

NAVSEA  
STANDARD ITEM

**FY-25**

ITEM NO: 009-08

DATE: **01 OCT 2023**

CATEGORY: I

1. SCOPE:

1.1 Title: Shipboard Fire Protection and Fire Prevention; accomplish

2. REFERENCES:

2.1 Standard Items

2.2 NFPA Standard 312, Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-up

2.3 NFPA Standard 1962, Standard for the Care, Use, and Service Testing of Fire Hose Including Couplings and Nozzles

2.4 29 CFR Part 1915, Occupational Safety and Health Standards for Shipyard Employment

2.5 NFPA Standard 14, Standard for Installation of Standpipe and Hose Systems

2.6 NFPA Standard 1961, Standard on Fire Hose

2.7 NFPA Standard 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

2.8 46 CFR 164.009, Noncombustible Materials for Merchant Vessels

2.9 NFPA Standard 10, Standard for Portable Fire Extinguishers

2.10 NAVSEA OP-4, Ammunition and Explosives Safety Afloat

2.11 Underwriter Laboratories (UL) Standard 199, Automatic Sprinklers for Fire-Protection Service

3. REQUIREMENTS:

3.1 Plan and execute all work to minimize the use of temporary firefighting systems. When the scope of work allows, the ship's firemain system must provide the ship's firefighting capability.

3.1.1 If the ship's fire main system is unable to meet the requirements listed below, a temporary firemain system must be provided or a shore firefighting supply must be connected to fulfill firemain system requirements.

3.1.1.1 Installed ship's fire main must maintain sufficient fire pumps to supply daily system cooling and flushing (i.e., auxiliary) loads plus the fire protection water supply requirements contained in Attachment A.

3.1.1.2 Installed available ship's fire pumps must be physically located in different spaces. For ships requiring more than four operational pumps, up to 25 percent may be collocated.

3.1.1.3 Fire pumps must be powered from different switchboards or have operable automatic or manual bus transfers.

3.1.2 Firemain system repairs or modifications that reduce the coverage or damage control capability of the ship's firemain must be coordinated through the use of jumpers and/or temporary fire hose manifold stations in affected areas to restore firefighting capabilities.

3.1.3 Use of temporary firefighting systems must be approved by the SUPERVISOR.

3.2 Provide fire protection in accordance with 2.2 through 2.6.

3.3 Establish, document, implement, and maintain a Shipboard Temporary Fire Protection Plan when temporary fire protection is needed. The plan must include, at a minimum, the following elements:

3.3.1 Temporary firefighting and dewatering equipment inventory

3.3.2 Identification of which hoses/pipes are charged/not charged

3.3.3 Diagram of temporary firemain system, to include the following elements:

3.3.3.1 Diameter, length, and connection path of each distribution hose/pipe (See Note 4.3)

3.3.3.2 Location of each temporary fire hose manifold station.

3.3.3.3 Connection locations to shore side water supply.

3.3.3.4 Coverage for all spaces where ship's firemain is inoperative.

3.4 Submit one legible copy, in hard copy or approved transferrable media, of the initial Shipboard Temporary Fire Protection Plan to the SUPERVISOR for approval and posting no later than 10 days prior to placing any section of the ship's firemain out of service.

3.4.1 Submit one legible copy, in hard copy or approved transferrable media, of an updated Shipboard Temporary Fire Protection Plan prior to any modification to the plan after initial approval.

3.5 Provide information on the operation and use of the Temporary Firemain and the Shipboard Temporary Fire Protection Plan at least one day prior to securing ship's firemain and no later than one day prior to entering dry dock, graving dock, or marine railway.

3.6 Provide temporary fire protection equipment as follows:

3.6.1 Each fire hose must be:

3.6.1.1 Manufactured with National Hose/National Pipe Straight Hose (NH/NPSH) fittings (NH for 2 and one-half inch and larger hoses, and NPSH for one and one-half inch couplings to ensure compatibility with shipboard equipment).

3.6.1.2 Inspected and service-tested in accordance with 2.3 within 90 days prior to being placed in service for the first time and annually thereafter.

3.6.1.3 Cotton or synthetic double jacketed manufactured to the requirements of 2.6 or in accordance with MIL-H-24606B.

3.6.1.4 Each Temporary and Permanent hose or hose reel subject to damage (i.e. painting, hydro/sand blasting, and hot work) must be protected by an enclosure or covering. The enclosure or covering must be fire retardant, red, and must not significantly restrict access to the hose or hose reel for firefighting. The use of hook and loop fasteners and doors are acceptable.

3.6.2 Each fire hose nozzle must be:

3.6.2.1 One and one half inch combination straight stream and spray pattern nozzles, conforming to MIL-N-24408, rated for 125 gallons per minute (GPM) at 100 pounds per square inch (PSI).

3.6.2.2 Pre-connected to the end of each handline hose and maintained operational. (See Note 4.4)

3.6.3 Each temporary fire hose manifold station must:

3.6.3.1 Be provided in sufficient numbers such that all parts of the ship, including the interior of temporary structures, can be reached from at least 2 each, 100 foot lengths of one and three-quarters inch hand line hoses, with no allowance for stream reach.

3.6.3.2 Have, at a minimum, three handline outlets, each individually valved from each temporary fire hose manifold station. Each handline outlet must be one and one half-inch NPSH thread.

3.6.3.3 Have distribution hoses of sufficient size to meet a minimum of 95 GPM and 60 PSI residual nozzle pressure at the end of each one and three-quarters inch handline hose.

3.6.3.4 Have 2 each, 100 foot lengths of one and three-quarters inch handline hose manufactured with one and one-half inch NPSH couplings pre-connected to temporary fire hose manifold station valve outlets and faked on racks nearby.

3.6.3.5 Have pressure gauges installed with a 0 – 250 (plus or minus 50) PSI range.

3.6.3.6 Have a 0 – 250 (plus or minus 50) PSI range calibrated gauge installed on the hydraulically most remote temporary fire hose manifold station.(See Note 4.2).

3.6.3.7 Have operating instructions posted on each temporary manifold station with sources of water identified. Instructions must endure the repair process, stay attached, and be legible the entire time the station is on board.

3.6.4 Primary fire pump(s) must:

3.6.4.1 Have functioning auto start capability.

3.6.4.2 Provide GPM flow specified in Attachment A uninterrupted at a minimum of 150 PSI measured at the most remote shore side outlet providing firemain water to the ship.

3.6.4.3 Maintain constant pressure automatically without manually manipulating valves.

3.6.5 Back-up fire pump(s) must:

3.6.5.1 Be equivalent to primary fire pump(s), powered from a source(s) different than that powering the primary fire pump(s), and be pre-installed in the temporary fire protection system.

3.6.5.2 Be physically separated from the primary fire pump(s) and other back-up fire pump(s) in such a way that damage to or loss of access to fire pump(s) will not result in loss of firefighting water pressure or damage to or loss of access to other fire pump(s).

3.6.5.3 Have an operating pressure staggered from the primary fire pump(s) to minimize pump cycling (i.e. if the primary fire pump station starts at 140 psi to restore the system to 150 psi then the back-up fire pump station should be set to start at 130 psi).

3.6.6 Ensure when ship's firemain system cannot be used, portable fire pump(s) capable of providing a total of 500 GPM at 100 PSI must be on board the ship during berth shifts, transits to and from Naval facilities, dockings, undocking's. The pump must be connected to the ship's firemain system or the temporary firemain system prior to ship movement.

3.6.7 Ensure all engine driven equipment providing emergency services (firefighting water, power, and lighting) are equipped with a functioning audible low fuel level alarm capable of producing a continuous 110dBA (plus 0 or minus 25 decibel) signal.

3.6.8 When connection of the shore supply to the ship's Firemain Shore Connection fitting is not possible, ensure a tri-gate hose connection compatible with the ship's portable fire pumps is used to connect to the ship's fire plugs, to permit ship's firemain to remain in service while also acting as shore firemain connection.

3.6.9 Provide and install distribution hoses connected to the ship's permanent firemain or temporary firemain in sufficient number to deliver the fire protection capacity specified in Attachment A. This must be determined by dividing the water supply capacity from Attachment A (plus cooling and flushing loads) by the hose line capacity for the chosen distribution hose/pipe diameter. (See Note 4.1 for example).

3.6.9.1 The number of hoses connected to the ship from the shore must not be reduced when the ship's firemain becomes operational unless the permanently installed pumping capacity of the ship can meet the entire fire protection water supply requirement of Attachment A plus cooling and flushing loads.

3.6.10 Unpressurized 2 and one-half inch drop lines, supplied from a temporary hose manifold station, with a 2 and one-half inch NH by one and one-half inch NPSH by one and one-half inch NPSH hose fittings may be utilized to provide coverage to the lowermost compartments (tanks and voids) that are inaccessible with a 100 feet of handline hose, approved by the SUPERVISOR.

3.6.11 Equip temporary firemain systems with a minimum of 2 isolation valves from shore side supply prior to entry to the temporary firemain system. Place additional isolation valves in the remainder of the temporary firemain system so that the maximum distance between any 2 adjoining valves does not exceed 200 feet.

3.6.12 Provide Fire Department Connections (FDC) at the temporary firemain manifold located on the pier.

3.6.12.1 Consult with local Fire and Emergency Services (F&ES) provider to determine the type of fitting and threads required for temporary pier connections. Each temporary pier fire connection must at a minimum, consist of two 2½ inch or one 4 inch or larger connection.

3.6.12.2 For each pier connection install a UL312 listed check valve in line with each pier connection.

3.6.12.3 Post a diagram at each temporary pier fire connection that indicates which portion of the temporary firemain are served.

3.6.13 Where drydocked ships or ships under construction are constructed of combustible hull materials such as composites and wood, materials subject to melting such as aluminum, or equipped with combustible external hull/structure treatments such as Special Hull Treatment (SHT), Radar Absorbent Material (RAM), or Passive Countermeasure System (PCMS), each fire hose station must be provided such that each area of the hull/structure are reachable by 2 separate fire hose stations rigged with 100 feet of hose.

3.6.14 The ship's permanently installed AFFF system must be maintained in an operational condition during the availability, impairment to the permanently installed AFFF system or where flammable or combustible materials are temporally stored or maintained without permanent AFFF system installed must have a mitigation plan approved by the SUPERVISOR.

3.7 Provide emergency fire protection equipment as follows:

3.7.1 Install a temporary fire alarm system on the quarterdeck configured to send a signal directly to the cognizant fire department, shipyard/Naval facility fire department, or a continuously manned location within the shipyard/Naval facility where trained personnel can take immediate action to transmit an alarm.

3.7.1.1 Each temporary fire alarm device placed aboard ship must be a fire alarm pull box, non-dial telephone, and annunciator panel, or as approved by the SUPERVISOR.

3.7.1.2 Provide a telephone on the QD, to the extent practicable, any time contractor work or location of the vessel (shipyard, Naval or contractors facility) affects the ship's casualty reporting system (ship's telephone).

3.7.1.3 Conspicuously post the emergency reporting procedures at the quarterdeck.

3.7.1.4 Test the temporary fire alarm system daily. Repair or replace defective or inoperative equipment immediately. Submit one legible copy, in hard copy or approved transferrable media, of the test report for the temporary fire alarm system, when requested by the SUPERVISOR.

3.7.2 Provide dewatering equipment to include a sufficient number of pumps capable of providing 100 GPM minimum each and a total dewatering capability equal to at least one-half of the supply GPM specified in Attachment A.

3.8 Develop and implement a written Fire Safety and Emergency Fire Response Plan in accordance with 2.4. In addition to the requirements of 2.4, the plan must identify:

3.8.1 Each integrated fire protection system in effect during the performance of the maintenance availability.

3.8.2 Each fire prevention program used, along with the types and frequency of tests of equipment and devices.

3.8.3 Details of all communication links (telephones, drop boxes, alarms, horns) location, testing interval, and interface with shore side response systems.

3.8.4 Each normal and emergency source of electric power, firefighting water, lighting, testing interval, and interface with shore side response systems.

3.8.5 Each location of all normal and emergency backup support equipment to be used in support when combating a fire, and the equipment's testing cycle.

3.8.6 Each organization to be used, designation of responsibility for all shifts, training, anticipated response times, and interface with shore side response units.

3.8.7 Ensure general procedures for directing contractor employees on fire reporting, fire responses, firefighting actions, personnel accountability, and prolonged firefighting responsibilities.

3.8.8 Provision for portable communication devices for contractor use during firefighting operations between site, fire, and contractor's/shipyard's operations center.

3.8.9 Submit one legible copy, in hard copy or approved transferrable media of the Fire Safety and Emergency Fire Response Plan to the SUPERVISOR no later than 10 days prior to commencement of work.

3.8.9.1 Submit one legible copy, in hard copy or approved transferrable media, of an updated Fire Safety and Emergency Fire Response Plan prior to any modification to the plan after initial approval.

3.9 Review the Fire Safety and Emergency Fire Response plan in accordance with 2.4 with contractor employees and subcontractors.

3.10 Ensure access to temporary and Ship's Force firefighting equipment is not obstructed or restricted.

3.11 Provide fire reporting devices in Dry dock, graving dock, or marine railway as follows:

3.11.1 Fire reporting devices must be clearly identified and located at each manifold station and each exit serving the dry dock, graving dock, or marine railway.

3.11.2 Fire reporting device separation must not exceed 200 feet horizontally along the dry dock, graving dock wall, or marine railway or 100 feet from either end of the dry dock, graving dock, or marine railway.

3.11.3 Modifications to locations of fire reporting devices for ships docked side by side, must be approved by the SUPERVISOR.

3.12 Provide water for firefighting to the ship through sufficiently sized hoses or pipes to carry capacities specified by Attachment A. These requirements must be in addition to water required for flushing and cooling.

3.12.1 Maintain a minimum of 100 PSI residual and static pressure uninterrupted for the entire availability and during testing, measured at each temporary fire hose manifold station.

3.13 Locate each temporary fire distribution hose and each fire hose manifold station to minimize exposure to areas of the ship where flooding due to a ruptured hose would cause damage.

3.14 Conduct an orientation brief to Ship's Force no later than 5 days of the availability start to include the following:

3.14.1 Procedures to rapidly secure temporary systems (e.g., air, electrical power, and ventilation) under Ship's Force control.

3.14.1.1 Train Ship's Force personnel on the procedures to operate temporary firefighting systems, if installed. Provide written operating procedures/instructions to Ship's Force on each type of firefighting system. Provide information and physical training aids for all versions of quick disconnect fittings used in conjunction with temporary services.

3.14.2 Procedures to operate temporary firefighting equipment.

#### (I)(G) "TEMPORARY FIREMAIN OPERATIONAL TEST"

3.15 Conduct an operational test of both shore side supply and shipboard distribution of firefighting water through the temporary firemain system prior to taking down ships firemain. 3.15.1 and 3.15.2 must be tested concurrent with acceptance criteria met simultaneously.

3.15.1 Discharge firefighting water from 4 each one and three-quarters inch handline hoses from the two most hydraulically remote temporary fire hose manifold stations on the ship that share the same distribution hose (four nozzles total). Discharge firefighting water from each hose simultaneously for 60 seconds prior to measurement start in order to obtain steady state flow conditions. Once at steady state, test firefighting water flow for a minimum of 60 seconds. Measure and record flowrate and residual nozzle pressure at each nozzle by in-line flow meter and calibrated nozzle pressure gauge. The elevation of each nozzle tested must be equal to or greater than the elevation of the temporary fire hose manifold station providing water to that nozzle. Accept/Reject Criteria: Temporary pumps must automatically start. Maintain a



minimum of 95 GPM and a minimum of 60 PSI residual pressure while flowing simultaneously at each nozzle for a minimum of 60 seconds. Pressure and flowrate must be constant, maximum nozzle pressure variation allowed during 60 seconds is plus 25 or minus 0 PSI.

3.15.1.1 When nozzle(s) cannot be tested at the same or higher elevation as the temporary fire hose manifold station(s), add 4.5 PSI to residual nozzle pressure acceptance criteria per 10 foot drop in elevation from the station(s).

3.15.2 Measure and record residual pressure at the shore side supply outlet(s) providing water to those temporary fire hose manifold stations tested in 3.15.1 while simultaneously discharging the 4 nozzles tested in 3.15.1. Accept/Reject Criteria: Maintain a minimum of 150 PSI residual pressure at the shore side supply outlet(s).

3.15.3 Accomplish a retest of 3.15.1 and 3.15.2 if the system is modified after initial test and the criteria of either 3.15.3.1 or 3.15.3.2 are met.

3.15.3.1 After any temporary firemain system modification, where the previously tested hydraulically most remote stations are no longer the hydraulically most remote.

3.15.3.2 After any temporary firemain system modification, where the available residual pressure at the most hydraulically remote stations is reduced.

(V) “TEMPORARY FIREMAIN OPERATIONAL TEST”

3.16 Conduct an operational test of temporary firemain discharge water every 60 days from the most hydraulically remote temporary fire hose manifold station to verify valves are not secured and/or obstructions in the piping system are not present. Verify that all control valves in the temporary firemain system are in the intended open/closed position. Accept/Reject Criteria: Maintain a minimum of 95 GPM and a minimum of 60 PSI residual pressure while flowing one nozzle for a minimum of 30 seconds.

(I)(G) “PERIODIC SHORE SIDE WATER SUPPLY VALIDATION”

3.17 Conduct validation of shore side water supply flow and pressure prior to availability start date, each time the vessel shifts berths, and annually thereafter should the contract extend beyond one year. Measure and record flow and residual pressure using a calibrated in-line flow meter and calibrated pressure gauge. Accept/Reject Criteria: Minimum water supply specified in Attachment A plus flushing and cooling loads is available at the shore side firemain supply outlet(s) and with a minimum of 150 PSI residual pressure.

3.18 Provide a recirculation capability where weather and flow conditions are such that freezing may occur. Freeze protection equipment must be functional when temperatures drop below 40 degrees F.

3.19 Use of aluminum piping in a temporary saltwater firemain system is prohibited.

3.20 Provide a representative, whose purpose is to coordinate and be responsible for the management of all project temporary services, including services provided by other maintenance activities.

3.21 The following applies to routing of temporary services through *each* installed ship openings, both exterior and interior, designed for personnel ingress and egress:

3.21.1 Doorways/Hatches: Temporary services must be routed within the topmost area of the opening, such that the unobstructed opening of any doorway/hatch with services run must be at least fifty (50) inches high and twenty-six (26) inches wide.

3.21.2 Vertical Ladders: Temporary services must be routed to allow safe access. Route services so that personnel may transit the hatch. Services must not be routed within four (4) inches on either side of the ladder. Services routed behind the ladder must not interfere with safe access to the ladders and rungs.

3.22 Submit one legible copy, in hard copy or approved transferrable media, of a consolidated drawing in the format of a damage control diagram, depicting all services entering the ship to the SUPERVISOR within two days of services being routed onboard the ship.

3.22.1 The drawings must be conspicuously posted at the quarterdeck and damage control central for use by emergency responders. The drawing must include the issue date clearly legible on each page. The drawing must be updated weekly, or immediately to reflect significant changes, and must be suitable for use by emergency responders for isolation of services during an emergency.

3.22.2 At a minimum, the drawing must include:

3.22.2.1 Type and description of service.

3.22.2.2 Shore side shut-off points.

3.22.2.3 Route of service through the ship.

3.22.2.4 Location of quick disconnect fittings.

3.22.2.5 Identification of critical temporary services and any cautions for critical services.

3.22.2.6 Status of hull openings and access cuts and identification and location of closure materials.

3.22.2.7 De-watering capabilities.

3.22.2.8 Designated fire zone boundaries.

3.22.2.9 Critical temporary services and their shore side shut-off points must be highlighted.

3.23 Install quick disconnect fittings (QDF) within 6 feet of hull penetrations used for personnel access to facilitate the deployment of smoke control curtains. Where it is necessary to support a service between a QDF and the designated boundary or hull penetration, the type of support must not prevent rapid clearing of services from the opening.

3.23.1 For hull openings used for services only, a QDF is not required, provided the opening is fitted with an air and smoke control curtain that remains in place around the services.

3.23.1.1 Curtains must be made of fire retardant fabric in accordance with 2.7.

3.24 Temporary enclosures erected around hull access openings must be constructed with openings and removable covers to accommodate standard smoke control ventilation fans (e.g., damage control box fans). If the enclosure is constructed with ventilation fans installed, the fans must be equipped with reverse air flow capability.

3.25 Ensure that adequate protection is provided during installation, operation, and removal of temporary services. For fluid systems, spray protection must be installed at each mechanical joint of a temporary system that is inside of the hull of the vessel, in the vicinity of shore power or electrical equipment, or in the vicinity of hull openings to prevent fluids other than air spray on ship's equipment. Spray protection must consist of adequate see through sheeting (minimum 5 mils thickness) around each joint secured by several wraps of tape allowing view of the component as much as possible. Anti-chafing protection must be installed around services in particular areas (i.e., hatches, high traffic areas, vicinity of sharp objects) where there is a high risk of damage.

3.26 Provide a plan for protecting permanently installed fire detection devices to the SUPERVISOR for approval prior to commencing work that has the potential to damage or render fire detection devices nonresponsive.

3.27 The ship's permanently-installed fire detection system must be maintained in an operational condition during the availability, impairment to the permanent-installed fire detection system must be approved by the SUPERVISOR.

3.28 Use metal canister vacuum cleaners aboard the ship, except those used for regulated and controlled radiological and hazardous waste or hazardous material.

3.28.1 Vacuum cleaners must be emptied of all debris at the end of each shift at a minimum, on a daily basis.

3.28.2 Permanently and legibly mark each vacuum cleaner with a company name or unique identifier.

3.29 Plastic trash cans are prohibited for trash collection onboard in spaces where industrial work is being performed. Plastic trash bags may be used onboard as a liner for metal trash cans.

3.30 Store each plastic bodied tool in metal tool boxes or remove from the ship at the end of each shift. Equipment that must remain in service after working hours (e.g., temporary lighting, monitoring devices, etc.) is exempt from this requirement.

3.30.1 Requirements of paragraph 3.31, do not apply to currently regulated and each controlled radiological containment, nor does it supersede any requirements of the Naval Nuclear Propulsion Program.

3.31 Temporary lights must have 3-conductor cable, guard or shield, hook, and lamp holder. Exposed non-current-carrying metal parts of the fixture must be grounded either through a third wire in the cable containing the current conductors, or through a separate wire that is grounded at the fixture's voltage source.

3.31.1 Temporary lighting fixtures must not be used to power portable electric tools.

3.31.2 Maintain temporary lights in a safe condition. Splices must not be permitted in magazine and ammunition handling spaces.

3.32 Temporary services must be suspended using non-combustible high temperature devices, brackets, or material that meets test requirements of 2.8. Plastic tie wraps, string, rope, or other combustible material must not be used.

3.33 Temporary services must be positively identified with durable unique markings that include maintenance activity name, service type, location, and shore side shut-off points. Tags must be located (at a minimum) at the source, point of entry aboard ship, at each connection point (including quick disconnects), and termination point. Vital services must be designated by the SUPERVISOR.

3.34 Rigging of temporary services, such as but not limited to hoses, electrical lines, welding leads, and temporary lights must be kept clear of the decks utilizing temporary support trees or ship's structural members, such as beams, braces, and welded brackets and be arranged to minimize tripping and other safety hazards and to allow free access through doors, hatches, and passageways.

3.34.1 Temporary service lines must be routed to allow emergency access and egress to all areas of the ship and must not impede damage control and watchstander performance of duties. Where appropriate, run temporary services outboard to keep passageways clear.

3.34.2 Remove temporary services from the ship when no longer in use.

3.34.3 Evaluate temporary services during the daily safety, fire prevention, and housekeeping inspection, made jointly with the SUPERVISOR and Ship's Force. Discrepancies must be promptly corrected.

3.35 Shipboard temporary ventilation systems used for exhausting toxic contaminants and/or flammable vapors must be constructed so that ducting within confined and enclosed spaces is under negative pressure.

3.35.1 Use fire retardant ventilation ducting. Proper documentation of fire retardancy must be available for review upon request of the SUPERVISOR.

3.36 Crimping or pinching of fuel gas/oxygen/compressed gas hoses, air hoses, or hoses carrying hazardous/toxic/flammable materials is prohibited. All hoses must be disconnected at the manufacturer's fittings. Prior to disconnecting hoses from equipment/tool, pressure must be released by disconnecting the hose from the source, e.g., manifold or gas cylinder.

3.37 "Screw type" hose clamps are prohibited on any pressurized hose (e.g., compressed gas and air hoses).

3.38 Each inert gas/oxygen depleting (OD), fuel gas and oxygen hose run must be positively identified with durable unique markings that include maintenance activity name, service type, location, and shore side shut-off points. Tags must be located (at a minimum) at the source, point of entry aboard ship, at each connection point (including quick disconnects), and termination point.

3.38.1 Unattended hose lines or torches are prohibited in confined spaces.

3.38.2 All hose lines must be disconnected at the supply manifold at the end of each shift.

3.38.3 All disconnected hose lines must be rolled back to the supply manifold or to open air to disconnect the torch; or extended fuel gas and oxygen hose lines must not be reconnected at the supply manifold unless the lines were given a positive means of identification when they were first connected and the lines are tested using a drop test to ensure the integrity of fuel gas and oxygen burning system. Alternate procedures must be approved by the SUPERVISOR.

3.38.4 Upon completion of system hook-up, accomplish a pressure drop test to include the torch, hoses, and gauges.

3.38.5 Apply pressure to the system. Back off pressure by turning off the valve supplying gases to the system. If the pressure on the gauge drops, a leak in the system exists. If the pressure on the gauge does not drop, the system is tight.

3.38.6 After applying pressure, wait 2 minutes to ensure pressure does not drop.

3.38.7 The use of gas hose splitters is prohibited.

3.39 Locate oxygen, acetylene, fuel gas, toxic, refrigerant, air conditioning gases, oxygen depleting (OD) gas supply systems off the ship. Manifolds connected to pierside supply systems may be placed on board ships as long as they are located on a weather deck and equipped with a shutoff valve located on the pier. The pierside shutoff valve must be in addition to the shutoff valve at the inlet to each portable outlet header required by 2.2.

3.39.1 Oxygen, acetylene, fuel gas, toxic, and OD gas supply systems must be stored to prevent collisions by trucks, forklifts, falling objects, etc.

3.39.2 Liquid oxygen (LOX) tanks must be staged in designated locations on the quay wall/pier to be determined by the Fire Safety Council (FSC) via the SUPERVISOR.

3.39.3 When gas cylinders are in use on board ship, they must be located on the weather decks or in a location determined by the Fire Safety Council (FSC) via the SUPERVISOR and must be secured in cylinder racks, and in an upright position. The number of in-use cylinders must be limited to those which are required for work in progress and which have pressure regulators connected to the cylinder valves. On-board reserve gas cylinders must not exceed one-half the number of in-use cylinders and must be located in a remote area of the weather decks or in a location determined by the FSC via the SUPERVISOR. Reserve acetylene cylinders must be secured in an upright position.

3.39.4 When not in use, gas cylinders and manifolds on board must have valves closed, lines disconnected, protective cover (cap) in place, and must be secured. Acetylene cylinders must be secured in cylinder racks and in an upright position.

3.40 The ship's permanently-installed general announcing system will be maintained in an operational condition during the availability. Any work that would impair the permanently-installed general announcing system must have a mitigation plan approved by the SUPERVISOR.

3.40.1 Install a temporary general announcing system which can be heard or seen in each space that is not normally manned and the ship's general announcing system cannot be heard, such as occupied tanks and voids, including tanks entered through hull cut access when in dry dock. The temporary general announcing system must be approved by the SUPERVISOR prior to the start of work.

3.40.2 Install an audible and visible system to warn personnel to evacuate the ship. The audible phase must consist of a klaxon horn, siren, or other device and must be clearly distinct from the fire and stop hot work alarms. Sounding of the evacuation alarm must be accompanied by the flashing of lights on all alarm box stations. Both the audible and visible signal must be actuated from the central CASCON Station and/or DCC/Quarterdeck. The evacuation alarm system must be approved by the SUPERVISOR. The ship's temporary or permanent announcing system may be used for

evacuation ship alarm and will announce the emergency. To achieve separate fire, stop hot work, and evacuate ship alarms, the ships announcing system must be used to announce the nature of the emergency in conjunction with the alarm actuation.

3.40.3 Install casualty reporting non-dial red telephones with an indicator light that report to the Ship's Quarter Deck or a system approved by the SUPERVISOR when the Shipboard Casualty Reporting System is nonoperational. Install telephones in each fire zone at least every 100 feet of ship's length on decks/platforms, placed on alternating sides of the deck/platform and located at a junction with athwartship passageways. Install a telephone on each level and each fire zone of the ship's superstructure, such that a telephone is within 100 feet of any part of the level. Install telephones in each space of decks/platforms below the Damage Control or Main Deck less than 100 feet of ship's length, within ten feet of all exit ladders. Install a telephone within ten feet of the exit to each tank open for maintenance. Label each phone with space location.

3.41 Provide a representative whose function is to coordinate hot work notification and execution, known as the Hot Work Coordinator, for each Repair Activity (RA) work performed during the contract performance period.

3.41.1 Hot Work Coordinator must:

3.41.1.1 Receive, review, and coordinate each hot work authorization form submitted by each RA.

3.41.1.2 Complete Attachment C for each approved hot work authorization form and sign after verifying with Hot Work Supervisor that hot work is ready to commence and after hot work has ended. Each signature affirms requested hot work authorization form will be worked each shift and that the hot work has ended.

3.41.1.3 Meet daily, when hot work is scheduled with each designated representative from each RA, the Commanding Officer's designated representative, and the SUPERVISOR to eliminate each hot work conflict, and to advise the SUPERVISOR of each hot work problem that could impact the RA's or any ship's work operation.

3.41.1.4 Participate in each Fire Safety Council (FSC) meeting when needed to support adjudicating each request for deviation.

3.41.1.5 Ensure that each RA submits a properly filled out hot work authorization form.

3.41.1.6 Submit each hot work authorization form to the Commanding Officer's designated representative responsible for maintaining Attachment "C" at a location agreed upon by the FSC.

3.41.1.7 Ensure each hot work authorization form revision submitted by the cognizant RA is processed prior to proceeding with the work necessitating the revision to the hot work authorization form.

3.41.1.8 Prioritize allocation of hot work authorization forms each shift based on the integrated production schedule.

3.42 Provide notice for each job or separate area of hot work aboard ship using a hot work authorization form.

3.42.1 Submit one legible hard copy or approved transferrable media, to the Hot Work Coordinator for submission to ships force by 1400 the day prior for high confidence hot work.

3.42.2 A smaller number of hot work authorization forms may be submitted after the arrival of the first shift on the day of execution. This number must not exceed 20 percent of the total hot work submitted for execution that day.

3.42.3 Hot work authorization form provided to the Hot Work Coordinator must, at a minimum, include a serial number, a description of the work to be done, specific location compartment number, and each compartment adjacent to each deck, bulkhead, and similar structure upon which hot work is to be accomplished and the time hot work will commence.

3.42.4 Notify Hot Work Coordinator if a condition changes and a hot work authorization form will not be performed, needs to be modified, or substituted with another hot work authorization form.

3.42.5 The amount of hot work authorization forms submitted must not exceed each parameter identified in Attachment D.

3.42.6 Submit one legible copy, in approved transferable media, of each request for deviation to the SUPERVISOR.

3.42.6.1 Each request submitted must include rationale for the deviation, the quantity of hot work authorization forms exceeding the thresholds identified in Attachment D, and duration of deviation.

3.43 Inspect and authorize each hot work area aboard ship.

3.43.1 Post the submitted hot work authorization form conspicuously at the entrance to each compartment or area where hot work is being performed. Provide a copy of each hot work authorization form to the SUPERVISOR upon request.

3.43.2 Hot work authorization form must include, in addition to each requirement listed in 3.42.3, current gas-free status of the area, any presence of combustible material within 35 feet in any direction of the operation, or further if affected by the operation, and if any combustible material is present, each action that must be taken



to protect the material from hot work, provision and assignment of each fire watch, and affirmation that the condition at the work site includes ventilation, temporary lighting, accesses, and permits each fire watch to have a clear view of and immediate access to each affected area.

3.43.3 Hot work authorization form must affirm each fully-charged fire extinguisher suitable to the type and location of hot work being performed in accordance with 2.9 is available at the work site. Inspect each area 30 minutes after completion of hot work unless the contractor's Hot Work Supervisor surveys each affected work area and determines that there is no further fire hazard.

3.43.4 Hot work authorization form must be signed by a Hot Work Supervisor specifically designated as responsible for the execution of hot work for each shift where hot work is being accomplished after the Hot Work Supervisor has physically verified the exact location and extent of hot work with each Hot Work Operator.

3.43.5 Hot work authorization form is effective for 24 hours unless a shorter period is specified in the contract or the gas-free status of the work area or system requires work stoppage.

3.43.6 A new hot work authorization form is required if work is interrupted due to loss of gas free status.

3.44 Submit a weekly hot work report in approved transferable media that will be reviewed during the weekly production meeting. The report must include:

3.44.1 Daily recap of the number of hot work authorization forms submitted, number of hot work authorization forms executed, percent of hot work authorization forms executed compared to submitted, and reason (i.e. excess form submitted, lack of material/equipment or personnel, weather, reprioritization of personnel, change in gas-free status) for each hot work authorization form not executed.

3.44.2 Two-week forecast of planned hot work to include the date, shift, work item number, and location of hot work.

3.45 Provide trained fire watches, at all affected areas where hot work is being accomplished. Provide fire extinguishing equipment as described in 2.2 and 2.4.

3.45.1 The program utilized to train fire watches must be in accordance with the requirements of 2.2, and include steps to be taken by the fire watch and hot work operator prior to accomplishment of hot work, proper selection and use of fire extinguishing equipment and other safety equipment, relationship between the fire watch and hot work operator, proper fire reporting procedures and other sounding of fire alarms, and reporting of fires to the ship's Quarterdeck. A means of communicating between all fire watches and their corresponding hot workers must be provided. This training must include theory and practical (hands-on) fire suppression techniques. This training must be

provided to all newly assigned fire watches, with annual updates provided to personnel. Provide visible means of identifying trained fire watches, i.e., badge, sticker, vest, etc.

3.45.2 Submit one legible copy, in approved transferrable media, of the training program when requested by the SUPERVISOR.

3.45.3 Each fire watch attending worker(s) accomplishing hot work must be equipped with a fully-charged and operable fire extinguisher, have immediate access and an unobstructed view of the affected hot work area to which they are assigned and must remain at the job site for 30 minutes from the time the hot work is completed unless the contractor's Hot Work Supervisor surveys the affected work area and determines that there is no further fire hazard.

3.45.4 The fire watch must not accomplish other duties while hot work is in progress.

3.45.5 Where several workers are accomplishing hot work at one site, the fire watch must have a clear view of and immediate access to each worker accomplishing hot work.

3.45.6 No more than 4 workers must be attended by a single fire watch.

3.45.7 In cases in which hot material from hot work may involve more than one level, as in trunks, machinery spaces, and on scaffolding, a fire watch must be stationed at each level unless positive means are available to prevent the spread or fall of hot material.

3.45.8 In cases where hot work is to be accomplished on a bulkhead or deck, combustible material must be removed from the vicinity of the hot work on the opposite side of the bulkhead, overhead, or deck, and a fire watch must be posted at each location.

3.45.9 If multiple blind compartments are involved in any hot work job, fire watches must be posted simultaneously in each blind area.

3.45.10 Comply with the firefighting and fire prevention requirements of **2.10** prior to hot work operations in or adjacent to areas containing ammunition or explosives.

3.45.11 Hot work must not be conducted during any logistics or maintenance movement of ammunition or explosives.

3.45.12 No hot work must be performed without an operational general announcing system, i.e., Ship's 1MC, or a documented communication strategy approved by the SUPERVISOR.

3.46 Use fireproof or fire-retardant covering in accordance with MIL-C-24576, **Type-I, Class-1 or compliant with ANSI/FM 4950 Welding Pad criteria**, such as fireproofed canvas, fire-resistant synthetic fabrics, non-combustible fabrics, metal covers or other suitable materials,|

to protect ship's equipment from falling sparks or other potential sources of fire. Install coverings prior to commencing hot work and maintain throughout the hot work evolution. Fire Retardant Gel (FRG) products in accordance with CID A-A-60022 may be used in conjunction with approved fireproof or fire-retardant covering for additional fire and thermal protection. FRG products cannot be used as stand-alone fire protection. ***FRG products cannot be used for submarine construction, maintenance, repair, and modernization or in ship areas under the cognizance of NAVSEA 08.*** Remove FRG residue from ship's equipment in accordance with SSPC-SP 1 at the completion of hot work. Proper documentation of fire retardancy must be available for review upon request.

3.46.1 Non fire-retardant temporary wooden structures located on the pier, dry dock edge, or in the dry dock (not including dry dock blocks) must be a minimum of 35 feet from the ship to prevent spread of fire.

3.46.2 Lumber, plywood, and staging boards, except that used for pallets, must be fire retardant in accordance with Category Two, Type II, of MIL-L-19140.

3.46.3 Storage of material aboard ship must be limited to that which is required for work in progress. Materials, trailers, temporary lights, flammable liquids, fueling of vehicles, and the rigging of hoses/welding leads/temporary lights aboard the ship must comply with the following: Material, including that stowed in bins that are placed and held temporarily on hangar decks, well decks, or tank decks must not exceed 8 feet in height. A 20-foot-wide lane must be maintained the length of hangar decks to act as a fire break. Material must occupy a deck space not to exceed 25-feet by 25-feet with adjacent 6-foot-wide aisles on each side for ready hose line access.

3.46.4 Prior to bringing equipment or working material aboard ship, its crating and packing must be removed. If the equipment or material may be damaged during handling, the crating and packing must be removed immediately after the equipment or working material is brought aboard and taken ashore for disposal. A small quantity of pallets may be staged in a location determined by the Fire Safety Council (FSC) via the SUPERVISOR aboard ship for use in materials handling operations.

3.46.5 Install sprinkling systems (or other firefighting equipment approved by the supervisor) on temporary structures constructed or staged in an internal sprinklered area of the ship (e.g., hangar bay, helo hangar) onboard for the purpose of material stowage.

3.46.6 Identify sprinkler and open sprinkler pendent, upright or sidewall type. The type must be most suitable for the shape and configuration of the protected area. Pendent and upright sprinklers must have 180-degree full cone spray patterns. The sprinkling density must be 0.2 gpm/sqft and the sprinklers must be arranged to cover the entire level of the temporary structure and all contents. Follow the manufacturer's instructions for spacing of sprinklers, distance from the overhead of the protected area, and distance from

stowed material or obstructions. Place placards on the interior of the protected area and note the height that material cannot be stacked above.

3.46.7 The system must be a dry deluge type, manually operated by a quarter-turn sprinkler valve located outside and near the access to the structure. The system must be continuously charged up to the sprinkler valve, from the ship's permanent or temporary firemain, using temporary piping or a non-collapsible hose suitable for the pressure and flow. Piping downstream of the sprinkler valve must be metal. Aluminum must not be used for piping. Place a placard at the sprinkler valve identifying the protected area and providing instructions on operating the sprinkler valve. Provide freeze protection with the water supply.

3.46.8 Automatic sprinklers, with the heat responsive and activating elements removed, may be substituted for open (deluge) sprinklers.

3.46.9 CONEX boxes/MILVANS staged within the ship for material storage or other operational purposes must be of all steel exterior construction and be capable of being completely sealed closed. Each enclosure placed on board the ship must be supported at least 10 inches above the deck. Only Class A type combustibles and non-combustibles are permitted to be stored within such structures and they must remain completely sealed closed when not being physically manned. When such structures are used as manned office or operating spaces (including temporary Enclosed Operating Stations), they must be equipped with smoke detection in accordance with 2.11 and must have at a minimum, one fire extinguisher of appropriate size and class at each access. The use of kitchen appliances (microwaves, coffee makers, hot pots, etc.) and hot work within the unit is prohibited.

3.46.10 Smoke alarms, approved by Underwriter's Laboratory, must be installed in enclosures and must be audible outside the enclosures.

3.47 Install sprinkling system on each temporary structures constructed or staged onboard not for the purpose of material stowage. The sprinkling density must be 0.1 gpm/sqft and the sprinklers must be arranged to cover the entire level of the temporary structure and all contents. The system must be a wet automatic type. The system must be continuously charged up to the sprinkler, from the ship's permanent or temporary firemain. Place a placard at the sprinkler valve identifying the protected area and providing instructions on operating the sprinkler valve. Provide freeze protection with the water supply. Operation of the sprinkler system must sound an audible alarm outside the structure. Install smoke detection system inside the structure. Provide audible alarms both inside and outside the structure. Provide portable AFFF and CO2 extinguishers interior to the structure near the access.

3.47.1 The quantity of flammable and combustible liquids brought onboard must be kept to a minimum, must not exceed that necessary for one shift's use, and must not be left unattended.

3.48 Fueling of vehicles or transfer of fuel between containers must be accomplished at designated sites on weather decks or in a location determined jointly by the contractor, Ship's Force, and the SUPERVISOR. Notify ship's Officer of the Deck prior to the fueling or transfer operation. When fuel is transferred between containers, the containers must be bonded and grounded to prevent static discharge. Fueling operations must be conducted at designated sites on exposed weather decks. All fuel must be transferred aboard ship in approved safety containers. Direct fueling of vehicles aboard ship must be avoided but may be utilized during operations via an approved fuel storage tank on the weather deck (flight deck, Helo deck, or deck edge elevator) provided the following safety precautions are provided and maintained by the performing activity:

3.48.1 Fuel storage tanks must be either of double wall construction or have integral cofferdam sized to exceed tank capacity.

3.48.2 Locate fuel storage tanks in a location approved by the SUPERVISOR, open to atmosphere on an exposed weather deck and not in interior spaces where a build-up of fuel vapors would be of concern.

3.48.3 Fuel storage tanks must be inspected and verified by safety personnel to meet safety requirements.

3.48.4 Perform and document weekly inspections of the fuel storage tanks.

3.48.5 Provide 2 dry chemical fire extinguishers, each with an Underwriter's Laboratory rating of at least 60 B:C, within 20 feet of each fuel storage tank.

3.48.6 Post signs at each storage tank designating ownership and contact numbers in the event of an emergency.

3.48.7 Stage an Oil and Hazardous Substance Spill Response Kit at each fuel storage station.

3.48.8 Install metal coamings 4 inches high, tack welded and caulked to the deck, around all through-deck access openings to control flammable liquid spills. Modifications from this requirement based on location of the access openings may be approved by the FSC via the SUPERVISOR.

3.49 FRG products may be used on welding blankets, curtains or pads when performing hot work in areas with combustible materials that are not movable (such as cable ways) and to protect equipment. Remove all non-stationary combustible material within 35 feet where possible. FRG or coated blankets, curtains or pads must not be used in direct contact of the backside of welds or in close proximity to welds. FRG or coated blankets, curtains or pads must not be placed closer than the minimum required stripback distance for heat sensitive material (e.g. paint) or 6" whichever is greater. For applications where stripback is not required, FRG or coated blankets, curtains or pads must not be placed closer than 6" to a weld. FRG or coated blankets, curtains or pads must not be used in direct contact with materials to be welded that are

subject to Hydrogen Induced Cracking (HIC), are hardenable, have toughness testing requirements, are subject to elevated preheat temperatures (>60°F minimum) or interpass temperature controls, or require specific welding procedure qualification involving high and low cooling rate testing (e.g. high carbon or alloy steel, HY steel, HSLA steel, and duplex stainless steels).

3.50 Plan and execute work in such a manner that the ship's permanently installed lighting and power systems will be out of service for the minimum amount of time.

3.50.1 Install temporary lighting for ship's lighting systems that are non-operational or require additional illumination.

3.50.2 Provide 2 sources of lighting to all spaces that normally have 2 sources for ship's lighting systems that are non-operational. The lighting may be the ship's permanent and emergency lighting systems or a combination of temporary and ship's permanent lighting, provided that separate power sources are utilized for each system. The removal of lighting from spaces or compartments that could impede damage control efforts, personnel egress, and/or casualty responder access must require approval by the SUPERVISOR prior to removal.

3.50.3 Permanent or temporary lighting must meet the illumination requirements of 2.2.

3.51 Accomplish temporary access requirements as follows:

3.51.1 Temporary access cuts may be made in fire zone boundaries provided they are equipped with fume tight steel closures when installed. Boundary degradation by use of temporary access cuts or passage of service lines must be permitted only upon granting of a written waiver by the FSC via the SUPERVISOR, for a limited time.

3.51.2 Submit one legible copy, in approved transferrable media, of a record of boundary openings and their locations to the SUPERVISOR and one additional copy to the Commanding Officer's designated representative. Resubmit boundary opening data when any changes, additions, or deletions of boundary openings occur.

3.51.3 Stage fire retardant material adjacent to the ship to provide for temporary closure of access cuts, hatches, and other hull penetrations created by contractor work (e.g., access cuts and open hatches due to running of temporary services).

3.52 Ensure at least one unobstructed access on ships designed with 3 or fewer accesses to each main and auxiliary machinery space and at least 2 unobstructed accesses on ships designed with 4 or more accesses to each main and auxiliary machinery space.

3.52.1 Accomplish a safety, fire prevention, and housekeeping, inspection during each shift whenever work is in progress. Once each manned/regular workday, the inspection must be made jointly with the SUPERVISOR and the Commanding Officer's designated

representative. Deviation from this requirement for availabilities less than 30 days in duration must be adjudicated by the SUPERVISOR.

3.52.2 Submit one legible copy, in approved transferrable media, of request for deviation to the SUPERVISOR.

3.52.3 Submit one legible copy, in an approved transferrable media, of a written report of the discrepancies and corrective actions, using Attachment E, to the SUPERVISOR and the Commanding Officer's designated representative within 4 hours after completion of the inspection. All discrepancies, to include discrepancies corrected on the spot, must be documented and assigned responsibility for corrective action (e.g prime contractor, sub-contractor, AIT, and ship's force).

3.52.4 Provide a safety representative to accomplish the safety, fire prevention, and housekeeping, inspection who at a minimum has completed competent person training in accordance with 009-07 of 2. and the following OSHA Training Institute (OTI) courses or NAVSEA approved equivalents: 5410; Occupational Safety and Health Standards for Maritime Industry, 3095; Electrical Standards, 3115; Fall Protection, 521; OSHA Guide to Industrial Hygiene.

3.52.5 Submit one legible copy, in approved transferrable media, of the certificates of completion for the required courses upon request by the SUPERVISOR.

3.53 Determine fire zone boundaries as follows:

3.53.1 The FSC via SUPERVISOR must establish fire zone boundaries prior to start of production work.

3.52.2 For ships having fire zones by design, the designated bulkheads must be used as fire zones. Ships under 600 feet in length that do not have fire zones by design must have a minimum of 2 fire zone boundaries. Ships 600 feet and over in length that do not have fire zones by design must have a minimum of 3 fire zone boundaries.

3.53.3 Fire zone boundaries must be continuous through the vertical extent of the ship, from the keel up to the highest weather deck, excluding the superstructure.

3.53.4 For ships that have established fire zone boundaries that run from keel up through the superstructure, the fire zone boundaries as depicted on the ship's damage control diagrams must be observed.

3.53.5 On aircraft carriers, provide for closing of hangar division doors in case of fire in the event division doors being repaired by the contractor are mechanically inoperative. As a minimum, rig chain falls to manually close doors in the event of fire. Exceptions must be permitted only upon execution of a written waiver approved by the FSC via the SUPERVISOR.

3.53.6 Indicate each fire zone by installing a sign adjacent to each entrance. Mark each sign with international orange tape.

3.53.7 Maintain the ship's fire zone boundaries to the maximum extent practicable throughout the availability. This includes maintaining the capability of fire insulation where installed, fire-rated penetrations such as multi-cable transits (MCTs) and pipe penetrations, fume-tightness of the boundary, etc.

3.53.8 Degradation of a fire zone boundary must be approved by the SUPERVISOR. Install fire retardant material, such as fire resistant curtains/cloth, at each fire zone boundary degradation for immediate deployment by personnel when securing from work or evacuating the space.

3.53.9 Service line(s) must not be run through fire zone boundaries unless quick disconnects are installed in temporary service lines within 6 feet of the opening, door, or closure. The quick disconnects must be marked with international orange tape and be positively identified with durable unique markings that include the maintenance activity name, service type, location, and shore side shut-off points. All service line(s) must be able to be secured and pulled back within 3 minutes. Fuel gas/oxygen/compressed gas hoses, steam lines, hoses pressurized above 140 PSI, temporary general announcing/alarm system wiring, temporary heat and smoke sensor system wiring, ***temporary drain and dispose lines***, and hoses carrying hazardous/flammable materials (as defined in Subpart P of 2.2) must not be run through fire zone boundaries. The number of temporary service lines or their size must not restrict free and easy access or closure of fire zone boundary doors.

3.53.10 Demonstrate that all service lines are able to be pulled back within 3 minutes in coordination with SUPERVISOR scheduled fire drills. The FSC via the SUPERVISOR will determine the fire zone boundary.

3.53.11 Request for deviation must be in writing to the FSC via the SUPERVISOR and must include the following; rational for deviation, location(s) and duration of each deviation, description of services that will violate any fire zone boundary, hazards associated with services, and the hazard mitigation plan(s).

3.54 Shipboard Access (Surface Ships). On surface ships, one gangway must be located at the ship's quarterdeck. For Surface Ships less than 700 feet in length, one additional gangway must be provided. For Surface Ships 700 feet or over in length, two additional gangways must be provided. Each gangway must be located in a separate fire zone unless an alternate arrangement is approved by the FSC via the SUPERVISOR.

3.54.1 Each route of escape leading to each exit and gangway must be clearly marked and must endure an industrial work environment, stay attached, and remain legible.



3.54.2 When one of the brow/gangways designated for personnel access/egress must be secured, notify the SUPERVISOR for concurrence. (See 4.11)

3.55 Provide a clearly readable status board at the shore side access to each brow/gangway within two days of services being routed on the ship for availabilities 45 days and greater.

3.55.1 The status board(s) must have the following information:

3.55.1.1 The status of access/egress openings and must be updated as conditions change.

3.55.1.2 Space layouts and terminology in the format of a damage control diagram for the ship.

3.55.1.3 Areas where access may be limited due to routing of temporary services, work in progress and/or secured access and egress routes.

3.55.1.4 Ship plan of the day (SPOD).

3.55.1.5 Temporary service diagram (TSD).

3.56 Ensure access to temporary and Ship's Force firefighting equipment is not obstructed or restricted.

3.56.1 Ensure Ship's Force firefighting equipment is not relocated without written authorization from the SUPERVISOR. Provide a secure, Ship's Force accessible temporary storage facility for firefighting equipment that is moved from its original location.

3.57 Conduct a firefighting and fire prevention conference in conjunction with the arrival conference or no later than 5 days after start of the availability for availabilities in excess of 30 days. This conference must familiarize Ship's Force with the contractor's fire safety and fire response plan and with the procedures that will be in use by the contractor and the region/installation or municipal fire and emergency services, and familiarize all parties with the scope of work and aspects of the work or ship conditions that have significance in fire prevention and firefighting.

3.57.1 The conference must specifically address the following matters:

3.57.1.1 Fire alarm and response procedures.

3.57.1.2 Contractor firefighting capability and procedures.

3.57.1.3 Region/installation or municipal fire and emergency services firefighting capability and procedures.

3.57.1.4 Firefighting jurisdictional cognizance and incident command procedures.

3.57.1.5 Communication system for fire reporting and control or firefighting efforts.

3.57.1.6 Shipboard arrangement including access routes, availability or firefighting systems (installed and temporary), fire zone boundaries, and communication systems.

3.57.1.7 Each shipboard firefighting organization, system, drill, and equipment to include rehabilitation procedure.

3.57.1.8 Ship, space, and equipment security consideration.

3.57.1.9 Compatibility of ship, contractor, and region/installation or municipal fire and emergency services firefighting equipment.

3.57.1.10 Industrial work scope, including location of ship, and effect on firefighting systems, access, and communications.

3.57.1.11 The roles, responsibilities, and membership of the Fire Safety Council (FSC). Include the requirement to obtain permission from the FSC to perform work that affects the fire safety posture (e.g., securing the firemain, securing the 1MC, undocking, transferring fuel/lube oil) of the ship.

3.57.1.12 Hot work monitoring and confined space practices.

3.57.2 The firefighting and fire prevention conference must include a table top fire drill.

3.58 Conduct a tour of the ship with region/installation or municipal fire and emergency services personnel, the SUPERVISOR, Ship's Force, and contractor key personnel assigned specific responsibilities during fires to familiarize personnel with the ship's normal access, ship arrangement, shipboard fire prevention, and firefighting systems, equipment, and organization and anticipated condition while industrial work is in progress.

3.59 Provide a portable 300 KW diesel generator with associated cables, lugs/plugs to supply emergency power during transits to and from dry dock when ship's emergency power cannot be used.

3.60 Stage dust collectors off the ship.

3.60.1 Submit each request for deviation to the FSC via the SUPERVISOR for adjudication. Deviation request must include a written risk mitigation plan.

3.61 Provide cognizant management representation to participate in reoccurring Fire Safety Council meetings.

3.6I.1 Cognizant management representation must be prepared to address fire safety, work, and energy control problems, and offer a reasonable solution to each problem, which may have impact on fire safety posture during the availability.

3.6I.2 The representative(s) must be authorized to make each management decision relative to each routine fire safety decision of the Fire Safety Council that, in good faith, commit the contractor.

3.62 Notify the vessels Quarterdeck and the Supervisor immediately by verbal means of each fire, which occurred, or is occurring on the vessel, dry dock where a naval vessel is docked or a pier/berth where the vessel is moored.

3.62.1 Secure and preserve the scene until released by the SUPERVISOR.

3.62.2 Submit one legible copy, in approved transferrable media, of a formal written report, Attachment F, of the incident to the SUPERVISOR within one day of each fire. Provide daily updates within one day upon request by the SUPERVISOR, until the final report is submitted. ***The written report must contain the date and time of incident, extent of each personal injury or property damage, contractor/subcontractor name, Job Order/Work Item Number, type of fire, location of event (ship name and hull number, space, compartment), a brief description of the event including occurrences leading up to the incident, equipment involved, Contract Number, witness and/or individuals involved, short term and long term corrective action, and root cause analysis must be in accordance with Attachment “G”.***

#### 4. NOTES:

4.1 Example equation for DDG-51 Class with 200-foot hose:

Parameters for the example:

Attachment A = 1000 GPM for DDG

Sample Cooling and flushing load: 250 GPM

Attachment B = 200 GPM for 200-foot hose of 2 and one-half inch hose

$$\frac{(\text{Attachment A} + \text{Cooling and Flushing Load})}{\text{Attachment B}} = \# \text{ of hoses required}$$
$$\frac{(1000\text{gpm} + 250 \text{ gpm})}{200\text{gpm}} = 6.25 \text{ hoses}$$

Requires 7 (rounded up to next whole number) 2 and one-half inch hoses to supply firefighting and cooling load.

4.2 “Hydraulically Remote” is defined as an area/location that will encounter the highest pressure loss, from both flow friction and elevation change, while encountering maximum possible flowrate.

4.3 Distribution Hose is defined any hose or pipe that transports water to the temporary hose manifold stations or ship's firemain.

4.4 Handline Hose is defined as the hose(s) that transports water from the temporary hose manifold station to the hose fire nozzle.

4.5 Air and smoke control curtains are not intended to provide an air tight seal of the hull opening. The curtains are to ensure that emergency responders can control the flow of air and smoke through the opening to allow for de-smoking of compartments, and minimize "chimney" effects.

4.6 A "quick disconnect" is a coupling or connecting device/system designed to permit easy and immediate separation of lines without the use of tools and to ensure the contents do not escape.

4.7 Shipboard fixed extinguishing systems such as Halon and CO2 are to be secured or isolated only at the discretion of the ship's Commanding Officer or designated representative. Employees should be trained as required by 2.2 before entering/working in spaces with active shipboard fixed extinguishing systems.

4.8 The term "annual" means once a year, not-to-exceed 12 months.

4.9 FRG CID permanent identification number; A-A-60022. |

4.10 Fires are unintended states, processes, or instances of combustion in which fuel or other material is ignited and combined with oxygen, giving off smoke, sparks, or flame. Smoke or sparks may or may not be present. However, if unexpected smoke or sparks exist, a fire should be assumed to exist (this is especially relevant to Class 'C' fires when the smoke or sparks cease after power is secured).

4.11 The Fire Safety Council (FSC) must concur on mitigation actions. FSC must ensure a means of access/egress is maintained via the other required brow(s)/gangway(s).

ATTACHMENT A  
FIRE PROTECTION WATER SUPPLY REQUIREMENTS

| <u>SHIP CLASS</u> | <u>SHIP TYPE</u>                       | <u>FLOW (GPM)*</u> |
|-------------------|--|--------------------|
| AD                | Destroyer Tender                       | 1,500              |
| ADG               | Degaussing Ship                        | 500                |
| AE                | Ammunition Ship                        | 1,500              |
| AF                | Store Ship                             | 1,500              |
| AFS               | Combat Store Ship                      | 1,500              |
| AG                | Miscellaneous Auxiliary Ship           | 1,500              |
| AGEH              | Hydrofoil Research Ship                | 500                |
| AGF               | Miscellaneous Flagship                 | 2,000              |
| AGFF              | Frigate Research Ship                  | 1,000              |
| AGM               | Missile Range Instrumentation Ship     | 1,500              |
| AGMR              | Major Communications Relay Ship        | 1,500              |
| AGOR              | Oceanographic Research Ship            | 500                |
| AGP               | Gunboat Support Ship                   | 2,000              |
| AGS               | Surveying Ship                         | 1,000              |
| AH                | Hospital Ship                          | 1,000              |
| AK                | Cargo Ship                             | 1,500              |
| AKS               | Store Issue Ship                       | 1,500              |
| AKR               | Vehicle Cargo Ship                     | 1,500              |
| ANL               | Net Laying Ship                        | 500                |
| AO                | Oiler                                  | 1,500              |
| AOE               | Fast Combat Support Ship               | 1,500              |
| AOG               | Gasoline Tanker                        | 1,000              |
| AOR               | Fleet Replenishment Oiler              | 1,500              |
| AP                | Transport Ship                         | 1,000              |
| APB               | Self-propelled Barracks Ship           | 500                |
| AR                | Repair Ship                            | 1,500              |
| ARB               | Battle Damage Repair Ship              | 500                |
| ARC               | Cable Repair and Laying Ship           | 1,000              |
| ARG               | Internal Combustion Engine Repair Ship | 1,500              |
| ARL               | Landing Craft Repair Ship              | 1,000              |
| ARS               | Salvage Ship                           | 500                |
| ARST              | Salvage Tender                         | 1,000              |
| ARSD              | Salvage Lifting Ship                   | 500                |
| ARVA              | Aircraft Repair Ship                   | 1,000              |
| ARVE              | Aircraft Engine Ship                   | 1,000              |
| ARVH              | Helicopter Tender                      | 1,500              |
| AS                | Submarine Tender                       | 1,500              |
| ASR               | Submarine Rescue Ship                  | 600                |

ATTACHMENT A  
FIRE PROTECTION WATER SUPPLY REQUIREMENTS (Con't)

| <u>SHIP CLASS</u> | <u>SHIP TYPE</u>                           | <u>FLOW (GPM) *</u> |
|-------------------|--|---------------------|
| ATA               | Ocean Tug                                  | 500                 |
| ATF               | Ocean Tug Fleet                            | 500                 |
| ATS               | Salvage and Rescue Tug                     | 500                 |
| AVM               | Guided Missile Ship                        | 1,500               |
| CV, CVN           | Aircraft Carrier                           | 3,000               |
| CG                | Guided Missile Cruiser                     | 1,000               |
| DDG               | Guided Missile Destroyer                   | 1,000               |
| FFG               | Guided Missile Frigate                     | 1,000               |
| IX                | Unclassified Miscellaneous                 | 1,500               |
| LCC               | Amphibious Command Ship                    | 1,000               |
| LCS               | Littoral Combat Ship                       | 1,000               |
| LHA**             | Amphibious Assault Ship                    | 2,500               |
| LHD**             | Amphibious Assault Ship                    | 2,500               |
| LPD***            | Amphibious Transport Dock                  | 1,500               |
| LSD***            | Landing Ship Dock                          | 2,000               |
| YRB               | Repair and Berthing Barge                  | 500                 |
| YRBM              | Repair, Berthing and Messing Barge         | 500                 |
| YRBL              | Repair, Berthing and Messing Barge (large) | 500                 |
| LST               | Landing Ship Tank                          | 1,500               |
| MCM               | Mine Counter Measures Ship                 | 750                 |
| PC                | Patrol Coastal                             | 500                 |
| PCH               | Hydrofoil Patrol Craft                     | 500                 |
| PG                | Patrol Combatants                          | 500                 |
| PGH               | Hydrofoil Gunboat                          | 500                 |

\* All flows are from the pier or dry dock outlet and are available at adequate residual pressures from those systems in compliance with present design criteria for dry docks and piers as reflected in NAVFAC design manuals (UFC 4-213-10, UFC 4-213-12, UFC 4-152-01, UFC 4-150-02, and UFC 4-150-06).

\*\* Includes supply to operate 2 hangar sprinkler groups and 2, 2 and one-half-inch hose lines.

\*\*\* Includes supply to operate one sprinkler group and 2, 2 and one-half-inch hoses.

Attachment B

Hose Capacity (GPM)\*

| SIZE (in.)                                     | LENGTH<br>(100ft.) | LENGTH<br>(150ft.) | LENGTH<br>(200ft.) | LENGTH<br>(250ft.) |
|--|--------------------|--------------------|--------------------|--------------------|
| 2 ½  | 300 GPM            | 225 GPM            | 200 GPM            | 175 GPM            |
| 3 ½  | 750 GPM            | 600 GPM            | 500 GPM            | 450 GPM            |
| 4  | 1000 GPM           | 825 GPM            | 700 GPM            | 650 GPM            |
| Notes:<br>*Based on 20 PSI total friction loss |                    |                    |                    |                    |

**ATTACHMENT C**

|                           |             |
|---------------------------|-------------|
| Hot Work Notification Log |             |
| Ship name/hull number:    | Location:   |
| Date:                     | Log sheet # |

| Company/Command | HW Coordinator<br>(Print Name) | HW Auth<br>Form<br>Serial # | <i><b>Time<br/>Released</b></i> | HW Coordinator<br>Signature | End Time | HW Coordinator<br>Signature | HW Location |
|-----------------|--------------------------------|-----------------------------|---------------------------------|-----------------------------|----------|-----------------------------|-------------|
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |
|                 |                                |                             |                                 |                             |          |                             |             |



## ATTACHMENT C

### HOT WORK NOTIFICATION LOG INSTRUCTIONS

- 1- Ship Name/Hull Number: Indicate ship name and hull number of the location of the walk thru.
- 2- Location: Indicate location where ship is moored or docked, i.e. name of contractor facility or pier at Naval Base or Station.
- 3- Date: Indicate date of when the log was put into service. New log will be used each day.
- 4- Log Sheet #: Indicate the log number by keeping a running total throughout the availability.
- 5- Company/Command: Indicate Company/Command conducting the hot work (i.e. prime contractor, sub-contractor, AIT, RMC, ship's force).
- 6- HW Coordinator: Indicate by printing legibly the name of the Hot Work Coordinator responsible for managing HW authorization forms.
- 7- HW Authorization Form Serial Number: Indicate the serial number of the hot work notice for the hot work commencing.
- 8- **Time Released : Indicate the time HW Coordinator releases the HW Authorization Form to HW Supervisor.**
- 9- HW Coordinator Signature: Signature of the Hot Work Coordinator affirming requested hot work authorization forms will be worked each shift.
- 10- End Time: **Indicate the time the HW Supervisor reports to the HW Coordinator that HW has ended.**
- 11- HW Coordinator Signature: Signature of the Hot Work Coordinator affirming hot work has ended and space is in a safe condition.
- 12- HW Location: Compartment number and noun name of location where HW will be accomplished.

## ATTACHMENT D

### LIMIT OF SUBMITTED HOT WORK AUTHORIZATION FORMS PER DAY PER SHIP CLASS

| Ship Class                                     | Hot Work limit Per Day |
|--|------------------------|
| Amphibious Assault Ship (LHD, LHA) waterborne  | 100                    |
| Amphibious Assault Ship (LHD, LHA) in dry-dock | 150                    |
| Command Ship (LCC) waterborne                  | 75                     |
| Command Ship (LCC) in dry-dock                 | 125                    |
| Amphibious Transport Dock (LPD) waterborne     | 75                     |
| Amphibious Transport Dock (LPD) in dry-dock    | 125                    |
| Dock Landing Ships (LSD) waterborne            | 100                    |
| Dock Landing Ships (LSD) in dry-dock           | 150                    |
| Guided Missile Cruiser (CG) waterborne         | 75                     |
| Guided Missile Cruiser (CG) in dry-dock        | 125                    |
| Guided Missile Destroyer (DDG) waterborne      | 75                     |
| Guided Missile Destroyer (DDG) in dry-dock     | 125                    |
| Littoral Combat Ship (LCS) waterborne          | 50                     |
| Littoral Combat Ship (LCS) in dry-dock         | 75                     |
| Mine Countermeasures Ship (MCM) waterborne     | 50                     |
| Mine Countermeasures Ship (MCM) in dry-dock    | 75                     |
| Patrol Coastal Ship (PC) waterborne            | 50                     |
| Patrol Coastal Ship (PC) in dry-dock           | 75                     |

## ATTACHMENT E

Fire Zone BoundariesSafety, Fire Prevention, and Housekeeping  
Discrepancy and Corrective Action LogAttendees

Ship name/hull number:

Location:

Prime Contractor:

Date:

Time:

| No. | Point of Contact | Date Identified | Date Corrected | Location | Discrepancy | Corrective Action | Code |
|-----|------------------|-----------------|----------------|----------|-------------|-------------------|------|
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |
|     |                  |                 |                |          |             |                   |      |

Type Codes: 1-Housekeeping, 2-Fire Prevent./Fire Equipment, 3-Hot Work., 4-FZ Boundary, 5-Electrical, 6-Compress Gas/Hoses/Bottles/Manifolds, 7-Scaffolding, 8-Egress/Exit, 9- Walking/Working Surfaces, 10-PPE, 11- Containment, 12-Unguarded/Edges/Holes/Openings/Fall Protection, 13- Confined/Enclosed Spaces, 14-Lines & Leads Hazards, 15-Equip. Adrift & Rollback, 16-Ventilation, 17-Machine Guarding/Hand Tools, 18-Crane/Rigging, 19-Environmental & Hazardous Material/Communication, 20-Environmental Protection, 21-General Safety

ATTACHMENT E

ESH DISCREPANCY AND CORRECTIVE ACTION LOG INSTRUCTIONS

- 1- Fire Zone Boundaries: List the designated Fire Zone Boundaries.
- 2- Attendees: List Company and or Command and names of personnel present for walk thru.
- 3- Ship Name/Hull Number: Indicate ship name and hull number of the location of the walk thru.
- 4- Location: Indicate location where ship is moored or docked, i.e. name of contractor facility or pier at Naval Base or Station.
- 5- Prime Contractor: Indicate prime contractor who has the contract with the SUPERVISOR.
- 6- Date: Indicate date of walk thru being accomplished.
- 7- Time: Indicate start time (24 hour clock) of walk thru being accomplished.
- 8- No. (number): List sequentially, each discrepancy noted during the walk thru. Number will continue where the numbering left off the previous day, until the end of the availability.
- 9- Point of Contact: Indicate Company/Command identified with the discrepancy (i.e. prime contractor, sub-contractor, AIT, RMC, ship's force).
- 10- Date Corrected: Date condition was corrected. If condition is not corrected, condition will be carried over to the next walk thru until condition is corrected.
- 11- Location: Indicate location of the condition, i.e. space number or frame number.
- 12- Discrepancy: Indicate condition that needs corrective action, be specific as necessary.
- 13- Corrective Action: Indicate corrective action taken to correct the condition and who is responsible for the corrective action.
- 14- Code: Indicate code, located at the bottom of ATTACHMENT A that condition can be grouped with, i.e. lines on deck causing trip hazard would use code 14- Lines and Leads Hazards.

Type Codes: 1-Housekeeping, 2-Fire Prevent./Fire Equipment, 3-Hot Work., 4-FZ Boundary, 5-Electrical, 6-Compress Gas/Hoses/Bottles/Manifolds, 7-Scaffolding, 8-Egress/Exit, 9- Walking/Working Surfaces, 10-PPE, 11- Containment, 12-Unguarded/Edges/Holes/Openings/Fall Protection, 13- Confined/Enclosed Spaces, 14-Lines & Leads Hazards, 15-Equip. Adrift & Rollback, 16-Ventilation, 17-Machine Guarding/Hand Tools, 18- Crane/Rigging, 19-Environmental & Hazardous Material/Communication, 20-Environmental Protection, 21-General Safety

ATTACHMENT F  
FOR OFFICIAL USE ONLY

|  |  |  |
|--|--|--|
| <b>FIRE INCIDENT REPORT</b>                |  |  |
| Report #                                   |  |  |
| INITIAL REPORT<br><input type="checkbox"/> | REQUESTED UPDATE<br><input type="checkbox"/> | FINAL REPORT<br><input type="checkbox"/> |

CLASS OF FIRE:

NAME(S) OF INJURED (if applicable):

|  |                                       |
|--|---------------------------------------|
| <u>FIRE INCIDENT DATE:</u><br><u>TIME:</u> | <u>COMPANY:</u><br><u>SUPERVISOR:</u> |
| <u>LOCATION(S) OF INCIDENT:</u>            | <u>WAF NUMBER:</u>                    |
| <u>CAUSE OF FIRE INCIDENT:</u>             | <u>EQUIPMENT INVOLVED:</u>            |
| <u>WORK ITEM NUMBER:</u>                   | <u>CONTRACT NUMBER:</u>               |

**WITNESS AND/OR INDIVIDUALS INVOLVED**

| NAME(S) | DEPT. | COMPANY |
|---------|-------|---------|
|         |       |         |
|         |       |         |
|         |       |         |
|         |       |         |

**DESCRIPTION OF FIRE INCIDENT**

**DISPOSITION OF INJURED (if applicable)**

**IMMEDIATE CORRECTIVE ACTION**

ATTACHMENT F  
FOR OFFICIAL USE ONLY

|                            |        |
|----------------------------|--------|
| INVESTIGATED BY (NAME):    | TITLE: |
| SIGNATURE OF INVESTIGATOR: | DATE:  |
|                            |        |
| FIRE INCIDENT REPORT       |        |
| Report #                   |        |

LONG TERM CORRECTIVE ACTION

ROOT CAUSE ANALYSIS

ATTACHMENT F  
FOR OFFICIAL USE ONLY

|  |  |
|--|--|
|  |  |
|--|--|

|                            |        |
|----------------------------|--------|
| INVESTIGATED BY (NAME):    | TITLE: |
| SIGNATURE OF INVESTIGATOR: | DATE:  |

Incident Report Instructions

REPORT NUMBER- Unique tracking number created by contractor

CLASS OF INCIDENT- i.e. Alpha, Charlie, Delta, Echo

NAME(S) OF INJURED- Self Explanatory

FIRE INCIDENT DATE: - Self Explanatory

TIME: - Self Explanatory

COMPANY: - Prime and subcontractors involved

SUPERVISOR – Supervisor of employee(s) involved

LOCATION(S) OF FIRE INCIDENT: - Installation, private yard, Ship name and hull number, space number(S) and compartment name(S)

WAF NUMBER – WAF assigned to the hot work being conducted or equipment being worked

ATTACHMENT F  
FOR OFFICIAL USE ONLY

CAUSE OF FIRE – i.e. Hot Work, industrial process, temporary service damage, temporary service malfunction

EQUIPMENT INVOLVED – Equipment working on and equipment being used to cause fire incident

WORK ITEM NUMBER – Work Item being accomplished when fire incident occurred

CONTRACT NUMBER: - Contract Number assigned by government agency i.e. RMC, Alteration Installation Team (AIT) Sponsor.

WITNESS AND/OR INDIVIDUALS INVOLVED – Name, company of witnesses and or individuals involved with the fire incident.

DESCRIPTON OF FIRE INCIDENT OR NEAR MISS – Short description of events leading up to the fire incident and extent of injuries and or damage to equipment.

DISPOSITION OF INJURED – i.e. Transported to hospital via ambulance or POV, transported to clinic, released from hospital, name of hospital or clinic, limited duty or loss time (if known).

IMMEDIATE CORRECTIVE ACTION – i.e. Scene/space secured, ship notified (who and when), RMC notified (who and when) clean up of fire debris, equipment secured.

INVESTIGATED BY – Self Explanatory.

TITLE – Self Explanatory.

SIGNATURE OF INVESTIGATOR – Self Explanatory.

DATE – Self Explanatory.

LONG TERM CORRECTIVE ACTION – What action(s) were taken so that the fire incident does not reoccur, i.e. training, safety stand down or process/policy change.

ROOT CAUSE ANALYSIS – Process by which you will identify the cause or contributing factors of the fire incident.

Note: Attach additional information as necessary.



## Attachment G

| Root Causes   | Category Description   |
|---|--|
| <ul style="list-style-type: none"> <li>• Personnel <ul style="list-style-type: none"> <li>○ Work Practices</li> <li>○ Training</li> <li>○ Supervision</li> </ul> </li> <li>• Procedures</li> <li>• Design <ul style="list-style-type: none"> <li>○ Technical Documentation</li> </ul> </li> <li>• Material</li> </ul> | <ul style="list-style-type: none"> <li>• Work Practices- Craftsman knows or understands the requirements, but fails to follow them</li> <li>• Training- Training of employees and subcontractors.</li> <li>• Supervision- Lack of preparation or follow through for the original planned event.</li> <li>• Procedures- Issues with procedures provided by outside agency or another activity utilized during the unplanned event.</li> <li>• Tech Documentation- Issues with DWGs, Specifications or Design aspect.</li> <li>• Material- Failure of material to perform under designed conditions and uses.</li> </ul> |
| Category  | Attribute  |
| Work Practices  | <ul style="list-style-type: none"> <li>• Failure to follow Procedure</li> <li>• Use of incorrect or outdated Procedures</li> <li>• Inattention to detail</li> <li>• Improper tools/use of tools</li> </ul>   |
| Training  | <ul style="list-style-type: none"> <li>• Nonexistent training or qualification</li> <li>• Content is inadequate</li> <li>• Inadequate training or qualification frequency</li> </ul>   |
| Supervision   | <ul style="list-style-type: none"> <li>• Assignment of unqualified personnel</li> <li>• Inadequate direction provided</li> <li>• Inadequate review of worksite or Documents</li> </ul>   |
| Procedures  | <ul style="list-style-type: none"> <li>• Procedure contains inadequate or unclear direction</li> <li>• Procedure contains incorrect direction</li> </ul>   |
| Technical Documentation   | <ul style="list-style-type: none"> <li>• Error in Drawing or Technical Document</li> <li>• Design deficiency</li> </ul>  |
| Material  | <ul style="list-style-type: none"> <li>• Material Failure</li> </ul>   |