



VSRA Annual WAF Training Student Workbook

Please check with your facility and the ship to see if they have any updates or additions to these forms

Submit questions and comments to:

VSRA OTraining Team:

OTraining@VirginiaShipRepair.org or 757-233-7034

Introduction

The forms in this supplemental handout are provided as a resource for students to use during the Annual WAF Training. It is not required that these forms be completed, nor submitted to successfully complete the course. However, we highly encourage students to use them for note taking during the session and use them as a guide in the field. Although VSRA makes a substantial effort to always supply companies and facilities with any course updates published, VSRA cannot control the version of the course that a facility may be using. Always check with your facility or ship to ensure these are the most current versions of the documentation. In addition, always check to ensure the training you are taking is the most updated version available. VSRA always keeps the most updated version available on-line. Replacement DVD copies for classroom training is available through the VSRA training department at OTraining@VirginiaShipRepair.org

FORMS CONTENTS:

WORK AUTHORIZATION PROCESS FLOW CHART

WORK AUTHORIZATION FORM (WAF)

TAG-OUT RECORD SHEET (FRONT AND BACK)

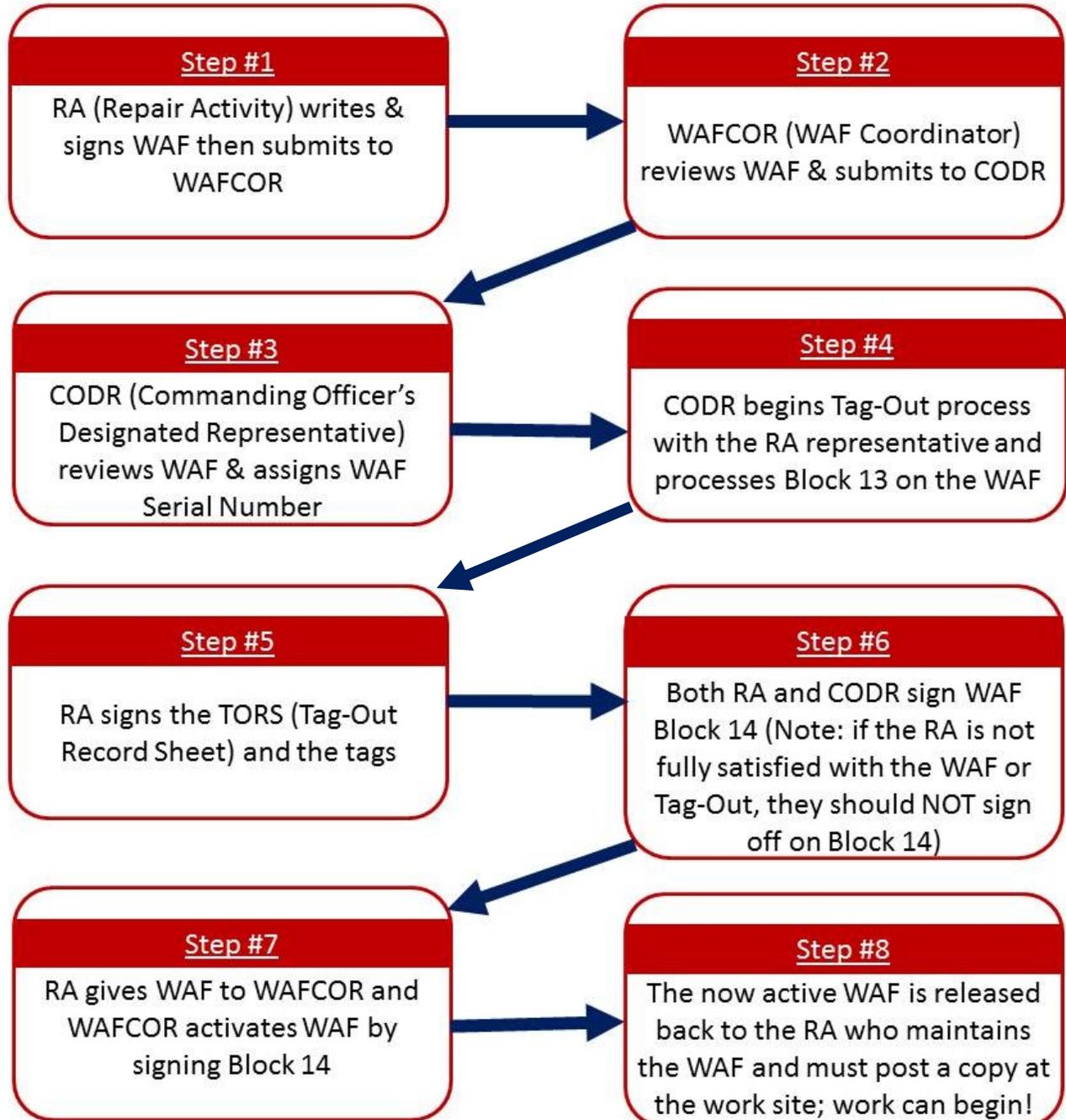
TECHNICAL WORK DOCUMENT RECORD SHEET (TWDRS)

STOP WAF FORM

JFMM VOLUME IV CHAPTER 10

STANDARD ITEM REFERENCES 009-106/009-24

The WAF Process



DANGER/CAUTION TAG-OUT RECORD SHEET

1. SYSTEM OR COMPONENT

2. LOG SERIAL NO.

3. AMPLIFYING INSTRUCTIONS (MANDATORY FOR CAUTION TAGS)

OPERATIONS/WORK ITEMS INCLUDED IN TAG-OUT

4. REASON FOR TAG-OUT AND APPLICABLE DOCUMENTATION (E.G, TWD, JSN, WAF, ETC.)	5. TAG NUMBERS USED	6. DATE/TIME ISSUED OR ADDED	7. PETTY OFFICER IN CHARGE (SIGNATURE)	9. AUTHORIZING OFFICER (SIGNATURE)	WORK COMPLETE	
			8. INDEPENDENT REVIEWER (SIGNATURE)	10. REPAIR ACTIVITY REP. (SIGNATURE) (WHEN REQD)	11. WORK CENTER REPRESENTATIVE	13. DATE

STOP WAF

1. STOP WAF SERIAL NUMBER	2. SHIP TYPE / NUMBER	3. SYSTEM ID	4. ASSOCIATED WAF SER.NO.
5. TASK GROUP INSTRUCTION NUMBER(S) (TGIs)			
6. DESCRIPTION OF WORK TO BE STOPPED			

AUTHORIZATION STOP WORK SECTION

7. ALL WORK DESCRIBED IN BLOCKS 5 AND/OR HAS BEEN STOPPED.

RA _____ DATE _____ TIME _____

PROJECT MGR. _____ DATE _____ TIME _____

WAFCOR _____ DATE _____ TIME _____

SHIP'S FORCE _____ DATE _____ TIME _____

AUTHORIZATION RELEASE STOP WORK SECTION

8. ALL WORK AS DESCRIBED IN BLOCKS 5 AND/OR HAS BEEN RELEASED FOR CONTINUATION OF WORK.

RA _____ DATE _____ TIME _____

PROJECT MGR. _____ DATE _____ TIME _____

WAFCOR _____ DATE _____ TIME _____

SHIP'S FORCE _____ DATE _____ TIME _____

STOP WAF

VOLUME IV
CHAPTER 10
WORK AUTHORIZATION AND CONTROL

REFERENCES.

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

LISTING OF APPENDICES.

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

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

10.2 **WORK AUTHORIZATION.** Work on ship's systems and components, as defined in Volume I, Chapter 1, Appendix D of this manual, must be properly authorized and controlled in order to ensure rigorous personnel and ship safety standards are met at all times. All outside activity work on ship's systems and components, regardless of who performs the work, requires formal authorization through a Work Authorization Form (WAF) for the specific work to be accomplished. This applies to all U.S. Naval ships in all types of maintenance availabilities, public and private. The Work Authorization System and preparation of the WAF are discussed below.

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

- a. Work requiring formal authorization may include Planned Maintenance System (PMS), troubleshooting, corrective maintenance (repair) or alterations. It may also include removal of system components for repairs.
- b. As many ship systems, such as hydraulics and high-pressure air, are operationally interrelated, caution must be exercised in planning work so that other systems are not unintentionally disabled when setting work boundaries for the system to be worked.

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

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

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

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

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

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

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

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

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

- a. The WAF (Appendix A) will be identified as "Sheet 1".
- b. Continuation sheets will be identified as "Sheet 1A, Sheet 1B", etc.

- c. Revision sheets will be identified as “Sheet 2, Sheet 3”, etc.

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

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

NOTE: ELECTRICAL SAFETY CHECKS (E.G., VOLTAGE CHECKS TO ENSURE CIRCUITS ARE DE-ENERGIZED) ARE PART OF THE WORK PROCESS, NOT PART OF THE TAGOUT PROCESS, AND THEREFORE SHOULD BE PERFORMED AFTER BLOCK 14 OF THE WAF IS SIGNED. VOLTAGE CHECKS PERFORMED PRIOR TO SIGNING BLOCK 14 OF THE WAF MUST BE APPROVED BY THE COMMANDING OFFICER AND PERFORMED IN ACCORDANCE WITH NAVSEA S9086-KC-STM-010/CH-300.

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

10.4.3 Transfer of Non-Nuclear Systems and Nuclear Instrumentation and Control Systems (Depot availabilities only). During depot availabilities, large amounts of work will be performed on ship’s systems. Formal work control practices in place by a shipyard enable Ship’s Force to transfer non-nuclear systems and Nuclear Instrumentation and Control systems to the shipyard. Transfer of systems is the process by which Ship’s Force transfers the authority to approve all actions within a system or portion of a system to a shipyard and subsequent return of systems back to Ship’s Force prior to major events. Systems, or portions of systems, are transferred with or without transferring the ability to operate ship’s equipment. By transferring a system or portion of a system to the shipyard,

the shipyard is responsible for authorizing all work, testing and equipment operation within the boundary transferred. Transfer of systems does not diminish a Commanding Officer's overall responsibility for the safety of personnel, equipment and the ship. Although other activities may perform work within the boundaries and Ship's Force normally retains responsibility for operating ship's equipment, all actions (i.e., work, testing, equipment operations, etc.) within the boundary must be approved by the shipyard.

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

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

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

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

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

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

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

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

10.4.7 Barrier Criteria.

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

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

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

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

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

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

- b. Safety of Ship Maintenance Items. The ship's Commanding Officer's permission is required prior to authorizing the maintenance evolution. The following, as a minimum, shall be scheduled on the SOSMIL:

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

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

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

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

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

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

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

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

- (1) The event shall be authorized on the SOSMIL, contained in section 10.4.8 of this chapter (Submarines only).
 - (2) Hull openings shall be maintained in accordance with reference (a).
 - (3) Seawater valves should normally be operated using ship's systems. A temporary system may be used to operate seawater valves after obtaining Commanding Officer's permission.
 - (4) Ship's dewatering capability meets the requirements of references (d) through (f).
- d. Dewatering capability. Each compartment shall be capable of being dewatered at a rate of at least 200 GPM with pumping started within three minutes of the flooding being called away. Ship's Force will demonstrate adequate dewatering capability by planning and scheduling flooding drills to be observed by the ISIC and Lead Maintenance Activity Representative at the following times:
- (1) Within seven days of docking and temporary systems being delivered.
 - (2) Every 90 days while in dock.
 - (3) Just prior to undocking, normally within one week.

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

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

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

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

10.5.3 Action.

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

- (5) Keeping the Commanding Officer and the Engineer Officer informed as to the status of close-outs and significant deficiencies noted.
- b. Personnel performing tank, void and space close-out or entry are responsible for:
 - (1) Obtaining a copy of Appendix G and Appendix H.
 - (2) Forwarding to the DCA completed copies of Appendix H.
- c. Responsibility for Re-Entry Controls (REC) and final certification is as follows:
 - (1) In cases where entry is required to be made for production work by both Ship's Force and FMA personnel, the FMA will be responsible for REC and Ship's Force will be responsible for final certification close-out.
 - (2) For cases where only FMA work is anticipated, the FMA will be responsible for REC and Ship's Force will be responsible for final certification close-out. For the cases in which only the maintenance activity has access (e.g., waterborne entry into mud tanks or ballast tanks by divers) the maintenance activity will be responsible for final certification close-out.
 - (3) For cases where only Ship's Force work is anticipated, Ship's Force will be responsible for REC and final certification close-out.

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

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INSTRUCTIONS FOR COMPLETING WORK AUTHORIZATION FORM

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

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

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

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

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

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

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

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

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

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

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

Block 11. SAFETY OF SHIP: For submarines, when required by paragraph 10.4.8 of this chapter and/or reference (a), check YES or NO. If the SPOD is used, the Repair Activity's Ship Safety Officer will sign concurrence. During times when safety of ship qualified RA work control personnel process the WAF, they may sign concurrence for non-Safety of Ship maintenance. If the SOSMIL is used, the qualified Watch/Duty Officer will verify that work is listed on the SOSMIL for that day and sign the block.

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

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

Block 14. PLANT/SHIP CONDITIONS (e.g., drained, de-pressurized, de-energized) SET, FMA/DIVISION/REPAIR ACTIVITY ARE AUTHORIZED TO START WORK: The Watch/Duty Officer signs in all cases for authorizing the start of all work. Note any restrictions and/or precautions in Block 9. If Block 11 is checked YES, the Watch/Duty Officer shall ensure the work of the WAF is listed on the SOSMIL/Ship's Plan of the Day prior to authorization of the WAF. RAR signs for authorizing the start of work when the WAF is for repair activity work.

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

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

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

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

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TECHNICAL WORK DOCUMENT RECORD SHEET COMPLETION INSTRUCTIONS

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

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

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

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

APPENDIX C
WORK AUTHORIZATION FORM CONTINUATION SHEET

1. USS	3. WAF NO.	REV

CHECK IF CONTINUED ON ANOTHER SHEET

Sheet _____

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WORK AUTHORIZATION FORM REVISION SHEET

1. USS	3. WAF NO.	REV
9. RESTRICTIONS/PRECAUTIONS/REMARKS		
AUTHORIZATION TO WORK		
11. SAFETY OF SHIP (Submarine Only): <input type="checkbox"/> YES <input type="checkbox"/> NO RA SSO (if SPOD used) or QUALIFIED WATCH/DUTY OFFICER (if SOSMIL used) _____ DATE _____		
12. CONCURRENCES: _____ DATE _____ DATE _____ DATE _____		
13. TAGOUT REQUIRED: <input type="checkbox"/> YES <input type="checkbox"/> NO SYSTEM/COMPONENT IS LINED UP FOR WORK, A TAGOUT IS HUNG, VERIFIED AND SIGNED BY THE REPAIR ACTIVITY (IF REQUIRED) AND SHIP.		
	TAGOUT NO. _____	

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

	WATCH/DUTY OFFICER	DATE

	REPAIR ACTIVITY	DATE

CHECK IF CONTINUED ON ANOTHER SHEET

Sheet _____

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APPENDIX D

BARRIER CRITERIA FOR SUBMARINE HULL PENETRATIONS

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

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

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

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

- a. Hull penetrations less than four feet above the waterline.
 - (1) Cofferdams shall be installed around all open hull access openings, including temporary hull cuts, which have less than four feet of freeboard at the opening. Cofferdams shall be constructed and tested in accordance with reference (a) to maintain watertight integrity to at least four feet above the waterline. A hull opening such as an electrical cable penetration need not have a cofferdam installed if it is adequately blanked or plugged while the system is under repair. Cofferdams will be designed to permit personnel access, temporary services and equipment shipping, as applicable, without violating the required watertight integrity. The ship's topside freeflood structure may be used to achieve the four foot requirement, however, the opening must be controlled in the same manner as a cofferdam. Positive control to maintain closure through the use of danger tags, and gagging devices, mechanical locks and/or blanks must be exercised for all hull access openings not in an as-built condition. Removal or changes in status shall be approved by the Commanding Officer.

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

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

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

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

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

- a. Ship's Force will identify the hull opening by noun name, docking plan number, frame number, side and distance off centerline and item number (as obtained from the ship's docking plan) and provide this information to the FMA.
- b. The FMA planning division will verify the data provided by Ship's Force and calculate the circumferential distance from the centerline.
- c. The FMA LWC will provide the verified data and the fitting/flange, including the required installation hardware, to the diving supervisor.
- d. Ship's Force shall mark the fitting location using a weighted and marked line, referenced from frame marks topside.
- e. The Ship's Duty Officer shall authorize the installation of the fitting/flange and coordinate the pre-brief for the installation evolution. As a minimum, the brief shall be attended by the Ship's Duty Officer, LWC Supervisor and Diving Supervisor. The mechanism for authorizing the hull blank installation shall be the Work Authorization Form (Appendix A), in accordance with this chapter.
- f. The divers, in conjunction with Ship's Force and the LWC Supervisor shall verify the location of the hull opening and weighted/weighted line prior to the divers entering the water.
- g. A diver accompanied by Ship's Force shall tap on the internal hull opening until the in-water diver acknowledges the location by returning the signal.
- h. After installation, the hull fitting/flange location and installation shall be independently verified by a second diver.
- i. Divers, assisted by the LWC and Ship's Force, shall verify the hull fitting/flange integrity with a 100 psig air test.
- j. Divers and the LWC Supervisor shall mark the hull fitting/flange by attaching a tether from the fitting/flange to topside. At the topside attachment point the tether shall be labeled "Hull Fitting (Noun Name) Installed".

- k. Positive verification from inboard of the hull fitting/flange placement and integrity must be achieved for each installed fitting/flange prior to proceeding with any maintenance. The verification shall be accomplished using the method for testing a single closure described in paragraph 2.a of this Appendix. If either of the leak check methods of paragraphs 2.a.(2) or (3) of this Appendix are not possible, the Commanding Officer shall be notified and give specific permission for continuing/conducting the maintenance.
- l. If internal verification of hull fitting/flange integrity is not possible due to system configuration, the fasteners shall not be fully removed from the pressure boundary being disassembled until the system is fully drained and hull fitting/flange integrity has been verified.
- m. If a hull fitting/flange is left installed for system and/or at sea operations, the guidance of Volume V, Part I, Chapter 8 of this manual concerning Departure From Specification shall be followed.

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

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

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

- a. The material must be the identical type, level and pedigree required for the system application in accordance with reference (h) or as required by NAVSEA drawings.
- b. Blanks must be constructed such that the design sealing surface dimensions and fitup characteristics of the system are maintained.
- c. Dimensions of blanks will be in accordance with reference (h).
- d. Applicable hydrostatic strength and porosity testing will be performed as required by system test pressure drawings.
- e. All blanks shall be marked in accordance with reference (h). Maximum allowable pressure will be the hydrostatic test pressure (e.g. 6750 psi for a 4500 psi application, 4500 psi for a 3000 psi application, etc.). Additionally, mark piece with nominal operating pressure and material used. Ensure pressure markings are annotated "MAX" and "NOM" as appropriate.
- f. Blanks installed for maintenance or testing will be identified by a plain tag stating the purpose of the blank. This tag will be in addition to any danger tags used.

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APPENDIX E

SAFETY OF SHIP MAINTENANCE ITEM LIST EXAMPLE

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

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

The following items are Safety of Ship:

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

Review and approval (all parties must sign):

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

PROCEDURES AND SAFETY PRECAUTIONS FOR ENTERING SUBMARINE SPACES, TANKS AND VOIDS

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

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

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APPENDIX H
CLOSE-OUT INSPECTION CHECK-OFF LIST

Name of tank, void or space _____

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

	DESCRIPTION	PETTY OFFICER/ OFFICER INITIAL
7.	VENTS AND DRAINS	
	a. Adequate draining exists from each bay.	
	b. Vents are clear of loose gear and rags.	
	c. Ensure that vents/drains have no installed blanks.	
8.	GALVANIC PROTECTION	
	a. Zincs are properly located and installed such that vibration does not occur when struck with a rubber mallet.	
	b. Mounting straps and bolts are painted.	
	c. Surfaces behind zincs are properly painted.	
9.	CLEANLINESS	
	a. Check space clear of loose gear and rags.	
	b. Check space clean and free of dirt.	
10.	COMPLETION	
	a. All interior inspection items are clear of any discrepancies.	
	b. Take an inventory of all tools and materials with which you entered the tank or void. Verify all items carried into the tank or void have been removed.	
	c. All personnel are clear of the tank or void.	
	d. Tank or void cover gasket and gasket seat areas are in acceptable condition.	
	e. Tank or void cover studs and nuts are torqued to the specified values required and the lock tabs are properly engaged or spot welded.	
	f. Inspect the exterior for incomplete work that would require a reinspection.	
	g. Ensure that all temporary services are removed from tank.	

Signature of Senior Enlisted Inspector

Date

Signature of Officer Inspector

Date

Reviewed by DCA

Date

NAVSEA
STANDARD ITEM

FY-13

ITEM NO: 009-106
DATE: 30 JUL 2010
CATEGORY: I

1. SCOPE:

1.1 Title: Work Authorization Form Coordinator (WAFCOR); provide

2. REFERENCES:

2.1 Joint Fleet Maintenance Manual (JFMM)

3. REQUIREMENTS:

3.1 Provide a representative whose function is to coordinate the Work Authorization and Control Process, known as the Work Authorization Form (WAF) Coordinator (WAFCOR), from 30 days prior to the actual scheduled start date of shipboard work to the completion of shipboard work.

3.2 The WAFCOR shall be responsible for the work authorization control process for all Repair Activity (RA) work being performed during the contract performance period. The WAFCOR shall receive, process, compare, and coordinate all WAFs and Technical Work Documents (TWDs) submitted by RAs in accordance with the requirements of Volume IV, Chapter 10, of 2.1. The WAFCOR shall meet daily with the designated representatives from each RA, the Commanding Officer's designated representative, and the SUPERVISOR to eliminate any tag-out conflicts, and to advise the SUPERVISOR of any work authorization problems that could impact the RA's or the ship's work operations and testing.

3.2.1 The WAFCOR shall ensure that each RA submits a properly filled out WAF. The WAF/TWD shall show or explain the job description for each work authorization. The WAFCOR shall assign a tracking number and submit the WAF to the Commanding Officer's designated representative. The Commanding Officer's designated representative will determine if adequate isolation and plant/system conditions exist to safely and properly conduct the work, authorize and hang tag-outs, and sign the WAF. Each individual RA must submit work authorizations even if multiple RAs are working on the same components.

3.2.2 The WAFCOR shall legibly sign and release the WAF for start of work upon receipt of legible signature from the cognizant RA's designated representative.

3.2.2.1 Post a copy of the released WAF at the worksite prior to and during productive work. Maintain the WAF in the work authorization log until notified by the cognizant RA's designated representative that the work is complete and ready for tags to be cleared. The RA's designated representative will sign the WAF completion block, then obtain ship's concurrence to clear the tag and sign the Tagout Record sheet(s) completion block. Additional sign-offs required by the WAF for testing and closure shall be made as the work progresses.

3.2.3 The WAFCOR shall ensure that the cognizant RAs submit a copy of revisions or changes to the WAF or TWD at the time of revision or change. The WAFCOR will submit all changes to the Commanding Officer's designated representative for processing. Accomplish all applicable verifications required by the original WAF including any tag-out actions. Signatures by all applicable parties shall be reentered on the original WAF or attached sheet. The system tag-outs shall be verified by the Commanding Officer's designated representative and the cognizant RA prior to the accomplishment of the work.

4. NOTES:

4.1 Repair Activity (RA) is any activity (public or private) other than Ship's Force involved in the construction, testing, repair, overhaul, refueling, or maintenance of the ship. Repair Activities include the prime contractor, all subcontractors, government provided contractors or agencies, Alteration Installation Teams, Fleet Maintenance Activities, Naval Shipyards, and others.

4.2 Training requirements are listed in NAVSEA Standard Item 009-24.

NAVSEA
STANDARD ITEM

FY-14

ITEM NO: 009-24
DATE: 17 JAN 2013
CATEGORY: I

1. SCOPE:

1.1 Title: Authorization, Control, Isolation, Blanking, and Tagging Requirements; accomplish

2. REFERENCES:

- 2.1 Joint Fleet Maintenance Manual (JFMM)
- 2.2 9002-AK-CCM-010/6010, Industrial Ship Safety Manual (ISSM) for Submarines
- 2.3 S0400-AD-URM-010/TUM, Tag-Out Users Manual
- 2.4 845-4612172, Hydrostatic Test Blanks
- 2.5 MIL-STD-777, Schedule of Piping, Valves, Fittings, and Associated Piping Components for Naval Surface Ships
- 2.6 802-5959353, MIL-STD-777D Modified for DDG-51 Class, Schedule of Piping, Valves, Fittings, and Associated Piping Components
- 2.7 29 CFR Part 1915, Occupational Safety and Health Standards for Shipyard Employment

3. REQUIREMENTS:

3.1 Accomplish the requirements of Volume IV, Chapter 10 of **2.1**, for administration, work authorization procedure, transfer of non-nuclear systems and nuclear instrumentation and control systems, work authorization form revisions, and barrier criteria. For submarines only, accomplish the requirements of Volume IV, Chapter 10 of **2.1** for safety of ship maintenance item identification, listing, and control, or the requirements of **2.2** for Ship's Plan of the Day (SPOD).

3.2 Accomplish the requirements of **2.3** for equipment, systems, circuits, components, piping, and valves that require isolation.

3.2.1 Ensure the isolation, deenergization, drainage of the isolated area, and depressurization of mechanical, electrical, electronics, and pressure system has been accomplished.

3.2.2 Train and qualify contractor's designated representative in the Work Authorization Form (WAF) and Tag-Out process in accordance with **2.1** and **2.3**.

3.2.2.1 Maintain a current copy of the plan utilized to train and qualify contractor's designated representatives in accordance with **2.1** and **2.3** for reference by the SUPERVISOR.

3.2.2.2 Notify the SUPERVISOR of revisions to the plan as they occur.

3.3 Post warning signs and barriers and install temporary positive means to prevent closure or movement of components that create a safety hazard at hull and deck openings.

3.4 Install and maintain blanks and plugs, painted blaze orange (existing system fasteners used for blanking and that will be either discarded or re-used for installations are excluded), on piping, valves, equipment, ventilation systems, on components being stored, installed, or removed, on openings aboard ship resulting from the removals, immediately upon each removal, and on openings requiring isolation to accomplish work in the Work Items including tanks. The use of cloth, polyvinyl sheet, paper, tape, and rubber sheeting as blanks is prohibited. DC plugs, wood, or wood products are prohibited as blanks on pressurized systems, but may be used on non-pressurized systems. Wooden materials are prohibited for use as foreign material exclusion prevention devices on all systems.

3.4.1 Blanks installed on equipment, valves, and piping openings in systems which are subject to pressure shall be in accordance with **2.4** to withstand maximum system pressure and secured in place with gaskets and fasteners in accordance with **2.5** and **2.6**.

3.4.1.1 Pressure blanks shall have a positive means of attachment for affixing tags. Tags must endure the repair process, and must stay attached and be readable until the blanks are removed.

3.4.2 Blanks/plugs installed on openings in equipment, valves, and piping systems not subject to pressure shall preclude entry of foreign material and protect flanges and threaded areas.

3.4.3 Remove blanks/plugs installed in 3.4 immediately prior to installing piping, valves, or equipment and when work requiring isolation is complete.

3.4.4 Provide and maintain a written record of temporary blanks/plugs used, including those used for Foreign Material Exclusion (FME), documented on a signed and dated check-off sheet verifying installation and removal. Include type, size, quantity, and associated system/equipment name or tank number and location (frame, port, starboard, below or above water line).

3.4.4.1 Maintain the list for the duration of the availability.

3.4.4.2 For tanks, the check-off sheet for the removal of blanks shall be at the tank closing and the removal shall be verified by Ship's Force representative and the SUPERVISOR prior to tank closing. After the tank closing is satisfactory, the check-off sheet shall be submitted.

3.4.4.3 Submit one legible copy, in hard copy or approved transferrable media, of the temporary blank/plug record and check-off sheet to the SUPERVISOR.

3.4.5 Piping, ventilation, and equipment components designated as scrap prior to removal do not need to be blanked to maintain cleanliness. However, precautions shall be taken to preclude spillage of system contents.

3.5 Install identification tags on each removed piping section, valve, ventilation system, *interference*, and equipment to indicate company name, ship's name, hull number, system, location, and Work Item number prior to removal from system. Tags must endure the repair process, and must stay attached and be readable until the removed piping section, valve, ventilation system, or equipment is reinstalled.

3.6 Tape and insulate cable ends disconnected from equipment to prevent shorting out or grounding in the event a system is accidentally energized.

3.6.1 Tag each cable indicating circuit number and location of panel and fuse box-energizing cable.

3.6.2 Install dust covers on equipment connectors following disconnection of cable plugs.

3.7 Use the company's lockout/tag-out plus program for unmanned craft and barges in accordance with **2.7**.

3.7.1 Position equipment to achieve required isolation, deenergization, drainage of the isolated area, and depressurization, and use lockout/tag-out plus program when lock-out of equipment, systems, circuits, components, piping, or valves is required in accordance with **2.7**.

3.7.2 Provide a copy of the contractor's lockout/tag-out plus program when requested by the SUPERVISOR.

4. NOTES:

4.1 JFMM (**2.1**), 6010 (**2.2**), and TUM (**2.3**) are available on-line at:

<http://www.submepp.navy.mil/jfmm/index.htm>