| 40. PURGE GAS: | 41. FLOW RATE | 42. SHIELD GAS | 43. FLOW RATE | 44. CUP SIZE | 45. TUNGSTEN SIZE | | |
| 46. WELD LAYER | 47. PROCESS | 48. QUAL EXP DATE | 49. AMPS | 50. INTERPASS TEMP | 51. WELDER SIGNATURE | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 53. INSPECTION DATA CONTAINED ON REVERSE OF THIS PAGE REMARKS: | | | | | | | |
| 94. FINAL DISPOSITION: <input type="checkbox"/> ACCEPT <input type="checkbox"/> REJECT | | 95. NDT SUPERVISOR | | | | DATE | |

THE PERSON DESIGNATED TO SIGN FOR AN ACTION VERIFIES, BASED ON PERSONAL OBSERVATION OR CERTIFIED RECORDS, AND CERTIFIES BY HIS/HER SIGNATURE THAT THE ACTION HAS BEEN PERFORMED IN ACCORDANCE WITH THE SPECIFIED REQUIREMENTS.

**WELDING IN PROCESS CONTROL/NONDESTRUCTIVE TEST RECORD
QA FORM 20 (BACK)**

| NDT INSPECTION DATA | | | | | |
|--|-----------------|-----------------------|-------------------------------------|-----------------------------|------------------|
| 54. INSPECTION STANDARD | | 55. WELD CLASS | 56. ACCEPTANCE STANDARD | | 57. ACCEPT CLASS |
| 58. WELD PREP | 59. INSP METHOD | 60. ACCEPT/REJECT | 61. NDT INSPECTOR SIGNATURE | | 62. DATE |
| COMPONENT A | | [] ACCEPT [] REJECT | | | |
| COMPONENT B | | [] ACCEPT [] REJECT | | | |
| 63. JOINT FITUP | | [] ACCEPT [] REJECT | | | |
| 64. INSP LAYER | 65. INSP METHOD | 66. INSP PROC NO | 67. ACCEPT/REJECT | 68. NDT INSPECTOR SIGNATURE | 69. DATE |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| 70. NDT INSPECTION DATA REPAIR NO. _____ | | | Defect: L W D | | |
| 71. Repair Method: | | | Excavation: L W D | | |
| 72. INSP LAYER | 73. INSP METHOD | 74. INSP PROC NO. | 75. ACCEPT/REJECT | 76. NDT INSPECTOR SIGNATURE | 77. DATE |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| 78. NDT INSPECTION DATA REPAIR NO. _____ | | | Defect: L W D | | |
| 79. Repair Method: | | | Excavation: L W D | | |
| 80. INSP LAYER | 81. INSP METHOD | 82. INSP PROC NO. | 83. ACCEPT/REJECT | 84. NDT INSPECTOR SIGNATURE | 85. DATE |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| 86. NDT INSPECTION DATA REPAIR NO. _____ | | | Defect: L W D | | |
| 87. Repair Method: | | | Excavation: L W D | | |
| 88. INSP LAYER | 89. INSP METHOD | 90. INSP PROC NO. | 91. ACCEPT/REJECT | 92. NDT INSPECTOR SIGNATURE | 93. DATE |
| | | | [] ACCEPT [] REJECT | | |
| | | | [] ACCEPT [] REJECT | | |
| 53. REMARKS (Continued): | | | | | |

THE PERSON DESIGNATED TO SIGN FOR AN ACTION VERIFIES, BASED ON PERSONAL OBSERVATION OR CERTIFIED RECORDS, AND CERTIFIES BY HIS/HER SIGNATURE THAT THE ACTION HAS BEEN PERFORMED IN ACCORDANCE WITH THE SPECIFIED REQUIREMENTS.

BLOCK 65 - **INSP METHOD**

Enter the type and method of inspection performed (e.g., VT 5X, PT).

BLOCK 66 - **INSP PROC NO.**

Enter the inspection procedure number.

BLOCK 67 - **ACCEPT/REJECT**

Enter accept or reject to indicate disposition of the weld layer. If final disposition of the weld is rejectable, document reason(s) for rejection, **description and location of the defect(s)** in Block 53. **Document the repair number, length, width and depth of the defect(s)** in Block 70, 78, or 86, as applicable.

BLOCK 68 - **NDT INSPECTOR SIGNATURE**

NDT Inspector print name and enter signature certifying the disposition of the weld layer.

BLOCK 69 - **DATE**

Enter the date Block 68 is signed.

NOTE: IF REPAIRS ARE REQUIRED TO THE JOINT, RECORD THE INSPECTIONS IN BLOCKS 72 THROUGH 77, 80 THROUGH 85, AND 88 THROUGH 93 IN THE SAME MANNER AS BLOCKS 64 THROUGH 69. BLOCKS NOT COMPLETED WILL BE LEFT BLANK **EXCEPT AS DIRECTED BELOW.**

BLOCK 70 - **REPAIR NUMBER/L W D**

The NDT Inspector will enter the repair number, length, width and/or depth of the defect(s) if known. Enter N/A for length, width or depth if unknown based on the limitations of the inspection method performed.

BLOCK 71 - **REPAIR METHOD/L W D**

The welder will record the method of repair (e.g., file, excavate and weld, weld only). Document the length, width and depth of the excavation. If excavation was not required for weld repair, enter N/A for L W D.

BLOCK 78 - **REPAIR NUMBER/L W D**

The NDT Inspector will enter the repair number, length, width and/or depth of the defect(s) if known. Enter N/A for length, width or depth if unknown based on the limitations of the inspection method performed.

BLOCK 79 - **REPAIR METHOD/L W D**

The welder will record the method of repair (e.g., file, excavate and weld, weld only). Document the length, width and depth of the excavation. If excavation was not required for weld repair, enter N/A for L W D.

BLOCK 86 - **REPAIR NUMBER/L W D**

The NDT Inspector will enter the repair number, length, width and/or depth of the defect(s) if known. Enter N/A for length, width or depth if unknown based on the limitations of the inspection method performed.

BLOCK 87 - **REPAIR METHOD/L W D**

The welder will record the method of repair (e.g., file, excavate and weld, weld only). Document the length, width and depth of the excavation. If excavation was not required for weld repair, enter N/A for L W D.

BLOCK 94 - **FINAL DISPOSITION**

The NDT Inspector who completed the final inspection of the final weld will check acceptable or rejectable.

BLOCK 95 - **NDT SUPERVISOR SIGNATURE DATE**

NDT Supervisor print name, enter signature and date signifying all information in Blocks 1 through 93 is technically and administratively correct.

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QA FORM 26 INSTRUCTIONSHYDROSTATIC/PNEUMATIC TEST RECORD

PURPOSE: To document hydrostatic/pneumatic tests accomplished on piping systems or portions of a system to recertify the system after maintenance. It also provides a method for the FMA to specify the required retests for work they performed. The QA form 26 will not be used in DSS/SOC applications.

PROCEDURE: The numbered blocks on QA form 26 correspond with the instructions listed below. Any block not used will be marked NA. The planning organization shall fill in blocks identified with the diamond symbol prior to issuing the CWP.

BLOCK 1 - SHIP HULL NO.

Enter the ship's name and hull number.

BLOCK 2 - JCN

Enter the JCN.

BLOCK 3 - LWC

Enter the shop number of the LWC.

BLOCK 4 - CWP/REC SER. NO.

Enter the CWP/REC serial number or enter N/A if no CWP/REC is required. Do not list the CWP/REC revision.

BLOCK 5 - SYSTEM/COMPONENT

Enter the name of the system and component to be tested.

BLOCK 6 - TEST REFERENCES

Enter the applicable test reference and/or other applicable references (e.g., drawing number and revision used to obtain the required test pressure and conducting of the test).

NOTE: (FOR SUBMARINES ONLY) ENTER "S9505-AF-MMA-010/PIPING SYSTEMS" WHICH PROVIDES REQUIREMENTS FOR SHIP'S FORCE TO SET-UP AND CONDUCT TESTING.

BLOCK 7 - REQUIRED TEST AND INSPECTION POINTS

Enter the specific test requirements necessary to recertify the work. Specify test requirements (i.e., type of test, test fluid, special valve positions, duration, acceptance criteria, joints to be tested (if entire component/system is tested, so state)).

BLOCK 8 - DIAGRAM OF TEST AREA

Enter a diagram of the test area. Be specific. Include such things as relief valve locations, gage locations, blanks, gags, and valve positions, etc. The QAI will verify the diagram prior to performance of the test. For nuclear tests identify major components to be isolated or vented to preclude unnecessary pressurization.

NOTE: ALL VALVES WITHIN THE TEST BOUNDARIES MUST BE IDENTIFIED AND THEIR POSITION (OPEN/SHUT) DURING THE TEST ANNOTATED.

NOTE: IF DRAWINGS OR ADDITIONAL INFORMATION IS REQUIRED TO SUPPLEMENT THIS REPORT, EACH DRAWING, ETC., WILL BE NUMBERED AND AUTHENTICATED WITH THE SIGNATURE BY THE CRAFTSMAN AND QAI MAKING UP THE REPORT.

NOTE: LOCAL EXCEPTIONS TO GAGE RANGE AND OR INCREMENTS WILL BE APPROVED BY AN INDIVIDUAL WITH A TECHNICAL WARRANT.

NOTE: SHIPS, FLEET MAINTENANCE ACTIVITIES AND REGIONAL MAINTENANCE CENTERS MANAGED BY UNITED STATES FLEET FORCES COMMAND OR TYCOMS SHALL DISREGARD THE BLOCK 8 DIAMOND WHEN TESTING IS PERFORMED BY AN ACTIVITY OTHER THAN THE ACTIVITY PERFORMING REPAIR. THE ACTIVITY PERFORMING THE TESTING SHALL COMPLETE THE DIAGRAM REQUIRED BY BLOCK 8.

BLOCK 9 - GAGE DATA

Enter the primary and backup gage data.

BLOCK 10 - REQ'D TEST PRESSURE (PSIG) AND TEST DURATION

Enter the required test pressure and test duration. If listing the test pressure would classify the CWP enter "J", "H", Item 1 of Ref (a), etc. as appropriate from the applicable reference instead of classifying the document.

BLOCK 11 - ACTUAL TEST PRESSURE (PSIG) AND TEST DURATION

Enter the actual test pressure and the duration the test pressure was applied. Test duration will include the required test period and the time required to complete the inspection. If listing the test pressure would classify the CWP enter "J", "H", Item 1 of Ref (a), etc. as appropriate from the applicable reference instead of classifying the document.

BLOCK 12 - TEST RESULTS

- a. Check "SAT" block, if all inspections specified by Block 7 are complete and satisfactory.
- b. Check "UNSAT" block, if test results are unsatisfactory. Identify the specific inspection and reason for failure in the remarks section.

NOTE: IF A SATISFACTORY TEST CANNOT BE ACHIEVED, A DFS FOR NON-NUCLEAR TESTS OR LAR FOR NUCLEAR TESTS MUST BE PROCESSED IN ACCORDANCE WITH PART 1 CHAPTER 8 OF THIS VOLUME OR THE TASK MUST BE REWORKED AND RETESTED.

BLOCK 13 - REMARKS

Remarks pertinent to this test will be entered in this block.

BLOCK 14 - CERTIFICATION

PERFORMED BY

Person performing the test print name, enter signature, badge number and date signifying accuracy of data recorded.

INSPECTED BY

QAI/Shipyard Representative print name, enter signature, badge number and date verifying the accuracy of test results recorded and inspection performed satisfactory.

QA FORM 27 INSTRUCTIONSDROP TEST RECORD

PURPOSE: To document drop tests accomplished on piping systems or portions of a system to recertify the system after maintenance actions have been accomplished.

PROCEDURE: The numbered blocks on QA form 27 correspond with the instructions listed below. Any block not used will be marked NA. The planning organization shall fill in blocks identified with the diamond symbol, the Required Initial Test Pressure of Block 10 and the maximum allowable pressure drop in Block 12 prior to issuing the CWP.

BLOCK 1 - SHIP HULL NO.

Enter ship's name and hull number.

BLOCK 2 - JCN

Enter the JCN.

BLOCK 3 - LWC

Enter the shop number for the LWC.

BLOCK 4 - CWP/REC SER NO.

Enter the CWP/REC serial number or enter N/A if no CWP/REC is required. Do not list the CWP/REC revision.

BLOCK 5 - SYSTEM/COMPONENT

Enter the name of the system and/or component (i.e., FWD ESCAPE TRUNK) to be tested.

BLOCK 6 - REFERENCES

Enter the applicable test reference and/or other applicable references (e.g., drawing number and revision used to obtain the required test pressure and conducting of the test).

NOTE: ENTER "S9505-AF-MMA-010/PIPING SYSTEMS" WHICH PROVIDES REQUIREMENTS FOR SHIP'S FORCE TO SET-UP AND CONDUCT TESTING.

BLOCK 7 - REQUIRED TEST AND INSPECTION POINTS

Enter the specific test requirements, including inspection points, necessary to recertify the work. FMAs will fill in this block and then provide the QA form 27 to Ship's Force so they can prepare the test procedure to retest FMA work.

BLOCK 8 - DIAGRAM OF TEST AREA

Enter a diagram of the test area. Be specific. Include such things as relief valve locations, gage locations, blanks, gags, valve positions, initial and final temperature (if applicable), etc. The QAI will verify the diagram prior to performance of the test. For nuclear tests identify major components to be isolated or vented to preclude unnecessary pressurization.

NOTE: ALL VALVES WITHIN THE TEST BOUNDARIES MUST BE IDENTIFIED AND THEIR POSITION (OPEN/SHUT) DURING THE TEST ANNOTATED.

NOTE: IF DRAWINGS OR ADDITIONAL INFORMATION IS REQUIRED TO SUPPLEMENT THIS REPORT, EACH DRAWING, ETC., WILL BE NUMBERED AND AUTHENTICATED WITH THE SIGNATURE BY THE CRAFTSMAN AND QAI MAKING UP THE REPORT.

NOTE: LOCAL EXCEPTIONS TO GAGE RANGE AND OR INCREMENTS WILL BE APPROVED BY AN INDIVIDUAL WITH A TECHNICAL WARRANT.

NOTE: SHIPS, FLEET MAINTENANCE ACTIVITIES AND REGIONAL MAINTENANCE CENTERS MANAGED BY UNITED STATES FLEET FORCES COMMAND OR TYCOMS SHALL DISREGARD THE BLOCK 8 DIAMOND WHEN TESTING IS PERFORMED BY AN ACTIVITY OTHER THAN THE ACTIVITY PERFORMING REPAIR. THE ACTIVITY PERFORMING THE TESTING SHALL COMPLETE THE DIAGRAM REQUIRED BY BLOCK 8.

BLOCK 9 - GAGE DATA

Enter the primary and backup gage data.

BLOCK 10a - REQUIRED TEST PRESSURE

Enter the required test pressure (psig).

BLOCK 10b - ACTUAL TEST PRESSURE

Enter the actual test pressure.

BLOCK 11a - FINAL PRESSURE AT END OF TEST

Record final pressure reading when the required test time is completed.

BLOCK 11b - ACTUAL DURATION

Enter the actual duration of the test.

BLOCK 12 - ALLOWABLE PRESSURE DROP % IN MINUTES/HOURS

Enter the allowable pressure drop as a percentage of the test pressure in minutes or hours. Cross out time measure not used.

BLOCK 13 - FINAL PRESSURE DROP CORRECTED FOR TEMPERATURE CHANGE

Record final pressure drop calculated with corrections for temperature change in the same units as Blocks 11 and 12.

BLOCK 14 - TEST RESULTS

Check "SAT" block, if all inspections specified by Block 7 are complete and satisfactory.

Check "UNSAT" block, if test results are unsatisfactory. Identify the specific inspection and reason for failure in the remarks section.

NOTE: IF A SATISFACTORY TEST CANNOT BE ACHIEVED, A DFS FOR NON-NUCLEAR TESTS OR LAR FOR NUCLEAR TESTS MUST BE PROCESSED IN ACCORDANCE WITH PART I CHAPTER 7 OF THIS VOLUME OR THE TASK MUST BE REWORKED AND RETESTED.

BLOCK 15 - REMARKS

Enter any comments pertinent to the test.

BLOCK 16 - CERTIFICATION

PERFORMED BY

Person performing the test print name, enter signature and date signifying accuracy of data recorded.

INSPECTED BY

QAI/Shipyard Representative print name, enter signature, badge number and date verifying the accuracy of test results recorded and inspection performed satisfactory.

LOE: Identify the Level of Essentiality (MIC Level). The material control level shall be as identified by craftsman. Example: LI, NA. For SOC material, enter the appropriate Material Control Division (A, B, or C).

IDENT: Enter the marking on the part or on the packaging/container/tag (when the part is not marked) as shown in Table 1.

CRAFT INT: Craftsman: Installing craftsman enter initials for material installed. The initials shall correspond to the related Block 9 craftsman’s signature unless otherwise noted with a corresponding signature elsewhere on the form (e.g., Remarks block entry and signature).

NOTE: IF THE CRAFTSMAN INSTALLING THE MATERIAL IS OTHER THAN THE CRAFTSMAN SIGNING FOR JOINT DATA IN BLOCK 9 OR BLOCK 14, A CORRESPONDING SIGNATURE, PRINTED NAME AND DATE SHALL BE ENTERED IN THE REMARKS BLOCK.

| TABLE 1- DOCUMENTATION REQUIREMENTS | |
|--|--|
| Material Control Level | Required Information |
| Level I Material Other Than Fasteners | MIC Number and any other traceability number, including any local traceability number (e.g., PNSY MLN – examples Z142, AB12). |
| Level I Fasteners | NOTE: THE INFORMATION ENTERED FOR FASTENERS MAY NEED TO INCLUDE INFORMATION FROM BLOCKS 3 AND 8 FROM QA FORM 1. DO NOT ENTER THE PNSY TRACE NUMBER FROM BLOCK 3 OF THE QA FORM 1. Document the markings from the fastener to include either: (1) The color code and the heat/lot number, material type, and manufacturer’s symbol (for nuts containing a self-locking insert, the color of the insert is the manufacturer’s symbol). (2) The MIC number (when MIC number is on the fastener or on the individual tag for some fasteners). |
| Controlled Structural Material And SOC Control Division “A” Material | Traceability Number |
| SOC Control Division “B” Material | Markings providing identification to material type or specification |
| AERP And Other Rotatable Pool Material (688 Class, TRIPER, Etc.) | Enter the appropriate rotatable pool serial number (e.g. RP-148A, 4810-013-5812-A3-0113, TIN -292-11893, etc.) |
| Transferred And Cannibalized Material | Enter the Equipment Removal List No. or other material History/ Traceability number (ERL# XXXX, SSBN-600 EHF #24, etc.) |
| Other Material Within The LEVEL I/SUBSAFE Boundary And SOC Control Division “C” Material | 1. Enter at least one of the following documentation attributes: a. Stock Number (from package/container) b. Part Number (from package/piece) c. Part Number and associated Manufacturing Work Procedure (for manufactured items) d. Local Traceability Number (from piece/tag) e. Drawing and Piece Number (from piece/tag) f. Generic, MIL-SPEC, or Material Specification Marking (from piece) g. NDT record numbers or test results for items verified by generic material testing. 2. For SOC components only: Enter the stock number of the “O-ring lubricant or any sealant used during assembly. |

BLOCK 8 - BLUE/CHALK CHECK AND/OR VALVE BALL COMPRESSION DATA

NOTE: A QA-34 FORM IS NOT REQUIRED TO BE GENERATED SOLELY FOR CAPTURING BLOCK 8 DATA IF THE REMAINDER OF THE COMPONENT IS TO BE ASSEMBLED USING A QA-34A FORM. USE A QA-17 OR OTHER APPROPRIATE METHOD.

(PLANNING) A documented blue/chalk check or valve ball compression check is required for all controlled assemblies and is allowed by the DDGOS in lieu of a seat tightness test for welded in-line valves and components where a seat tightness test is not practical. Enter an X in the applicable NA box when Blue/Chalk

Check or Valve Ball Compression is not applicable. When a Valve Ball Compression check is required, enter the required stack height and ball cavity dimensions. These dimensions should include maximum and minimum requirements.

(CRAFTSMAN) Record actual ball/seat stack heights and cavity dimensions when Planning has provided the required dimensions. If more than one blue check is required, enter additional checks in Remarks. For hull and back up valves where more than one ball/seat stack height dimension is required, enter in the following manner:

(3.213/3.567) where the first dimension is for one ball/seat combination and the second dimension is for the other one. Identify each dimension to its associated valve. Sign, date and print name after satisfactory accomplishment of a Blue/Chalk Check or Valve Ball Compression check.

BLOCK 9 - JOINT DATA FOR JOINTS REQUIRING TORQUE DOCUMENTATION

Torque documentation is required for the following joints:

NOTE: WHEN MULTIPLE JOINTS ARE DOCUMENTED ON ONE QA 34 FORM, ENTER A SUCCESSIVE LETTER FOR EACH BLOCK 9_ USED (E.G., 9B, 9C, ETC.).

NOTE: THIS BLOCK MAY BE USED FOR SPECIFIC ATTRIBUTES THAT ARE NOT COVERED BY THE STANDARD ATTRIBUTES ON THE FORM.

JOINT ID/JOINT TYPE: Planner enter the joint identification number including joint type (e.g., ASW-5744 F). For joint types, use “F” for flanged bolted joints, “U” for union joints, and “S” for screw joints. When a joint identification number is not available, a joint description (e.g., Tailpiece-to-Body (F)) shall be used. Locally assigned joint numbers may be used when a joint description is not practicable and clarity is required. When additional attribute(s) applies to a component (e.g., hatches, etc.) that are not covered by the attributes already on the form, list the attribute and location (applicable reference) for the acceptance criteria (e.g., TWD, technical manual, etc.). For hatches, at a minimum list the “Seat Clearance Measurement”.

JOINT REF: Planner enter the letter corresponding to the reference listed in Block 6 that identifies where the joint number or description information is found (e.g., Mapping Diagram, Drawing, Tech Manual, Work Procedure, etc.).

REQ THREAD LUBE: Planner enter the type(s) of thread lubricant(s) that are authorized (e.g., MOLYKOTE P37, Fel-Pro C5A, etc. or options (e.g., MOLYKOTE P37 or Fel-Pro C5A)). Enter “None” if no lubricant is required.

APPLIED THREAD Craftsman enter the thread lubricant actually used during assembly.

LUBE: Enter “None” if no lubricant was used.

HI FSTNR: Planner indicate (Yes/No) whether the joint contains Hull Integrity Male Fasteners. When “NO” is checked, enter “NA” in the “EXISTING HI MALE FASTENER MARKING” block.

EXISTING HI MALE FASTENER MARKING: (Craftsman) When the “HI FSTNER” block is marked “Yes”, record the quantity of reused/existing male fasteners and the symbols of recognizable significance, as required by Part I, Chapter 5, paragraph 5.4.3.b(2) of this volume (e.g., 6 ea. .K., 2 ea. unmarked).

NOTE: (CRAFTSMAN) IF HULL INTEGRITY MALE FASTENERS (DRIVEN STUDS) ARE UNMARKED, ILLEGIBLE, OR THE SYMBOLS ARE NOT RECOGNIZABLE PER CRITICAL INSPECTION REQUIREMENTS OF PART I, CHAPTER 5, PARAGRAPH 5.4.3.b(2) OF THIS VOLUME, AND THEY WERE NOT REMOVED FROM THE HULL INSERT OR COMPONENT BODY:

- a. DOCUMENT THE QUANTITY
- b. ENTER THE WORDS “STUDS NOT REMOVED” IN THE REMARKS BLOCK
- c. REQUEST QAI PERFORM A GENERIC MATERIAL IDENTIFICATION TEST (E.G., ACID SPOT TEST).

NOTE: (QUALITY ASSURANCE INSPECTOR) PERFORM A GENERIC MATERIAL IDENTIFICATION TEST ON HULL INTEGRITY MALE FASTENERS (DRIVEN STUDS) THAT ARE UNMARKED, ILLEGIBLY MARKED, OR MARKED WITH SYMBOLS THAT ARE NOT RECOGNIZABLE PER CRITICAL INSPECTION REQUIREMENTS OF PART I, CHAPTER 5, PARAGRAPH 5.4.3.b(2) OF THIS VOLUME AND FOR WHICH THE CRAFTSMAN HAS ANNOTATED “STUDS NOT REMOVED”. MARK STUDS THAT ARE IDENTIFIED AS HAVING THE CORRECT MATERIAL

(I.E., .K. OR KM). IF THE STUDS CANNOT BE MARKED DUE TO SIZE/CONFIGURATION, ETC., ENTER THE RESULTS OF THE GENERIC MATERIAL IDENTIFICATION TEST IN THE REMARKS BLOCK.

Planner enter "NA" if not an HI joint or if no existing pressure boundary male fasteners are to be reused.

STUD ROTATION: Planner enter an X in the NA box of the Stud Rotation block when not applicable (e.g., when joint does not contain studs).

Craftsman record SAT after verifying all set studs to be tight during nut installation and torquing in accordance with Part I, Chapter 5, paragraph 5.4.7 of this volume.

- a. Anaerobic Stud Bonding Inspection - Newly Installed Studs. The following test procedures shall be performed to ensure proper bonding after curing has been completed:
 - (1) Mark the end of the studs using a felt tip marker, paint pen or other appropriate marking pen by making a line in the direction of the center of the bolt circle.
 - (2) All newly installed studs shall be tested using one of the following methods. Either method may be used unless otherwise specified. Both methods utilize the same lubricant as required for final assembly of the joint. Studs shall not be restrained from turning during the test by any method other than the locking compound in the set end of the stud.
 - (3) Torque Method. Apply the minimum breakaway torque on each newly installed stud per TABLE 2. Double nuts or a stud extractor (Colette) shall be used to apply the required torque. Acceptance criteria is per paragraph b.
 - (4) Self Locking Nut Method. Apply torque to each newly installed stud by installing and removing an unused self-locking nut per NASM 25027 or commercial spec IFI-100/107 with plastic elements. Install the nut to a point of stud thread protrusion that is at least 3 threads beyond the self-locking insert. Acceptance criteria is per paragraph b.
- b. The assembly is considered acceptable if there is no turning of the stud during the Breakaway Torque or Self-Locking Nut check. The assembly may also be considered acceptable if a slight initial turning motion (up to 1/4 turn) of the stud is observed, and no further turning motion is observed during torquing or nut installation/removal. (A small turning of the set stud represents a breaking or powdering of the locking compound which actually increases resistance to further turning motion.) Report any failures to Engineering.
- c. In some cases, work authorizing TWDs may specify that studs set with an anaerobic locking compound in submarine hull integrity applications be subjected to an ultraviolet light inspection. Engineering requests for this test will be based on accessibility and ability to view the stud hole. When ultraviolet light inspection is specified, properly installed anaerobic compounds should appear as a red dye and should fully encircle the stud. This is considered to be an extra line of defense above and beyond performance proof testing of paragraphs a.(1) through b. above. Under no circumstances should ultraviolet light inspection be used as a substitute for performance proof testing.
- d. In-Service Anaerobic Stud Rotation. Rotation of in-service Class 3 studs with anaerobic locking compound on subsequent tightening to the required torque is permissible, as long as the following check is performed:
 - (1) If the stud does rotate up to 1/4 turn during in-service nut tightening, then back off the nut 1/4 turn before continuing to torque it.
 - (2) If the stud does not rotate while backing off the nut or when torquing the nut afterwards, the stud is acceptable as long as the stud does not violate the stand-off requirement for that application. In this case, the stud rotation represents further breaking or powdering of the locking compound which increases resistance to any further turning motion.
 - (3) If the stud rotates while backing off the nut, rotates when torquing the nut afterwards or violates the stand-off requirement for that application, the stud must be removed and replaced. In this case, the stud rotation represents locking compound failure.

NOTE: IF ANY STUD ROTATION CAUSES THE STUD STAND-OFF TO VIOLATE THE STAND-OFF REQUIREMENTS FOR THAT APPLICATION, THEN THE STUD MUST BE REMOVED. THE STUD MAY BE CLEANED AND REINSTALLED IF IN ACCEPTABLE CONDITION OR REPLACED BY A NEW STUD.

TABLE 2 - Resistance Test Breakaway Torque Values for Anaerobic Locking Compounds

| STUD SIZE | MIN TORQUE (FT-LBS.) | STUD SIZE | MIN TORQUE (FT-LBS.) | STUD SIZE | MIN TORQUE (FT-LBS.) |
|-----------|----------------------|-----------|----------------------|-----------|----------------------|
| 1/4 | 2.5 | 5/8 | 25 | 1-3/8 | 100 |
| 5/16 | 5 | 3/4 | 33 | 1-1/2 | 115 |
| 3/8 | 6.7 | 7/8 | 50 | 1 3/4-5 | 150 |
| 7/16 | 8.3 | 1 | 67 | 1 3/4-8 | 160 |
| 1/2 | 12.5 | 1-1/8 | 75 | 2 | 180 |
| 9/16 | 17 | 1-1/4 | 83 | 2-1/4 | 215 |

FASTENER SIZE/TYPE: Planner enter the type, size and thread of the male fastener (e.g., 1-1/4"-7 Stud, 9/16"-18 SHCS, 3/4"-10 bolt, etc.).

REQUIRED TORQUE AND TOLERANCE: Planner enter the torque and tolerance required for the component or fastener. Mark the appropriate block (in-lbs or ft-lbs). When special tightening/assembly instructions apply in lieu of torque, enter tightening/assembly instructions and reference document/drawing; use Remarks if additional space is required.

TORQUE REF: Planner enter the letter of the reference listed in Block 6 that identifies where the torque value was obtained, including paragraph or table when applicable.

AVERAGE RUNNING TORQUE: Craftsman enter the average running torque as measured. Mark the appropriate block (in-lbs or ft-lbs).

(Planning/Craftsman) Enter "N/A" in the block when self-locking fasteners are not being used.

NOTE: RUNNING TORQUE DOES NOT NEED TO BE TAKEN INTO ACCOUNT FOR FASTENERS GREATER THAN 5/8 INCH DIAMETER UNLESS SPECIFIED IN THE TWD. THE INTENT IS TO ENSURE PROPER TORQUE IS APPLIED, TAKING RUNNING TORQUE INTO CONSIDERATION WHEN IT IS A SIGNIFICANT FACTOR WITH REGARD TO THE FINAL TORQUE. IF RUNNING TORQUE DOCUMENTATION IS NOT REQUIRED BY THE TWD FOR FASTENERS GREATER THAN 5/8", PLANNING SHOULD ANNOTATE THE BLOCK "NR" FOR NOT REQUIRED.

NOTE: CLICKER STYLE TORQUE WRENCHES AND HYTORC DEVICES ARE NOT TO BE USED TO MEASURE RUNNING TORQUE.

NOTE: THE AVERAGE RUNNING TORQUE MAY BE OBTAINED BY USING THE SAME DIAL TYPE TORQUE WRENCH THAT WILL BE USED FOR MEASURING THE FINAL TORQUE. A LOW RANGE DEVICE IS NOT REQUIRED AND RUNNING TORQUE DOES NOT HAVE TO FALL WITHIN THE 20% TO 90% SCALE REQUIREMENT. IF RUNNING TORQUE IS NOT MEASURABLE USING THIS DEVICE, ENTER "0" (ZERO) FOR THE AVERAGE RUNNING TORQUE.

NOTE: DOCUMENTATION OF THE TORQUE WRENCH USED FOR DETERMINING THE AVERAGE RUNNING TORQUE IS NOT REQUIRED. IF A DIFFERENT WRENCH IS USED TO TAKE THE RUNNING TORQUE BECAUSE THE FINAL TORQUE IS MEASURED WITH A CLICKER STYLE OR HYTORC DEVICE, THEN THE TORQUE WRENCH DATA MUST BE RECORDED.

FINAL TORQUE: Craftsman record the final torque observed on the torque device. The final torque observed shall be the average running torque, as required, plus the required torque. Mark the appropriate block (in.-lbs or ft-lbs). Request QAI to verify final torque by

direct observation for all Controlled Assemblies and hull integrity pressure boundary joints which contain Hull Integrity fasteners (as required in Table 3). In the event that a multiplier or HYTORC machine is used, place an asterisk or other symbol in this block and refer to the remarks block. In the remarks block add a statement such as “Torque multiplier was used, actual torque reading was XXX PSI. This converts to a torque value of XXX Ft-lbs.” When a combination of torquing methods (e.g., torque wrench, turn-of-the-nut method, etc.) is used for a single joint, record the final torque applied, and document the alternate torquing process. Record the quantity of fasteners that were tightened using the alternate method. When special tightening/assembly instructions apply in lieu of torque, as identified in the required torque block, document the actual special tightening/assembly applied to the joint (tightened, wrench tight, cap installed, etc.).

**TORQUE DEVICE/
INSTRUMENT USED:** Craftsman enter the range, serial number and calibration due date of the torque device used during assembly for the final increment. For HYTORC machine, enter “HYTORC”, the HYTORC’s head data (i.e., serial number), serial number of the pressure gauge used to read actual pressure applied for final torque and the calibration due date of that pressure gauge. If other calibrated instruments (e.g., torque multiplier, torque meter) are used, also enter data for these instruments.

CRAFTSMAN SIGNATURE/BADGE: Craftsman sign and date after satisfactory assembly of the joint.

QAI SIGNATURE/BADGE: When required, QAI shall sign and date after the satisfactory completion of assembly in accordance with the requirements. Planner enter NA when QAI is not required.

| Table 3 - QAI Inspection Requirements | | | | |
|---|-----------------------|---|-----------------------------------|-----------------------------|
| Location | Software Installation | Material Installations | Torque | Sealing Surface & Fasteners |
| Nuclear Level I piping system mechanical joints | Note 1 | Yes - Existing and New LI | Yes (when a torque is specified) | No |
| Controlled Assemblies | Yes | Yes - New LI Only | Yes | Yes |
| SUBSAFE Hull Integrity Joints | Yes | Yes - New LI Only | Yes | Yes |
| SUBSAFE Bolted Pressure Boundary Joints | No | Yes - New LI Only | No | No |
| EHF Installations | Yes | Yes - New LI Only | Yes | Yes |
| SOC Bolted Pressure Boundary Joints | Yes | Yes - New LI Yes - MCD-A Yes - MCD-B Yes - MCD-C | Yes | Yes |
| SOC Unions | Yes | Yes - New LI Yes - MCD-A Yes - MCD-B Yes - MCD-C | Yes (When source is specified) | Yes |

NOTE 1: YES - IF A FLEXATALLIC GASKET IS USED AND THE MATING SURFACES ARE NOT IN CONTACT. THE QAI IS NOT REQUIRED TO WITNESS INSTALLATION OF THE GASKET BUT MUST INSPECT THE MATING SURFACE GAP AND PARALLELISM AFTER SOFTWARE INSTALLATION AND FINAL TORQUE.

FOR JOINTS: CRAFTSMAN/QAI signature(s) certifies that the joint meets the requirements for the following:

- a. The applied lubricant is acceptable per the technical direction.

- b. All existing Hull Integrity Male Fasteners have been examined for markings of significance or have been verified by a generic material identification test to insure they are of proper material. All markings have been recorded and if required, the results of any material identification testing are recorded in the Remarks block.
- c. All set studs have been verified to be tight during assembly in accordance with Part I, Chapter 5, paragraph 5.4.7 of this volume.
- d. The final required pre-load torque has been applied in accordance with specified requirements.
- e. Sealing surfaces meet the acceptance criteria of the applicable Maintenance Standard.
- f. Alignment, gap and parallelism meet the specified requirements for the joint.
- g. Male fasteners type and size agree with entries in the "FASTENER SIZE/TYPE" block and the specified criteria.
- h. Existing fasteners are reinstalled in the same joint and are not obviously incorrect based on markings, color, corrosion or other visual indication.
- i. Thread protrusion is satisfactory. Thread protrusion is the number of threads protruding above the nut. Minimum thread protrusion is one thread on non-self-locking fasteners or flush for self-locking fasteners. Maximum thread protrusion is ten threads unless authorized by drawing or technical manual.
- j. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.
- k. The Craftsman will perform a visual check of new Level I material at the time of installation to verify the material meets the requirements of the TWD used to install the new material.

FOR OTHER THAN JOINTS: CRAFTSMAN/QAI signature(s) indicates compliance with the attribute(s) listed and the corresponding listed acceptance criteria. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.

If UNSAT, the craftsman/QAI will initiate action to resolve the UNSAT condition (e.g., submit a DF) and indicate the action taken in the Remarks block. Do not sign unless a satisfactory repair is completed or the UNSAT condition is accepted.

BLOCK 10 - LOCKWIRE/LOCKING CABLE/DEVICE INSTALLED OR REQD ACTION

(Only required for SUBSAFE/DSS SOC joints)

NOTE: THIS BLOCK APPLIES TO LOCKING DEVICES THAT ARE INSTALLED AFTER JOINT MAKE-UP OR FOR CASES WHEN AN ACTION MUST BE TAKEN AFTER JOINT MAKE-UP TO ENGAGE THE LOCKING DEVICE (E.G., FLIPPING OF A LOCKTAB, STAKING A FASTENER, ETC.) TO ALLOW JOINT MAKE-UP AND TESTING PRIOR TO INSTALLING OR ENGAGING THE LOCKING DEVICE. THIS DOES NOT INCLUDE SELF LOCKING NUTS, SELF LOCKING BOLTS/CAP SCREWS, LOCKWASHERS, ETC. THAT ARE PART OF THE JOINT MAKE-UP AND ARE LISTED IN BLOCK 7.

Planner enter an X in the NA box when not applicable. When an action is required to engage the locking device, enter a description of the required action.

Craftsman sign, date and check SAT when lockwire, locking cable or required locking device (e.g., locking ring for EHF, barrel nut locking device, etc.) has been properly installed, or the required action has been accomplished. Enter description (e.g., lockwire, locking cable, locktab) and ident (e.g., stock number, MIL-SPEC, or piece number) of the lockwire/locking cable/locking device. Enter description and "Existing" for existing locking devices. If more than one locking device type (e.g., lockwire and locktab washers) exists on the assembly, record additional information in the Remarks block. When the installation of more than one of

the same type of locking device is being documented in Block 10 (e.g., 2 setscrews), record the quantity in addition to the description (Block 11 may be used if additional space is needed). Recording the quantity is not required for lockwire/locking cable, nor when the locking device quantity is documented in Block 7.

BLOCK 11 - **REMARKS**

(Craftsman/QAI/QAS/Planning) Enter any pertinent remarks or additional information related to the repair/assembly of the component. Each entry shall contain signature, badge number and date except where the entry is pre-printed on the form by Planning.

BLOCK 12 - **LWC SUPERVISOR/SHOP SUPERVISOR SIGNATURE/BADGE NO.**

LWC Supervisor will enter signature, date and badge number for final review, signifying the accuracy of the completed form. If any entry is UNSAT, initiate action to resolve the unsat condition and indicate the action taken in the "Remarks" block. Do not sign unless a satisfactory repair is completed or the UNSAT condition is accepted.

BLOCK 13 - **QAS/QAO SIGNATURE/BADGE NO.**

QAS/QAO sign, date and enter badge number for final review, signifying entries are complete and that the data agrees with the listed requirements.

BLOCK 14 - **JOINT DATA FOR JOINTS NOT REQUIRING TORQUE DOCUMENTATION**

NOTE: THIS BLOCK MAY BE USED FOR SPECIFIC ATTRIBUTES THAT ARE NOT COVERED BY THE STANDARD ATTRIBUTES ON THE FORM.

JOINT ID/JOINT TYPE OR ATTRIBUTE DESCRIPTION: Planner enter the joint identification number including joint type (e.g., ASW-5744 F). For joint types, use "F" for flanged bolted joints, "U" for union joints, and "S" for screw joints. When a joint identification number is not available, a joint description (e.g., Bonnet-to-Body (S)) shall be used. Locally assigned joint numbers may be used when a joint description is not practicable and clarity is required. When additional attribute(s) applies to a component (e.g., hatches, etc.) that are not covered by the attributes already on the form, list the attribute and location (applicable reference) for the acceptance criteria (e.g., TWD, technical manual, etc.). For hatches, at a minimum list the "Seat Clearance Measurement".

JT. REF: Planner enter the corresponding reference listed in Block 6 that identifies where the joint number or description information is found (e.g., Mapping Diagram, Drawing, Tech Manual, Work Procedure, etc.).

(C) FOR CRAFTSMAN OR (I) FOR INSPECTOR: Planner enter "C" on one line for each joint or attribute. Enter "I" on the remaining line for each joint or attribute that requires an inspector signature; leave blank if inspector signature is not required.

CRAFTSMAN SIGNATURE/BADGE/DATE: Craftsman sign and enter badge number and date on the line associated with the "C" after satisfactory assembly of the joint. If UNSAT, the craftsman will initiate action to resolve the UNSAT condition and indicate the action taken in the Remarks block. Do not sign unless a satisfactory repair is completed or the UNSAT condition is accepted.

FOR JOINTS: This signature provides certification that the joint meets the requirements for the following:

- a. All driven studs have been verified to be tight during assembly. Stud rotation during torquing (and break away) is limited to 1/4 turn, but no more turning during installation or removal of the nut for newly installed Class 3 studs installed with locking compound.
- b. The joint has been tightened using an approved method. Recording of torque value is not required.
- c. Sealing surfaces meet the acceptance criteria of the applicable Maintenance Standard.
- d. Alignment, gap and parallelism meet the specified requirements for the joint.
- e. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.

- f. The Craftsman will perform a visual check of new Level I material at the time of installation to verify the material meets the requirements of the TWD used to install the new material.

FOR OTHER THAN JOINTS: This signature indicates compliance with the attribute(s) listed and the corresponding listed acceptance criteria. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.

INSPECTOR SIGNATURE/BADGE/DATE: (Inspector) When required, Inspector sign and enter badge number and date on the line associated with the "(I)" for verification that all new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.

NOTE: IF THE CRAFTSMAN INSTALLING THE MATERIAL IS OTHER THAN THE CRAFTSMAN SIGNING FOR JOINT DATA IN BLOCK 8, A CORRESPONDING SIGNATURE, BADGE NUMBER AND DATE SHALL BE ENTERED IN THE REMARKS BLOCK.

| TABLE 1- DOCUMENTATION REQUIREMENTS | |
|--|--|
| Material Control Level | Required Information |
| Level I Material Other Than Fasteners | MIC Number and any other traceability number, including any local traceability number (e.g., PNSY MLN – examples Z142, AB12). |
| Level I Fasteners | NOTE: THE INFORMATION ENTERED FOR FASTENERS MAY NEED TO INCLUDE INFORMATION FROM BLOCKS 3 AND 8 FROM QA FORM 1. DO NOT ENTER THE PNSY TRACE NUMBER FROM BLOCK 3 OF THE QA FORM 1. Document the markings from the fastener to include either: (1) The color code and the heat/lot number, material type, and manufacturer's symbol (for nuts containing a self-locking insert, the color of the insert is the manufacturer's symbol). (2) The MIC number (when MIC number is on the fastener or on the individual tag for some fasteners). |
| Controlled Structural Material | Traceability Number |
| AERP And Other Rotatable Pool Material (688 Class, TRIPER, Etc.) | Enter the appropriate rotatable pool serial number (e.g. RP-148A, 4810-013-5812-A3-0113, TIN -292-11893, etc.) |
| Transferred And Cannibalized Material | Enter the Equipment Removal List No. or other material History/Traceability number (ERL# XXXX, SSBN-600 EHF #24, etc.) |
| Other Material Within The LEVEL I/SUBSAFE Boundary | 1. Enter at least one of the following documentation attributes: a. Stock Number (from package/container) b. Part Number (from package/piece) c. Part Number and associated Manufacturing Work Procedure (for manufactured items) d. Local Traceability Number (from piece/tag) e. Drawing and Piece Number (from piece/tag) f. Generic, MIL-SPEC, or Material Specification Marking (from piece) g. NDT record numbers or test results for items verified by generic material testing. |

BLOCK 8 - JOINT DATA

NOTES:

- (1) THIS BLOCK MAY BE USED FOR SPECIFIC ATTRIBUTES THAT ARE NOT COVERED BY THE STANDARD ATTRIBUTES ON THE FORM.
- (2) FOR OVERHAUL OF HYDRAULIC ACTUATORS AND HYDRAULIC CONTROL VALVE ASSEMBLIES, ONLY ONE ENTRY IS REQUIRED FOR THE ENTIRE ASSEMBLY IN LIEU OF LISTING INDIVIDUAL JOINTS AS LONG AS A CLEAR DEFINITION OF WORK BOUNDARIES HAS BEEN IDENTIFIED IN THE WORK PROCEDURE. FOR THESE CASES, LIST "ACTUATOR ASSEMBLY" OR "CONTROL VALVE ASSEMBLY" IN THIS BLOCK.

JOINT ID & JOINT TYPE OR ATTRIBUTE DESCRIPTION: Planner - Enter the joint identification number including joint type (e.g., ASW-5744 F). For joint types, use "F" for flanged bolted joints, "U" for union joints, and "S" for screw joints. When a joint identification number is not available, a joint description (e.g., Bonnet-to-Body (S)) shall be used. Locally assigned joint numbers may be used when a joint description is not practicable and clarity is required. When an additional attribute(s) applies to a component (e.g., hatches, etc.) that are not covered by the attributes already on the form, list the attribute and location (applicable reference) for the acceptance criteria, (e.g., TWD, technical manual, etc.). For hatches, at a minimum list the "Seat Clearance Measurement".

JT. REF: Planner - Enter the corresponding reference listed in Block 6 that identifies where the joint number or description information is found (e.g., Mapping Diagram, Drawing, Tech Manual, Work Procedure, etc.).

(C) FOR CRAFTSMAN OR (I) FOR INSPECTOR: Planner - Enter "C" on one line for each joint. Enter "I" on the remaining line for each joint requiring an inspector signature.

CRAFTSMAN SIGNATURE/BADGE/DATE: Craftsman sign and enter badge number and date on the line associated with the "C" after satisfactory assembly of the joint.

For joints, this signature provides certification that the joint meets the requirements for the following:

- a. All set studs to be tight during nut installation and torquing in accordance with Part I, Chapter 5, paragraph 5.4.7 of this volume.
- b. The joint has been tightened using an approved method. Recording of torque value is not required.
- c. Sealing surfaces meet the acceptance criteria of the applicable Maintenance Standard or drawing.
- d. Alignment, Gap and Parallelism meet the specified requirements for the joint.
- e. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing material associated with the joint is acceptable and is correctly installed.

For other than joints, the signature indicates compliance with the attribute(s) listed and the corresponding listed acceptance criteria. All new material associated with the joint meets specified requirements and is listed in Block 7. Existing fasteners are installed in the same joint and are not obviously incorrect based on markings, color, corrosion or other visual inspection.

INSPECTOR SIGNATURE/BADGE/DATE: (QAI) When required, Inspector sign, print and enter badge number and date on the line associated with the "(I)" for verification of the following:

- a. Controlled assemblies: All controlled assemblies shall be documented on a QA Form 34.
- b. Non-Controlled assemblies: Inspector signature is for new Level I material only and meets the specified requirements and is properly documented in Block 7.
- c. Nuclear Level I Non-Controlled assemblies: Inspector signature is for new Level I material, gasket compression and parallelism. (Gap measurement is only required when mating surfaces are not in contact).

If UNSAT, the craftsman/QAI will initiate action to resolve the UNSAT condition (e.g., initiate a DFS) and indicate the action taken in the Remarks block. Do not sign unless a satisfactory repair is completed or the UNSAT condition is accepted.

BLOCK 9 - LOCKING DEVICE INSTALLED OR REQD ACTION

NOTE: THIS BLOCK APPLIES TO LOCKING DEVICES ON SUBSAFE COMPONENTS THAT ARE INSTALLED AFTER JOINT MAKE-UP OR FOR CASES WHEN AN ACTION MUST BE TAKEN AFTER JOINT MAKE-UP TO ENGAGE THE LOCKING DEVICE (E.G., FLIPPING OF A LOCKTAB, STAKING A FASTENER, ETC.) TO ALLOW JOINT MAKE-UP AND TESTING PRIOR TO INSTALLING OR ENGAGING THE LOCKING DEVICE. THIS DOES NOT INCLUDE SELF LOCKING NUTS, SELF LOCKING BOLTS/CAP SCREWS, LOCKWASHERS, ETC. THAT ARE PART OF THE JOINT MAKE-UP, AND ARE LISTED IN BLOCK 7.

Planner - Mark the NA box when not applicable. When an action is required to engage the locking device, enter a description of the required action.

(CRAFTSMAN) Enter the Block 8 joint identifier (e.g., 8A) in the JT ID block, check the "SAT" box and sign, enter badge number and date when lockwire or required locking device (e.g., locking ring for EHF's, barrel nut locking device, etc.) has been properly installed, or the required action has been accomplished. Enter description (e.g., lockwire, locktab) and identification (e.g., stock number, MIL-SPEC or piece number) of the lockwire/locking device. Enter description and "Existing" for existing locking devices. If more than one locking device type (e.g., lockwire and locktab washers) exists on the assembly, record additional information in the REMARKS block. When the installation of more than one of the same type of locking device is being documented in Block 9 (e.g., 2 setscrews), record the quantity in addition to the description (Block 10 may be used if additional space is needed). Recording the quantity is not required for lockwire/locking cable, nor when the locking device quantity is documented in Block 7.

BLOCK 10 - REMARKS

(CRAFTSMAN/QAI/QAS) Enter any pertinent remarks or additional information related to the repair/assembly of the component. Each entry shall contain signature and date except where the entry is pre-printed on the form by Planning.

- D5 An item that supports the Deep Submergence Program and is considered Scope of Certification MCD “A” material. Each item has undergone receipt inspection to insure it meets the requirements of the applicable specification and /or drawing and is certified for use in DSS-SOC applications. Items shall be permanently marked or tagged with a unique number traceable to the OOE. Material coded with D5 SMIC requires receipt inspection and segregated storage.
- D6 An item that requires special cleaning and packaging for oxygen/nitrogen service (MIL-STD-1330/MIL-STD-1622 critical clean) and is considered Deep Submergence Program Scope of Certification MCD “A” material. Each item has undergone receipt inspection to insure it meets the requirements of the applicable specification and/or drawing and is certified for use in DSS-SOC applications. Items shall be permanently marked or tagged with a unique number traceable to the OOE. Material coded with D6 SMIC requires receipt inspection and segregated storage.
- D7 An item that supports the Deep Submergence Program and is considered Scope of Certification, MCD “C” material. Each item has undergone receipt inspection to insure it meets the requirements of the applicable specification and/or drawing and is certified for use in DSS-SOC applications. Items shall have serialization markings identified on a securely attached RFI tag.
- D8 An item that requires special cleaning and packaging for oxygen/nitrogen service (MIL-STD-1330/MIL-STD-1622 critical clean) and is considered Deep Submergence Program Scope of Certification MCD “C” material. Each item has undergone receipt inspection to insure it meets the requirements of the applicable specification and/or drawing and is certified for use in DSS-SOC applications. Items shall have serialization markings identified on a securely attached RFI tag.

| | |
|--------------------------------|---|
| Surveys | Initial and sustaining surveys verify the adequacy of the DSS for manned use to the limits for which certification is being requested or was issued. This is accomplished by examining Objective Quality Evidence, reviewing processes and procedures and inspecting equipment to validate compliance with approved procedural, design, fabrication, test and maintenance requirements. |
| Suspension of Certification | A prohibition on manned operation of the DSS until the cause of the prohibition has been resolved. |
| Sustaining Activity | The recipient of the Letter of Certification. The Sustaining Activity maintains and operates the DSS in the as certified condition per the Letter of Certification required by the appropriate NAVSEA technical specification or manual. |
| Sustaining Certification | To sustain certification, the DSS must be operated and maintained in the as certified condition in accordance with the Letter of Certification. |
| System Certification Authority | The code within NAVSEA assigned the responsibility for the manned DSS process by Naval Operations. The SCA has final authority and responsibility for granting certification for DSSs covered by this manual. The SCA resides with the Deputy Commander for Submarines (NAVSEA 07). The working responsibility for certification is vested in NAVSEA 07Q. |

Technical Assistance Review An overall or specific area review of certification related documentation, processes or practices conducted at the request of the Program Manager to provide SCA guidance in support of the assigned DSS or facility certification.

Technical Data Recorded information (regardless of the form or method of recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. The term includes recorded information of a scientific or technical nature that is included in computer databases. For these purposes, technical data includes the characteristic of a particular science, trade or profession.

Type Commander For Submarines and Submarine TYCOM DSS assets it is Commander Submarine Force Atlantic and Commander Submarine Force Pacific. For DDS units it is Commander, Naval Special Warfare Command. When the DSS unit is attached to the host ship the TYCOM shall be as identified in the Memorandum of Agreement.

User Activity The activity that provides and exercises operational control for the DSS. In some instances the User Activity and the Sustaining Activity will be the same.

Work

- a. Any action that actually or potentially changes (including disassembly for the purposes of inspection or repair) the approved configuration of any part, component or ship's system.
- b. Any action that removes or affects the ship's ability to operate ship's systems or components in accordance with ship's systems/operating manuals or reactor plant manuals.
- c. Any testing or inspections required to establish, maintain or reestablish certification.
- d. Any design, engineering, planning or configuration management functions that involve the final review and/or approval of technical information.

Examples of work include the following:

1. Action which disassembles or removes any part, component or ship's system.
2. Action specified in a Technical Work Document.
3. Any action that removes or affects the ship's ability to operate ship's systems or components in accordance with ship's systems manuals, operating manuals or reactor plant manuals, excluding tagout in accordance with the Tagout Users Manual, including but not limited to:
 - (a) Component or system tests.
 - (b) Intrusive inspections (such as breaking the plane of electrical panels requiring electrical safety).
 - (c) Valve line ups that alter the normal system line up not governed by operating procedures.

Work (Cont'd)

- (d) Removing valve hand wheels, disconnecting of reach rods.

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QA FORM 26A INSTRUCTIONSHYDROSTATIC/PNEUMATIC TEST RECORD

PURPOSE: To document hydrostatic/pneumatic tests accomplished on Scope of Certification piping systems or portions of a system to recertify the system after maintenance. It also provides a method for the Fleet Maintenance Activity to specify the required retests for work they performed. This form should be utilized to document mechanical joint tightness testing utilizing both an external pressure source and internal system pressure.

PROCEDURE: The numbered blocks on QA form 26A correspond with the instructions listed below. Any block not used will be marked NA. The planning organization shall fill in blocks identified by a ♦ prior to issuing the Controlled Work Package (CWP).

BLOCK 1 - DSS Platform/Hull Number

Enter the Deep Submergence System (DSS) or ship's name and hull number.

BLOCK 2 - JCN

Enter the Joint Control Number (JCN).

BLOCK 3 - LWC

Enter the shop number of the Lead Work Center (LWC).

BLOCK 4 - CWP SER. NO.

Enter the CWP serial number.

BLOCK 5 - SYSTEM/COMPONENT

Enter the name of the system and component to be tested.

BLOCK 6 - TEST REFERENCES

Enter the applicable test reference and/or other applicable references (e.g., drawing number and revision used to obtain the required test pressure and conducting of the test).

NOTE: ENTER "S9505-AF-MMA-010/PIPING SYSTEMS" WHICH PROVIDES REQUIREMENTS FOR SHIP'S FORCE TO SET-UP AND CONDUCT TESTING.

BLOCK 7 - REQUIRED TEST AND INSPECTION POINTS

Enter the specific test requirements necessary to recertify the work. Specify test requirements (i.e., type of test, special valve position, duration, acceptance criteria, joints to be tested (if entire component/system is tested, so state)).

BLOCK 8 - DIAGRAM OF TEST AREA

Enter a diagram of the test area. Be specific. Include such things as relief valve locations, gage locations, blanks, gags, and valve positions, etc. The Quality Assurance Inspector (QAI) will verify the diagram prior to performance of the test.

NOTE: ALL VALVES WITHIN THE TEST BOUNDARIES MUST BE IDENTIFIED AND THEIR POSITION (OPEN/SHUT) DURING THE TEST ANNOTATED.

NOTE: IF DRAWINGS OR ADDITIONAL INFORMATION IS REQUIRED TO SUPPLEMENT THIS REPORT, EACH DRAWING, ETC., WILL BE NUMBERED AND AUTHENTICATED WITH THE SIGNATURE BY THE CRAFTSMAN AND QAI MAKING UP THE REPORT.

NOTE: LOCAL EXCEPTIONS TO GAGE RANGE AND OR INCREMENTS WILL BE APPROVED BY AN INDIVIDUAL WITH A TECHNICAL WARRANT.

NOTE: SHIPS, FLEET MAINTENANCE ACTIVITIES AND REGIONAL MAINTENANCE CENTERS MANAGED BY UNITED STATES FLEET FORCES COMMAND OR TYCOMS SHALL DISREGARD THE BLOCK 8 DIAMOND WHEN TESTING IS PERFORMED BY AN ACTIVITY OTHER THAN THE ACTIVITY PERFORMING REPAIR. THE ACTIVITY PERFORMING THE TESTING SHALL COMPLETE THE DIAGRAM REQUIRED BY BLOCK 8.

BLOCK 9 - GAGE DATA

Enter the Primary and backup gage data. Backup gage data is not required when performing an operational test as defined in Part I, Chapter 7 of this volume when a second system gage is not available.

BLOCK 10 - REQUIRED TEST FLUID

Enter the required test fluid.

BLOCK 11 - REQ'D TEST PRESSURE (PSIG)

Enter the required test pressure. If listing the value would classify the CWP then the symbols "J" or "H" with the applicable reference may be used instead of classifying the document.

BLOCK 12 - ACTUAL TEST PRESSURE (PSIG)

Enter the actual test pressure. If listing the value would classify the CWP then the symbols "J" or "H" with the applicable reference may be used instead of classifying the document.

BLOCK 13 - REQUIRED TEST DURATION

Enter the required test duration including units.

BLOCK 14 - ACTUAL TEST DURATION

Enter the actual test duration including units.

BLOCK 15 - ALLOWABLE LEAKAGE

Enter the allowable leakage including units for the leakage.

BLOCK 16 - MEASURED LEAKAGE

Enter the actual measured leakage including units for the leakage.

BLOCK 17 - INSPECTION RESULTS

- a. Check "SAT" block, if all inspections specified by Block 7 are complete and satisfactory.
- b. Check "UNSAT" block, if test results are unsatisfactory. Identify the specific inspection and reason for failure in the remarks section.

NOTE: IF A SATISFACTORY TEST CANNOT BE ACHIEVED, A DEPARTURE FROM SPECIFICATION MUST BE PROCESSED IN ACCORDANCE WITH PART 1, CHAPTER 8 OF THIS VOLUME OR THE TASK MUST BE REWORKED AND RETESTED.

BLOCK 18 - OUT-OF-ROUNDNESS MEASUREMENTS

Enter out-of-roundness measurements for external hydrostatic tests of pipes only.

BLOCK 19 - REMARKS

Remarks pertinent to this test will be entered in this block.

BLOCK 20 - CERTIFICATION

PERFORMED BY

Person performing the test print name, enter signature and date signifying accuracy of data recorded.

INSPECTED BY

QAI print name, enter signature and date verifying the accuracy of test results recorded and inspection performed satisfactory.

QA FORM 27A INSTRUCTIONSDROP TEST RECORD

PURPOSE: To document drop tests accomplished on Scope of Certification piping systems or portions of a system to recertify the system after maintenance actions have been accomplished.

PROCEDURE: The numbered blocks on QA form 27A correspond with the instructions listed below. Any block not used will be marked NA. The planning organization shall fill in Blocks 1 through 7, 10, 11, 17 and 19 prior to issuing the CWP.

BLOCK 1 - DSS Platform/Hull Number

Enter the DSS or ship's name and hull number.

BLOCK 2 - JCN

Enter the JCN.

BLOCK 3 - LWC

Enter the shop number of the LWC.

BLOCK 4 - CWP SER. NO.

Enter the CWP serial number.

BLOCK 5 - SYSTEM/COMPONENT

Enter the name of the system and component to be tested.

BLOCK 6 - TEST REFERENCES

Enter the applicable test reference and/or other applicable references (e.g., drawing number and revision used to obtain the required test pressure and conducting of the test).

NOTE: ENTER "S9505-AF-MMA-010/PIPING SYSTEMS" WHICH PROVIDES REQUIREMENTS FOR SHIP'S FORCE TO SET-UP AND CONDUCT TESTING.

BLOCK 7 - REQUIRED TEST AND INSPECTION POINTS

Enter the specific test requirements necessary to recertify the work. Specify test requirements (i.e., type of test, special valve position, duration, acceptance criteria, and joints to be tested (if entire component/system is tested, so state)).

BLOCK 8 - DIAGRAM OF TEST AREA

Enter a diagram of the test area. Be specific. Include such things as relief valve locations, gage locations, blanks, gags, and valve positions, etc. The QAI will verify the diagram prior to performance of the test. For nuclear tests identify major components to be isolated or vented to preclude unnecessary pressurization.

NOTE: ALL VALVES WITHIN THE TEST BOUNDARIES MUST BE IDENTIFIED AND THEIR POSITION (OPEN/SHUT) DURING THE TEST ANNOTATED.

NOTE: IF DRAWINGS OR ADDITIONAL INFORMATION IS REQUIRED TO SUPPLEMENT THIS REPORT, EACH DRAWING, ETC., WILL BE NUMBERED AND AUTHENTICATED WITH THE SIGNATURE BY THE CRAFTSMAN AND QAI MAKING UP THE REPORT.

NOTE: LOCAL EXCEPTIONS TO GAGE RANGE AND OR INCREMENTS WILL BE APPROVED BY AN INDIVIDUAL WITH A TECHNICAL WARRANT.

NOTE: SHIPS, FLEET MAINTENANCE ACTIVITIES AND REGIONAL MAINTENANCE CENTERS MANAGED BY UNITED STATES FLEET FORCES COMMAND OR TYCOMS SHALL DISREGARD THE BLOCK 8 DIAMOND WHEN TESTING IS PERFORMED BY AN ACTIVITY OTHER THAN THE ACTIVITY PERFORMING REPAIR. THE ACTIVITY PERFORMING THE TESTING SHALL COMPLETE THE DIAGRAM REQUIRED BY BLOCK 8.

BLOCK 9 - GAGE DATA

Enter the Primary and backup gage data. Backup gage data is not required when performing an operational test as defined in Part I, Chapter 7 of this volume when a second system gage is not available.

BLOCK 10 - REQUIRED TEST FLUID

Enter the required test fluid.

BLOCK 11 - REQ'D TEST PRESSURE (PSIG)

Enter the required test pressure. If listing the value would classify the CWP then the symbols "J" or "H" with the applicable reference may be used instead of classifying the document.

BLOCK 12 - INITIAL TEST PRESSURE

Enter initial test pressure achieved at start of test.

BLOCK 13 - FINAL PRESSURE AT END OF TEST

Record final pressure reading when the required test time is completed.

BLOCK 14 - TEMPERATURE AT START OF TEST

Record temperature at start of the test with units.

BLOCK 15 - TEMPERATURE AT END OF TEST

Record temperature at the end of the test with units.

BLOCK 16 - CHANGE IN TEMPERATURE

Subtract temperature at the end of the test recorded in Block 15 from temperature at the start of the test recorded in Block 14.

BLOCK 17 - REQUIRED TEST DURATION

Enter the required test duration including units.

BLOCK 18 - ACTUAL TEST DURATION

Record actual duration of the test.

BLOCK 19 - ALLOWABLE PRESSURE DROP % IN MINUTES/HOURS

Enter the allowable pressure drop as a percentage of the test pressure in minutes or hours. Cross-out time measure not used.

BLOCK 20 - FINAL PRESSURE DROP CORRECTED FOR TEMPERATURE CHANGE

Record final pressure drop calculated with corrections for temperature change in the same units as Blocks 11 and 12.

BLOCK 21 - TEST RESULTS

- a. Check "SAT" block if all inspections specified by Block 7 are complete and satisfactory.
- b. Check "UNSAT" block, if test results are unsatisfactory. Identify the specific inspection and reason for failure in the remarks section.

NOTE: IF A SATISFACTORY TEST CANNOT BE ACHIEVED, A DEPARTURE FROM SPECIFICATION MUST BE PROCESSED IN ACCORDANCE WITH PART 1, CHAPTER 8, OF THIS VOLUME OR THE TASK MUST BE REWORKED AND RETESTED.

BLOCK 22 - REMARKS

Remarks pertinent to this test will be entered in this block.

BLOCK 23 - CERTIFICATION

PERFORMED BY

Person performing the test print name, enter signature and date signifying accuracy of data recorded.

INSPECTED BY

QAI print name, enter signature and date verifying the accuracy of test results recorded and inspection performed satisfactory.

BLOCK 24 - VALVE/SYSTEM LINEUP FOR PRESSURE TESTING

List all the valves within the test boundary and those valves that make up the test boundary. The required position for adequate testing of the component/system will be listed. Each valve will have the initials of the initial positioner, or in the event the valve is in the correct position and does not require positioning "NA" will be marked. Each valve will have 1st and 2nd checkers initials. Personnel involved with initial positioning, 1st and 2nd checking will print their names, sign, initial and date the required blocks at the bottom of the form.

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