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27 APRIL 2001

COMMANDANT NOTICE 16000 CANCELED: 27 APRIL 2002

Subj: CONFINED SPACE ENTRY POLICY ABOARD MERCHANT VESSELS FOR MARINE SAFETY AND ENVIRONMENTAL PROTECTION PERSONNEL

Ref: (a) Marine Safety Manual (MSM), Volume I, Chapter 10, COMDTINST M16000.6
(b) Title 29 Code of Federal Regulations (CFR) part 1915-Occupational Health and Safety Standards for Shipyard Personnel

1. PURPOSE. This Notice updates the guidance contained in reference (a) for Marine Safety personnel conducting confined and enclosed space entry aboard merchant vessels to best address the latest OSHA requirements contained in reference (b). This policy will be incorporated into the next revision of reference (a).

2. ACTION. Area and district commanders, commanders of maintenance and logistics commands, commanding officers of headquarters units, assistant commandants for directorates, Chief Counsel, and chiefs of special staff offices at Headquarters shall ensure compliance with the provisions of this Notice.

3. DIRECTIVES AFFECTED. The confined space entry policy contained in Marine Safety Manual (MSM), Volume I, Chapter 10, COMDTINST M16000.6, is superseded by the policy contained in this Notice.

DISTRIBUTION SDL No. 139

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4. BACKGROUND.

a. Current guidance for confined space entry is in the form of recommended Safe Work Practices (SWP's) contained in the Marine Safety Manual (MSM), Volume I, Chapter 10. Although much of the guidance in the MSM has been modified over the years and has been incorporated into SWP's in the current version, the general policy of requiring an NFPA Certificated Marine Chemist to test and certify confined spaces prior to entry by Coast Guard personnel has not changed. However, experience has shown that the SWP's have raised questions as to what is actually required and do not give any guidance for alternative procedures when the SWP's are not feasible based on local conditions. This has resulted in inconsistent application of policy.

b. Commandant (G-MSO-3), in an effort to update the confined space entry policy, remove any ambiguities, and provide better consistency among the field units, sent an initial draft to the field for comment. Based on the comments received, four key issues were identified:

(1) Who should certify confined spaces on merchant vessels safe for entry by Coast Guard personnel?

(2) What are the Coast Guard's responsibilities as (a) an employer of personnel working in shipyards, and (b) a federal safety agency working in a shipyard regulated by a different federal safety agency?

(3) Should Coast Guard personnel enter spaces where welding is being conducted?

(4) How will the Coast Guard address fall protection requirements?

c. Field responses to the draft were reviewed and draft policies for each issue were developed and redistributed for further comment. The general consensus on the second round of comments was that Marine Chemists should certify all spaces aboard merchant vessels prior to entry by Coast Guard personnel. Many comments contained strong reservations as to the consistency of the training and knowledge of competent persons at individual shipyards. These concerns were amplified by the findings of a Coast Guard Industrial Hygiene graduate student who evaluated several shipyard competent person programs in the Eighth District as part of a Master's Degree project, finding significant disparities in the levels of training, knowledge, experience and condition of air monitoring equipment. However, equally valid concerns were raised with respect to passenger vessel inspections and other situations where Marine Chemists are not readily available, or in the case of overseas inspections, not available at all. Such scenarios indicated that Coast Guard policy must provide alternatives to the use of a Marine Chemist, while still providing a safe, consistent entry policy.

d. Most of the comments concerning our role in shipyard compliance agreed that an exchange of hazard information is important to ensure the safety of our personnel. There were many good suggestions on how to handle violations of OSHA standards that were discovered by Coast Guard personnel. Most suggested partnering with shipyards and cautioned against the appearance that we were inspecting them. Some concerns were raised as to resource constraints and additional training that would be needed to visit and evaluate the shipyard safety programs and many differing opinions were offered as to who would be best suited to conduct such visits.

e. On the issue of entry during welding, many units felt awareness of welding hazards is much lower than for other common hazards and therefore had not been adequately addressed. They recommended a firm policy stating that we should not enter confined spaces until the welding has been completed and the space has been properly ventilated. There were others that were convinced that this policy would severely impact industry and that an alternative was necessary.

f. Comments on the fall protection issue strongly supported a policy of not climbing higher than 6 feet above a steel landing (IAW OSHA regulations), and for units to work with local shipyards to find alternative methods to conduct the necessary inspections without free climbing.

5. OSHA REQUIREMENTS.

a. Under 29 CFR part 1960, federal agencies must comply with OSHA standards unless an alternate standard has been submitted to and approved by the Secretary of Labor. Coast Guard military personnel and Coast Guard military specific operations are exempt from this requirement. However, the Coast Guard policy is to comply with all OSHA regulations, in the interest of the health and well being for all personnel, unless specifically covered by Coast Guard policy.

b. Confined space entry by Marine Safety personnel is covered under OSHA's regulations governing shipyard employment, specifically 29 CFR 1915, subpart B- Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment. The scope of this regulation includes all shipyard employment, including vessels, vessel sections and shoreside operations, regardless of location. Shipyard employment is defined as ship repairing, shipbuilding, shipbreaking and related employment. Coast Guard activities fall under the "related employment" category, which is defined as any employment performed as or in conjunction with ship repairing, shipbuilding or shipbreaking work, including, but not restricted to, inspection, testing, and employment as a watchman. NOTE: a vessel does not have to be in a shipyard for work on the vessel to be considered shipyard employment.

c. Subpart B requires all employers to designate "competent persons" or to state that a Marine Chemist will perform all duties required of a competent person. It does not allow one employer's personnel to enter confined spaces that have been certified by the competent person designated by a different employer. This requirement prevents an employer from passing on the responsibility of ensuring a safe and healthy work environment for its employees.

6. GENERAL POLICY.

Enclosure (1) outlines the general confined space entry policy in a simple question and answer format. The general policy addresses each of the four issues discussed previously in the Background section of this Notice. It incorporates the field comments discussed previously and better addresses OSHA requirements and other industry standards and guidelines. These include, but are not limited to, the National Institute of Occupational Safety and Health (NIOSH), the National Safety Council (NSC), and the National Fire Protection Association (NFPA).

7. ALTERNATIVE PROCEDURES.

a. Nothing in this instruction prevents Commanding Officers from exercising their authority to develop alternative SWP's based on local conditions when the policy in this Notice either inhibits the ability of the unit to meet its missions or does not adequately address the safety hazards.

b. The enclosures provide guidance on developing alternative SWP's to meet local needs and conditions. Appendix C of enclosure (1) contains specific guidance regarding designation of Coast Guard competent persons. Enclosure (6) is a SWP for entering spaces where welding is or has been conducted. While guidance for alternative policy is intended to be used as the exception rather than the rule, the enclosures should allow a unit some flexibility while still ensuring compliance with OSHA regulations and other standards and guidelines. The alternative procedures often require additional training, resources and/or equipment in order to meet equivalent levels of safety to the standard policy.

c. A Coast Guard health and safety professional from the respective MLC (kse) staff or the detached Safety and Environmental Health Officer located at the ISC must review alternative SWP's. Any alternative SWP that is developed must also be included in the unit's written safety and occupational health program as required by reference (a).

Encl: (1) Marine Safety and Environmental Protection Confined Space Entry Policy Aboard Merchant Vessels
(2) Job Aid #100: Evaluation of Shipyard Health and Safety Program with respect to impact on CG Employee Health and Safety
(3) Job Aid #200: Confined Space Entry Ventilation
(4) Safe Work Practice #100.1- CONFINED AND ENCLOSED SPACES (GENERAL)
(5) Safe Work Practice #110.1- CONFINED AND ENCLOSED SPACES: ENTRY IN THE SHIPYARD ENVIRONMENT
(6) Safe Work Practice #111- ENTERING CONFINED SPACES ON VESSELS IN SHIPYARDS WHERE WELDING IS BEING CONDUCTED
(7) Safe Work Practice #120.1- Confined and Enclosed Spaces: pumproom entry aboard vessels outside the shipyard environment
(8) Safe Work Practice #150- Confined and Enclosed Spaces: Entry aboard vessels

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INTRODUCTION

Confined spaces aboard merchant vessels can pose a serious threat to the health and safety of Coast Guard Marine Safety personnel. The atmospheric hazards associated with confined spaces may be acute, such as explosive or oxygen deficient atmospheres. Chronic health hazards also exist that are much less apparent, consisting of low level exposures which may result in delayed health effects, some of which may not occur until twenty or thirty years after the exposure. Exposures for Coast Guard personnel are more likely to be well below established exposure guidelines, but may consist of a multitude of chemicals, albeit at very low levels. The health effects related to the interaction of these various chemical exposures are unknown, making it important to prevent or minimize exposures wherever possible.

The purpose of this confined space policy is to reinforce current Coast Guard policy and provide supplemental guidance to assist individual marine safety units in complying with regulatory requirements and recommendations from established authorities. This policy is intended to make confined space entry procedures more consistent, in general, throughout the Coast Guard while also providing individual units or districts the flexibility to deviate from the policy to better address local hazards or conditions.

The policy was drafted from the standpoint of the responsibilities of the Coast Guard as "an employer." The Coast Guard has the same responsibilities as any shipyard has for its employees. As such, the Coast Guard has chosen to comply with 29 CFR part 1915. The difficulty with this requirement is that Coast Guard marine inspectors perform their duties in a multitude of work environments over which the Coast Guard has little or no control. Therefore, we must work closely with shipyards to ensure our personnel are aware of the potential hazards and are adequately protected. Close coordination is necessary to ensure our personnel are adequately protected while maintaining the ability to effectively perform required missions.

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DEFINITIONS.

Air Purifying Respirator (APR): A respirator that removes a contaminant from the air being inhaled by the wearer as a result of passing it through a filter or cartridge containing a solid sorbent, such as activated charcoal.

***Adjacent spaces:** Those spaces in all directions from subject space, including all points of contact, corners, diagonals, decks, tank tops, and bulkheads.

Ceiling Limit: An airborne concentration above which personnel should not enter without proper respiratory protection. For the purposes of this policy, the concentrations specified in exposure guidelines (PEL's/TLV's) for chemicals shall be treated as ceiling limits.

Competent Person (CP): A person who is designated in writing by their employer and has the ability to understand and carry out written or oral information or instructions left by the Marine Chemist, has knowledge of 29 CFR 1915 Subparts B, C, D, and H; has knowledge of the structure, location, and designation of spaces where work is done; has the ability to calibrate and use testing equipment including but not limited to, oxygen indicators, combustible gas indicators, carbon monoxide indicators, and carbon dioxide indicators, and to interpret accurately the test results of that equipment; has the ability to perform all required tests and inspections which are or may be performed by a competent person as set forth in Subparts B, C, D, and H of 29 CFR 1915; has the ability to inspect, test, and evaluate spaces to determine the need for further testing by a Marine Chemist or Certified Industrial Hygienist and has the ability to maintain records as required by 29 CFR 1915.7(d). Note: The CP must be trained and be able to perform all tests for toxic vapors conducted by a Marine Chemist. These toxic tests shall be carried out by the CP to maintain the Marine Chemist certificate. Finally, the CP's training must be documented.

DEFINITIONS (Cont'd).

Confined Space: For the purposes of this policy, a "confined space" encompasses those spaces defined in 29 CFR 1915 as either a "confined space" or "enclosed space." Functionally, this would be an area on a vessel or vessel section that has the following characteristics:

(1) limited access or egress; or

(2) contains or may contain an atmosphere whose oxygen content is or may become less than 19.5% or greater than 22.0% by volume;

(3) contains or may contain an atmosphere in which flammable vapors or gases exceed or may exceed 10% of the lower explosive limit (LEL); or

(4) contains or may contain vapors or gases whose concentration exceeds or may exceed the OSHA Permissible Exposure Limit (PEL) or ACGIH Threshold Limit Value (TLV); or

(5) contains other hazards which are created or aggravated by the size and confined nature of a space or by the type of activity occurring in the space.

Examples include, but are not limited to: cargo tanks or holds; pump rooms; storage lockers; tanks containing flammable or combustible liquids, gases, or solids; double bottoms/sides; voids; forepeak/rake ends; crawl spaces; or accessways. Confined spaces may also include machinery or other structures that may not normally be thought of as a space, such as: large piping systems, engine crankcases, large heat exchangers, scavenging spaces, boiler mud or steam drums, etc. The atmosphere within a confined space is the entire area within its bounds.

***Enter with Restrictions:** A standard safety designation that indicates that in all spaces so designated, entry for work shall be permitted only if conditions of proper protective equipment, or clothing, or time, or all of the aforementioned, as appropriate, are specified.

Lower Explosive Limit (LEL): The lower limit of flammability of a gas or vapor at ambient temperatures and pressures, expressed in % of the gas or vapor in air by volume. Also called the lower flammable limit (LFL). (Note: Combustible gas indicators measure % of the LEL in the atmosphere.)

DEFINITIONS (Cont'd).

***Marine Chemist:** The holder of a valid Certificate issued by the National Fire Protection Association in accordance with the "Rules for Certification of Marine Chemists," establishing the person's qualifications to determine whether construction, alteration, repair, or ship breaking of vessels, which may involve hazards covered by NFPA 306, *Control of Gas Hazards on Vessels*, can be undertaken with safety.

Must: Action is required.

***Not Safe for Hot Work:** A standard safety designation that indicates that in the compartment so designated, hot work shall not be permitted.

***Not Safe for Workers:** A standard safety designation that indicates that the compartment or space so designated shall not be entered by personnel.

Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL): The inhalation exposure limit specified in 29 CFR 1915.1000. These limits may be expressed as 8-hour time-weighted average (TWA), 15-minute Short Term Exposure Limit (STEL), or Ceiling Limit (C).

Primary protection: When toxic gas, vapor, fume or dust levels exceed the PEL or TLV concentration, and a respirator is used so that a person may safely enter the space, the respirator is providing **primary protection**.

***Safe for Hot Work:** A standard safety designation that indicates that the compartment or space so designated, as well as all adjacent spaces, meet the requirements of NFPA 306 to enable hot work to be safely conducted in the subject space. See NFPA 306, Section 2-3.4, for the requirements to meet this designation.

***Safe for Limited Hot Work:** A standard safety designation that indicates that the compartment or space so designated, as well as all adjacent spaces, meet the requirements of NFPA 306 to enable hot work to be safely conducted in a specific area of the subject space as stated on the Certificate. See NFPA 306, Section 2-3.6, for the requirements to meet this designation.

***Safe for Workers:** A standard safety designation that requires that in the compartment or space so designated, the following criteria shall be met: (a) The oxygen content of the atmosphere shall be at least 19.5% and not greater than 22% by volume. (b) The concentration of flammable materials shall be below 10% of the lower explosive limit. (c) Any toxic materials in the atmosphere associated with cargo, fuel, tank coatings, inerting mediums, or fumigants shall be within permissible concentrations at the time of the inspection. (d) The residues or materials associated with the work authorized by the Certificate shall not be capable of producing uncontrolled toxic materials under existing atmospheric conditions while being maintained as directed on the Certificate.

DEFINITIONS (Cont'd).

Safety and Environmental Health Officer (SEHO): A Coast Guard or Public Health Service professional trained in the anticipation, recognition, evaluation and control of workplace and environmental hazards. SEHO's are assigned to Integrated Support Commands (ISC).

Safety and Occupational Health Coordinator (SOHC): A person assigned at a Coast Guard marine safety unit to coordinate its Safety and Occupational Health Program. This is generally a collateral duty, but may be a full-time position at larger Marine Safety Offices.

Secondary protection: When toxic gas, vapor, fume or dust levels do not exceed the PEL or TLV concentration, but a respirator is used because of nuisance odors or extra protection from exposure to contaminants, the respirator is providing **secondary protection**.

Threshold Limit Value (TLV)- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances: Airborne concentrations of substances which represent conditions to which nearly all workers may be repeatedly exposed, day after day, without adverse health effects. These limits may be expressed as an 8-hour time-weighted average (TWA), 15-minute Short Term Exposure Limit (STEL) or Ceiling Limit (C).

Yard shutdown: All work stops on all vessels. The yard completely shuts down. No vessels are moved into, out of, or within the yard during the stoppage.

* Reference- NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, 1997 Edition.

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1. What are the Coast Guard's responsibilities as an employer of personnel working in shipyards?	A. As an employer, the Coast Guard is responsible to anticipate, recognize, evaluate, control and manage work place hazards encountered by its employees. B. At a minimum, all applicable OSHA regulations must be met. The OSHA shipyard regulations are found in 29 CFR 1915. C. Coast Guard policy is to apply consensus standards as well.
2. Is the shipyard required to provide hazard information to the Coast Guard?	A. Yes. 29 CFR 1915.12(f) states that employers (shipyard and Coast Guard units) shall ensure that all available information on confined space hazards, safety rules, and emergency procedures is exchanged with any other employer whose employees may enter the same spaces. B. It is in the shipyard's interest to assist the Coast Guard in obtaining the hazard information the Coast Guard needs to fulfill Hazard Communication (29 CFR 1910.1200) requirements so that inspections are not delayed. Units are encouraged to develop proactive relationships with local shipyards regarding health and safety programs.
3. When shall hazard information be exchanged between the shipyard and the Coast Guard?	A. Information on occupational hazards, safety rules, and emergency procedures shall be exchanged between Coast Guard marine inspectors and the shipyard work supervisor before beginning any work. B. Information on confined space hazards, safety rules, and emergency procedures shall be exchanged before marine inspectors enter confined spaces. C. The CID, detachment supervisor, detail supervisor or SOHC shall visit each work site as necessary, but at least annually, to assist the marine inspectors in evaluating hazards and shipyard competent person programs. See *Job Aid # 100* which is provided to assist you in these visits. D. Units are encouraged to make arrangements to have their SEHO's accompany unit personnel on at least one shipyard review annually. It is recommended these visits be performed in conjunction with the regularly scheduled SEHO visit(s).

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4. What are the Coast Guard's responsibilities as a federal safety agency in a work place regulated by a different Federal Safety Agency (OSHA)?	A. Coast Guard personnel are not authorized to conduct OSHA compliance inspections. B. Coast Guard units should develop proactive relationships or partnerships with shipyards with the goal of improving health and safety for Coast Guard employees and shipyard personnel alike. C. Coast Guard personnel may observe discrepancies between shipyard practices and OSHA regulations while evaluating and controlling hazards for Coast Guard employees. These discrepancies should be brought to the attention of the yard foreman and/or safety director. D. If the shipyard is not responsive to correcting the discrepancies, Commanding Officers should consider reporting the violations to the local OSHA office depending on the severity and possible consequences of the violations. MSM Volume II, Chapter 5.I.6, provides guidance on reporting problems to OSHA regarding competent persons. E. Coast Guard personnel must ensure the competency of personnel performing the duties of a competent person prior to entering a confined space. Responses from the field regarding confined space entry policy indicate that too often, shipyard competent persons have been incapable of identifying all atmospheric hazards, properly calibrating their test instruments, properly testing spaces, recording results, and/or interpreting the results. The Competent Person Section of *Job Aid # 100* can be used to better evaluate the competent person program. F. For assistance with questions or problems in shipyards, contact the cognizant SEHO, the Headquarters marine safety industrial hygienist on the safety and environmental health staff (G-WKS-2) or the staff industrial hygienist assigned to the Hazardous Materials Standards Division (G-MSO-3).

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5. Who must certify confined spaces on merchant vessels safe for entry by Coast Guard personnel?	A. A Certified Marine Chemist shall conduct the initial inspection and certify confined spaces on merchant vessels "Safe for Workers" before entry by Coast Guard personnel. B. A shipyard's competent person may not certify spaces for initial entry by Coast Guard personnel because they are **not** designated by the Coast Guard. C. **Exceptions: If an initial confined space entry must be made without a valid Marine Chemist Certificate, the requirements contained in Appendix B, as a minimum, shall be followed**. When a Marine Chemist is not available, such as for overseas inspections, inspections in remote areas or inspections on small passenger vessels, fishing vessels, etc., Commanding Officers may develop local policy following the guidelines in Appendix B to train and designate unit personnel to perform as competent persons. The requirements of 29 CFR 1915 still apply and must be adhered to in developing local policy. The cognizant SEHO shall be consulted when developing this policy and is required to review and approve the policy before it is implemented.
6. What is the relationship between Marine Chemists and the local Marine Safety Offices?	A. The Coast Guard relies heavily on Marine Chemists to ensure the safety of our personnel to safely enter confined spaces. B. Coordination with local Marine Chemists is critical to ensuring the safety of our personnel. It ensures an understanding of each other's role and promotes better communication. Good communication and working relationships can prevent incidents from occurring, resulting in a win-win situation. When questions/problems arise with a Marine Chemist, an attempt to resolve the issue on the local level should be attempted first. C. In the event a Marine Chemist is found to violate NFPA 306 or otherwise has not properly carried out his/her duties, a report should be made via the chain of command to Commandant (G-MSO-3), who is the Coast Guard representative on the Marine Chemist Qualification Board (MCQB). For expediency purposes, the initial report can be made via telephone.

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7. Can a Certified Industrial Hygienist (CIH) certify a space for initial entry by Coast Guard personnel?	A. Not necessarily. The CIH would also have to either be a Marine Chemist or be a Coast Guard member designated as a competent person. CIH's are not, by virtue of their certification, a Marine Chemist or a competent person. B. Although a CIH should have knowledge of all the atmospheric testing requirements performed by a competent person, they may not be familiar with the structure, location and designation of spaces where work is to be conducted and they may not be familiar with shipyard regulations (29 CFR part 1915) or NFPA 306.
8. May Coast Guard personnel enter confined spaces initially certified by a Marine Chemist, then "maintained" by a Shipyard Competent Person?	A. Yes, at the discretion of the OCMI. If marine inspectors enter confined spaces with Marine Chemist Certificates maintained by competent persons, the marine inspectors shall be familiar with the shipyard's competent person program. *Job Aid # 100* shall be used to review the competent person program before entry. B. Although this may not fully meet OSHA requirements for maintenance of the Certificate because the competent person is not designated by the Coast Guard, it is not feasible to require Marine Chemists to maintain the certificate during extended periods of work. If there has been a change in conditions, then a Marine Chemist must recertify the space. C. If the shipyard's health and safety program has not been evaluated and found to be satisfactory (especially the confined space entry program), then the inspection should be scheduled within 24 hours of the Marine Chemist certifying the space if possible. If it is still necessary to enter the space, with the competent person maintaining the space, then the inspector should witness the tests and inspections performed by the competent person. D. See Section 11 of this policy for required tests and when to recall the Marine Chemist.

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9. What are the acceptable levels for the following atmospheric hazards?	**Acceptable Limits:**
Oxygen concentration	A. 19.5 to 22% by volume. [If the oxygen reading is anything other than the ambient level (approximately 20.8% by volume), the reasonable explanation for this difference should be determined before entry.]
Flammable vapors or gases	B. Less than 10% of the LEL. [Any reading between 1 and 10% should be evaluated with caution prior to entry. Readings in this range may indicate that a toxicity hazard exists.]
Toxic vapor or gas concentration	C. Lower than the lesser of the OSHA PEL or ACGIH TLV concentration, treated as a ceiling limit. See also Section 10 and Appendix A for additional guidance.
Welding fumes	D. Since welding fumes cannot be measured by direct-reading instruments and since each welding situation is different, Coast Guard personnel shall **not** enter confined spaces where welding is being conducted, except as noted below. Prior to entering confined spaces where welding has recently been conducted, the marine inspector shall ensure that the space has been ventilated using forced mechanical ventilation for a period long enough to ensure at least three air changes. See *Job Aid #200* for assistance in determining air changes and guidance on ventilation configuration schemes. **Exception:** If the OCMI determines that entering the space during welding is necessary to properly carry out our mission, the procedures in *SWP #111* should, as a minimum, be followed.

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10. When may Coast Guard marine safety personnel use respirators in confined spaces?	A. Except as noted in paragraph C. below, respirators shall not be worn as primary protection; however, respirators may be used for secondary or back-up protection. They may also be used voluntarily for nuisance dusts or odors. Marine safety personnel shall not enter spaces or atmospheres containing toxic vapors, gases, dusts, mists or fumes that exceed the OSHA PEL or ACGIH TLV concentration, whichever is less. This is due to the high number of low level exposures to chemicals experienced by Coast Guard personnel and the inability to predict the effects of the interaction of multiple chemicals. Therefore, OSHA PEL and ACGIH TLV concentrations are treated as ceiling limits. This means that no entry should be made using 8 hour TWA's as an admin control, e.g., limiting time in space when levels are above the PEL/TLV. B. If respirators are used under any conditions, the unit must be in full compliance with the Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2C, which includes a written program, medical evaluations and fit testing. C. **Exceptions:** Under extenuating circumstances, or due to local conditions where there is no feasible method to control a specific respiratory hazard, the OCMI, in consultation with the cognizant SEHO, may authorize the use of air purifying respirators as primary protection. Unit policies and procedures shall document the exception(s).

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11. How often must atmospheric tests be conducted to maintain the Marine Chemist's Certificate?	A. At least once every 24 hours and more often as necessary, depending on work conducted in the space. B. If testing indicates conditions have changed, a Marine Chemist shall recertify the space. C. If there is any doubt that conditions may have changed since the last test in the space, Coast Guard personnel should request the shipyard competent person to re-test the space. D. If a Marine Chemist tested for toxics, the competent person must also test for the same toxics, as well as oxygen and flammable gases to maintain the Marine Chemist Certificate, unless specifically stated otherwise on the Certificate. E. See 29 CFR 1915 subpart B, App. A for a good discussion on retesting and change of conditions. (Request re-testing if work has been conducted, a lunch break has been taken and equipment was left unattended in the space, equipment may have been operated on deck and exhaust has entered the space, etc.) F. **Exception:** During a yard shutdown, at shipyards where work completely stops over the weekend, testing may be suspended during the weekend. All spaces must be checked prior to the first workers entering spaces at the beginning of the week. (See definition of **yard shutdown**.)

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12. When is ventilation required? See Job Aid #200 for assistance in determining adequate ventilation.	A. Prior to entry, spaces shall be ventilated so that a minimum of three complete air changes have occurred. B. During entry, continuous ventilation shall be provided at volumes and flow rates sufficient to ensure oxygen, LEL, and toxic, corrosive or irritant vapors and dusts are maintained at acceptable levels. (Refer to 29 CFR 1915.13(b)(3).) C. If the ventilation fans or ducting blocks the only means of access and egress, arrangements should be made with the yard foreman to have an attendant standing by at the entrance during the entire time Coast Guard personnel are in the space. Ensure the attendant is prepared to move the fan or ducting to allow Coast Guard personnel easy access and egress. D. **Exception:** If natural ventilation is sufficient to meet the initial entry requirements for atmospheric conditions listed in Section 9 of this policy, then forced mechanical ventilation is not required for entry, provided the oxygen concentration is continuously monitored (use of a personal oxygen monitor is sufficient) and conditions have not changed within the space (See App. A for guidance). Examples may include spaces such as lazarettes or accessways. This exception does not apply to spaces such as cargo tanks, fuel tanks or other tanks that have contained materials capable of producing additional hazards resulting from regeneration of vapors.
13. What personal protective equipment (PPE) shall be provided by the unit?	A. General PPE requirements are found in MSM Volume I, Chapter 8-Material Management. This chapter is a good starting point for determining PPE, but it is the unit's responsibility to ensure their personnel have appropriate PPE to perform all required tasks in a safe manner. B. Units should ensure adequate PPE is provided to personnel entering confined spaces based on the hazards present. Units should contact the cognizant SEHO for determining appropriate PPE or to assess hazards.

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14. What PPE is provided by Headquarters?	A. Commandant (G-MOC) currently funds replacement parts to maintain the Scott 105 and Scott 108 meters. The Marine Safety Industrial Hygienist in Commandant (G-WKS-2) manages the contract. To order spare parts, contact this individual. B. Commandant (G-MOC) also funds personal oxygen alarms (Toxiclips). The Marine Safety Industrial Hygienist in Commandant (G-WKS-2) manages the contract and Toxiclips are distributed directly to field units based on the number of personnel requiring them. To change the number of Toxiclips your unit receives or for status updates on equipment orders, contact Commandant (G-WKS-2). Additional Toxiclips can be ordered utilizing unit funds at the contract price by contacting Commandant (G-WKS-2).
15. When must the personal oxygen alarm (e.g., Toxiclip, Cricket) be worn?	A. The personal oxygen alarm shall be worn by at least the first Coast Guard person entering every confined space. B. If possible, all Coast Guard personnel entering confined spaces should wear personal oxygen alarms. C. If the space contains internal structural members that could result in pocketing of gases, an oxygen alarm is required for every Coast Guard person entering the space.

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16. When must the Emergency Escape Breathing Apparatus (EEBA) be carried?	The EEBA is required to be carried: A. When Coast Guard personnel are near compressed or liquefied gas cargoes; B. In pump rooms on vessels carrying cargo *(vice on a vessel in a shipyard, that is completely gas free);* C. During entries into tanks that have carried Subchapter O cargoes unless it creates a safety hazard (e.g. inhibits egress from the tank); D. During testing of CO_2 fire extinguishing systems; and, E. When entering other spaces that have the potential for suddenly changing atmospheres. Examples include, but are not limited to: entering a space to witness a soap test of a repair in which the adjacent space is pressed up and not designated "SAFE FOR WORKERS" by the Marine Chemist, and entering a ballast tank with the adjacent tank full of cargo and/or inerted. The inspector must exercise judgement in determining the circumstances when the space's atmospheric conditions may become dynamic. **When in doubt, the EEBA should be carried.**
17. What precautions must be taken to prevent falls from greater than 6 feet?	A. OSHA regulations require that personnel do not climb more than 6 feet above a steel landing or 15 feet above a water landing without using adequate fall arrest equipment. This applies only to free climbing and does not include fixed ladders. B. Recognizing the difficulty of always applying the standard, Coast Guard units shall develop proactive working relationships with local shipyards and vessel owner/operators to resolve the fall protection issue within the guidelines provided here. C. Other options for conducting an inspection without free climbing include use of binoculars, high quality camera/video equipment, fixed and moveable scaffolding that meet OSHA requirements, and rafting.

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18. When is intrinsically safe or explosion-proof portable equipment required?	A. If all the spaces in the entire cargo block are not certified "Safe for Hot Work," only Underwriters Laboratories (UL) approved, Class I Division I Group D equipment, including flashlights and radios, may be used. B. Use of an inspection hammer in a space designated "Safe for Workers" is authorized, unless a note on the permit or certificate indicates otherwise.
19. What information is required on a Marine Chemist Certificate?	A. All items in the top section, including: Date and Time, Specific Location of Vessel, Vessel (Name) and Type of Vessel, Previous (3) Cargoes or Loadings, Tests Performed including oxygen, flammability, toxicity (specifying chemical(s)) and visual inspection. B. In the body of the certificate: a Listing of the Spaces, Standard Safety Designation(s), Test Results (% Oxygen, % of LEL, Toxics – typically measured in ppm) listed for each space individually or for a group of spaces for which the same results exist, additional instructions or notes, and C. In the signature line, the Marine Chemist's signature and the Person signing for receipt of the certificate, including the date received.
20. Must Coast Guard personnel be accompanied by a person having responsibility for the work?	A. Yes. A person responsible for the work should always accompany Coast Guard personnel. (In shipyards, a yard representative. On vessels outside of shipyards, a vessel representative.)
21. What communications capabilities are required?	A. Prior to entering a confined space, entrants (Coast Guard personnel and persons responsible for the work) shall agree with topside personnel as to the manner and frequency of communications under normal and emergency conditions. This may include radios, whistles, voice, etc.

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22. What issues shall be evaluated and precautions taken with regard to access and egress? **See also Section 12. C.**	A. The type of confined space to be entered, access to the entrance(s) including number and size of openings, barriers within the space, size of the space, including time required for exiting in the event of an emergency and time required to rescue an injured worker are factors that affect the extent of precautions taken and the standby equipment needed when entering a confined space. B. Personnel should have an egress plan for normal conditions and emergencies for each confined space entry. This plan shall be discussed with other Coast Guard members, prior to entering a confined space. Particular care should be taken to ensure that trainees understand the plan. C. As part of the annual review of the shipyard's safety program (See *Job Aid #100*) the SOHC and CID shall determine whether the shipyard takes adequate precautions, provides appropriate standby equipment, and whether Coast Guard personnel are adequately trained on the shipyard's procedures. The cognizant SEHO can assist in this assessment.

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23. What rescue provisions must be in place before performing a confined space entry on merchant vessels?	A. Before entering a confined space, Coast Guard personnel shall obtain training from the shipyard or vessel (including offshore facilities) personnel regarding their rescue procedures including equipment that might be used. B. 29 CFR 1915 subpart B requires the employer to either establish a shipyard rescue team or arrange for an outside rescue team which will respond promptly to a request for rescue service. C. As part of the review of the shipyard's safety program, the CID or detachment or detail supervisor and SOHC shall review the shipyard's rescue program to ensure it is adequate. D. If vessels outside of shipyards do not have confined space rescue equipment, the unit may have to remind the vessel to arrange with the fire department or contract with a local confined space entry rescue team to ensure a rescue team is available. In areas where there is no available rescue services the provisions in SWP #150 shall be followed. Note: The procedures contained in SWP#150 do not meet the rescue team requirements in 29 CFR 1915 and although it has been determined to be more protective than the OSHA requirements the procedures cannot be used by CG civilian personnel until an alternative is approved by the Secretary of Labor.
24. Is the Marine Chemist and Competent Person required to inspect and test all four corners of the tank, high and low?	A. Not necessarily. NFPA teaches that if there are no barriers in a tank (basically, you have an empty box), then the atmosphere will either be mixed or heavier and lighter gases and vapors may be layered in the tank, but the concentration at any given height will be the same from one side of the tank to the other, and it is not necessary to walk to every corner. The Marine Chemist and competent person are required to physically enter spaces (when it is physically possible to do so) to conduct a visual inspection and personally determine conditions in the tank. They must also be able to determine that there are no residues that could regenerate an atmospheric hazard based on the scope of work. If this can be accomplished without walking all four corners then they are not required to do so.

APPENDIX A

Additional Guidance Regarding Atmospheric Hazards

Policy regarding acceptable limits for atmospheric hazards is based on requirements contained in 29 CFR 1915 subpart B and NFPA 306, Control of Gas Hazards on Vessels. These are minimum acceptable standards. Coast Guard confined space entry practice has been to refuse entry if there is a "change in conditions." However, there does not seem to be a consistent definition of a "change in conditions." OSHA (29 CFR 1915.15(d) and (f)) defines a change in conditions as an atmospheric condition that does not meet the minimal acceptable standards (e.g., oxygen between 19.5% and 22% by volume, less than 10% LEL and toxics below the PEL or IDLH). Coast Guard practice has taken a much more conservative approach, with an informal definition of a "change in conditions" as any deviation from the initial test results. (For example, changes from 20.8% to 20.6% oxygen or even 20.6% to 20.8% oxygen have been considered a "change in conditions.")

A conservative approach is good. Our goal is to enter confined spaces only when there is no deviation from ambient conditions. However, normal instrument variation and variation in ambient conditions can cause corresponding changes in meter readings that give a false impression of the true atmosphere. We need to understand these dynamics and be able to evaluate each situation to make a determination whether the space is safe to enter. This requires a positive, proactive working relationship with the Marine Chemist and the shipyard's competent person. The following process is recommended: Compare current atmospheric conditions in the space (most recent test made by the competent person, or marine inspector's own readings using properly calibrated instruments) with the original test results on the Marine Chemist certificate **and** current ambient conditions at an appropriate topside location (e.g., topside, but not next to a vent leading from a tank that is not certified safe for workers.) If the atmosphere in the tank deviates from the atmosphere noted on the original certificate and from ambient conditions, the inspector should work with the company representative responsible for the work, the shipyard competent person, and the Marine Chemist to determine what may be causing the deviation. It may be as simple as normal instrument variation, or there may be something affecting conditions in the space. The best way to determine this is to be familiar with the procedures that the Marine Chemist and competent person use, and to discuss the current situation with the Marine Chemist and competent person. It is also important to know the limits of the instruments being used. Users must have a full understanding of response times, accuracy, precision, operational parameters, and the interference of environmental factors.
Refer to 29 CFR 1915 subpart B, Appendix A for further guidance.

APPENDIX B

Designation of Coast Guard Competent Persons

OSHA regulations require all employers to designate one or more competent persons in accordance with 29 CFR 1915.7. The only exception is if all duties of the competent person, under 29 CFR part 1915, are carried out by a Marine Chemist. Coast Guard personnel can not enter a space initially certified by a shipyard's competent person because the Coast Guard did not designate the person and has no control over the training, qualification or adequacy of equipment provided. The Coast Guard will continue to accept a Marine Chemist certificate that has been maintained by a shipyard competent person in accordance with NFPA 306 and 29 CFR 1915.15, provided there has been a successful review of the individual shipyard's competent person program.

It is not feasible for the Coast Guard to adequately train and designate enough competent persons to certify the spaces to be entered for each inspection due to the number of entries being conducted and the numerous locations that are being inspected at any given time. It would basically require all marine inspectors to be trained and designated as competent persons and would require each marine inspector to have the necessary equipment to conduct the testing. It would also more than double the amount of time it would take for each inspection. However, there are limited situations where using a Coast Guard designated competent person may be more feasible than requiring a Marine Chemist. Examples may include remote areas where a Marine Chemist is not available, or where the type of inspection only involves entry into lazarettes or accessways on small passenger vessels where the hazards can be easily identified and characterized.

When, at the discretion of the OCMI, it is necessary to designate Coast Guard personnel as competent persons, field units should consult with their SEHO to develop the competent person aspects of the unit's confined space entry program. Assistance is also available from the industrial hygienists assigned to Commandant (G-MSO-3) and Commandant (G-WKS-2). The program should include the qualification requirements of the competent persons and the types of spaces and vessels which the competent person is authorized to certify. A Coast Guard designated competent person should be very limited in the scope of their authority and have very well defined roles.

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To designate a Coast Guard person as a competent person, the requirements of 29 CFR 1915.7(c) must be followed as a minimum. These requirements are summarized as follows:

The employer shall ensure that each designated competent person has the following skills and knowledge:

1. Ability to understand and carry out written or oral information or instructions left by a Marine Chemist or a Certified Industrial Hygienist;

2. Knowledge of subparts B, C, D and H of 29 CFR 1915;

3. Knowledge of the structure, location, and designation of spaces where work is to be done;

4. Ability to calibrate and use testing equipment, including but not limited to, oxygen indicators, combustible gas indicators, carbon monoxide indicators, and carbon dioxide indicators, and to interpret accurately the test results of that equipment;

5. Ability to inspect, test, and evaluate spaces to determine the need for further testing by a Marine Chemist or a Certified Industrial Hygienist; and

6. Ability to maintain records required by 29 CFR 1915.7(d).

In addition to the specific performance requirements of OSHA, it is also recommended that unit programs prescribe the following training/qualification requirements:

1. Attend the 3-Day shipyard competent person training course offered at both TRACEN Yorktown and TRACEN Petaluma (Course G-KSE-059- Shipyard Competent Person);

2. Training on the unit's confined space entry program;

3. Specific training to recognize and evaluate the hazards for the type of spaces the person will be authorized to certify;

4. Hands on training and use of the sampling equipment to evaluate and test spaces on vessels representative of the types of vessels for which the person will be authorized to certify safe for entry; and,

5. Periodic refresher training at intervals to maintain the persons competency and familiarity with the sampling equipment.

Job Aid # 100
Evaluation of Shipyard Health and Safety Program with respect to the impact on CG Employee Health and Safety

The purpose of this check sheet is to assist CID's, detachment and detail supervisors, SOHC's and SEHO's in reviewing shipyard safety hazards and controls with shipyard personnel. The goal is to exchange hazard information to ensure that CG members safely conduct their inspections while on the yard's facilities. Enforcement of OSHA regulations is **not** the primary goal. However, if in the course of ensuring CG member safety, uncorrected hazards affecting shipyard employee health and safety are noted, the shipyard should be informed of the hazards. For additional guidance on hazards that are not corrected by the shipyard see Item 4 of Enclosure (1).

General

☐ Shipyard actively participates in **exchange of hazard information and safety rules and procedures** with Coast Guard members. [29 CFR 1915(f) and Basic Elements of a Maritime Occupational Safety and Health Program Standard, published as a Guide in the last OSHA Shipyard Digest.]

☐ Housekeeping is adequate. [29 CFR 1915.91]

☐ Illumination of accesses, walkways and work areas is adequate. [29 CFR 1915.92]

☐ Utilities:

- ☐ Steam systems have relief valves, fittings have a safety factor of not less than five, hose and temporary piping are shielded where passing through normal work areas to prevent accidental contact with people in the space. [29 CFR 1915.93(a)]
- ☐ When vessel is supplied electrical power from a source other than the vessel itself, the vessel is adequately grounded, yard ensures through vessel owner or representative that vessel's circuits to be energized are in a safe condition, circuits used are protected with overcurrent protection. [29 CFR 1915.93(b)]
- ☐ Infrared heat lamps are adequately guarded. [29 CFR 1915.93(c)]

☐ Work on or near radar and radio is properly controlled. [29 CFR 1915.95]

☐ Work in lifeboats is properly controlled. [29 CFR 1915.96]

☐ Health and Sanitation: Health hazards that CG employees may encounter include those covered by 29 CFR Subparts B (Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment), C (Surface Preparation & Preservation), D (Welding, Cutting and Heating) and Z (Toxic and Hazardous Substances). These specific sections are discussed in more detail later in this check sheet.

- ☐ Eating & smoking are not allowed in areas where atmospheric contaminants are produced. [29 CFR 1915.97(c)]
- ☐ Employees working beneath or on outboard side of a vessel are not subject to contamination by drainage or waste from overboard discharges. [29 CFR 1915.97(d)]

Job Aid # 100
Evaluation of Shipyard Health and Safety Program with respect to the impact on CG Employee Health and Safety

Slips, Trips & Falls

☐ Trends or lessons learned specific to yard of which CG members should be aware?

Abrasive Blasting

☐ Materials used? (CG members shall avoid all areas where abrasive blasting is being conducted.)

Surface Preparation and Preservation

☐ CG members shall not enter a confined space where painting or paint removal is being conducted.

☐ CG members shall avoid open-air blasting operations.

☐ CG members shall avoid open-air spray painting operations.

☐ CG members shall avoid, to the extent possible, open air brush painting or preservative coating operations.

☐ For hazard communication purposes, what are the hazards of the paint removers and paint systems used by the yard? [29 CFR 1915 subpart C]

Welding, cutting and burning

☐ Yard is able to schedule Coast Guard inspections during periods when welding is not being conducted?

☐ If an exception must be made and *SWP# 111* is implemented, review 29 CFR 1915 subpart D and ensure that CG employees have information and personal protective equipment needed to comply.

Preventing falls from heights greater than six feet:

☐ Techniques used by yard to prevent falls from heights higher than 6 feet:

- ☐ Scaffolding in accordance with 29 CFR 1915 subpart E. Note that 29 CFR 1915.71(j) requires rails for scaffolding, staging, runways, or working platforms which are supported or suspended more than 5 feet above a solid surface or at any distance above water. If the rails are omitted, employees are to be protected by fall arrest systems IAW 29 CFR 1915.159.
- ☐ Rafting.
- ☐ Inspection through use of high quality binoculars, camera or video equipment.

☐ Any training needed by CG members to ensure they are protected from heights greater than 6 feet?

Ladders

☐ Use of ladders with broken or missing rungs or steps, broken or split siderails, or other faulty or defective construction is prohibited. [29 CFR 1915.72]

Job Aid # 100
Evaluation of Shipyard Health and Safety Program with respect to the impact on CG Employee Health and Safety

☐ Access to cargo spaces and confined spaces is adequate (ladders in good repair, or temporary ladder provided, at least two means of access not blocked by ventilation ducts, unless vessel design makes this impractical, then other appropriate precautions are taken). [29 CFR 1915.76]

Working Surfaces

☐ Working/walking surfaces are adequate (firebox floors covered with temporary planking to afford safe footing for work in boilers, scaffolding provided for working aloft, work platforms in restricted areas are adequate, persons boarding, leaving or working from small boats or floats are protected by PFDs. [29 CFR 1915.77]

Gear and Equipment for Rigging and Materials Handling

☐ Can CG members avoid all operations involving lifting and materials handling?

☐ If no, then review safety procedures contained in 29 CFR 1915 subpart G.

Personal Protective Equipment

☐ Based on hazards in the yard and CG policies (e.g., avoiding welding, painting and abrasive blasting), what PPE do CG personnel need to work safely in the yard? [29 CFR Subparts C and I]

Ship's machinery and piping systems

☐ Fire, steam and water spaces of a boiler or piping systems where people may be subject to injury from the direct escape of a high temperature medium such as steam meet the requirements of 29 CFR 1915.162 before work or inspections are started in the space or section of pipe.

☐ Ship's propulsion machinery meets the requirements of 29 CFR 1915.164 before work begins to prevent the unexpected release of energy.

Ship's deck machinery

☐ Safety steps required in 29 CFR 1915.165 are in place before work is performed on the anchor windlass or any of its attached accessories.

Portable air receivers and other unfired pressure vessels

☐ Does the yard use portable, unfired pressure vessels?

☐ Portable, unfired pressure vessels meet the requirements of 29 CFR 1915.172.

Drums and containers

☐ Where are drums and containers of hazardous materials stored?

☐ Drums and containers are stored according to 29 CFR 1915.73 and pressurized piping systems conveying hazardous liquids or gases are provided with relief valves and by-passes to prevent rupture of the system & escape of the hazardous liquids or gases.

Job Aid # 100
Evaluation of Shipyard Health and Safety Program with respect to the impact on CG Employee Health and Safety

Electrical circuits and distribution boards

☐ Electrical circuits and distribution boards are de-energized IAW 29 CFR 1915.181.

☐ When work is conducted behind an energized board, the board is covered or some other equally safe means is used to prevent contact with any of the energized parts.

Toxic and Hazardous Substances

☐ What toxic and hazardous substances are used by the yard?

☐ Request copies of Material Safety Data Sheets (MSDS's) for those substances around which CG employees may be working (should be used in Hazard Communication training.)

Confined Space Entry Program

☐ **Shipyard Competent Person Program**

- ☐ Competent persons are designated in writing by shipyard management. [29 CFR 1915.7(b)(1)]
- ☐ Competent person related training and experience is documented. [ISO 9000]
- ☐ Evidence that the competent person receives oversight from a Certified Marine Chemist or Certified Industrial Hygienist exists. [Recommended practices]
  - ☐ What is the interaction between the Marine Chemist and competent person?
    - ☐ Competent person accompanies Marine Chemist during testing.
    - ☐ Face to face exchange of information with Marine Chemist.
- ☐ Instrument calibration procedures are documented [ISO 9000]
- ☐ Instrument calibration is verified before each day's use by using a known concentration of test gas in a manner consistent with manufacturer's recommendations [NFPA 306, 2-2.1]
- ☐ Records of instrument calibrations are maintained [NFPA 306, 2-2.1]
- ☐ Confined space testing and inspection procedures are documented [ISO 9000]
- ☐ Confined space testing and inspection results are recorded and include at a minimum: location of vessel, time, date, location of inspected spaces, operations performed, test results, and any instructions. (e.g., Competent Persons Log) [29 CFR 1915.7(d)(1)]
- ☐ Confined space entry records are kept on file for a period of at least three months from the completion date of the specific job for which they were generated. [29 CFR 1915.7(d)(3)]

☐ **Confined space access control**

- ☐ Marine Chemist Certificates and Competent Persons Logs are posted in the immediate vicinity of the affected operations. [29 CFR 1915.7(d)(2)]

Job Aid # 100
Evaluation of Shipyard Health and Safety Program with respect to the impact on CG Employee Health and Safety

☐ The Competent Persons Log & other signs or labels are easy to understand. [29 CFR 1915.16(a)]

☐ **Confined space rescue team**

☐ The shipyard has established a shipyard rescue team [29 CFR 1915.12(e)], or

☐ The shipyard has arranged for an outside rescue team to respond within 5 minutes. [29 CFR 1915.12(e)] NOTE: Regulations state "promptly."

☐ The rescue team has held a practice drill or conducted an actual rescue within the last 12 months. [29 CFR 1915(e)(1)(iii)]

☐ At least one person on the rescue team is trained in basic first aid and CPR. [29 CFR 1915(e)(1)(iv)]

☐ **Practical verification of competent person skills**

☐ Competent person can describe hazards associated with confined space entry in general, and specific spaces in particular.

☐ Competent person can state the required oxygen and lower explosive limit (LEL) readings required for entry.

☐ Confined space testing and inspection procedures are to test for the same toxics the chemist tested, unless stated otherwise on the Marine Chemist certificate.

☐ Competent person demonstrates satisfactory testing procedures.

☐ Competent person records test results on competent person's log.

☐ Competent person makes appropriate judgement regarding maintenance of conditions and need to contact or recall the Certified Marine Chemist.

Job Aid # 200
Confined Space Entry Ventilation

In determining whether three air changes have occurred in a confined space, the type of ventilation (natural or mechanical), duct configuration, and potential sources of contaminants need to be considered. This guide is intended to help inspectors determine the length of time needed to make 3 complete air changes in a space and determine whether the duct configuration is adequate. The calculations assume ideal mixing and that the flow rate of the fan is equal to its rated capacity, neither of which will be true under real conditions. Therefore, additional time should be added based on the ventilation configuration and condition of the fans.

Calculating Time to Complete 3 Air Changes, Assuming Ideal Mixing Conditions

Minutes for 3 air changes = (Volume of Space (ft^3) ÷ Flow rate of fan (cfm)) X 3

Example:
A tank is 20 feet long by 35 feet wide by 10 feet high. The fan's capacity is 2000 cfm. Assuming ideal mixing, how long will three air changes take?

Answer: Volume of space = 20 ft X 35 ft X 10 ft = 7000 ft^3
Time for 3 air changes = (7000 ft^3 ÷ 2000 cfm) X 3 = 10.5 minutes

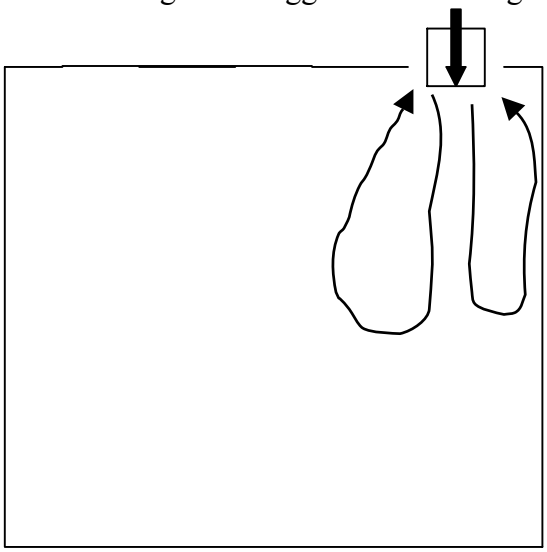
Table for determining time for 3 air changes, assuming ideal mixing (times listed are in minutes):

TIME FOR 3 AIR CHANGES (Minutes)							
Volume of Space (Ft^3)	**Flow Rate of Fan (CFM)**						
	500	1000	1500	2000	2500	3000	5000
5000	30	15	10	7.5	6	5	3
10,000	60	30	20	15	12	10	6
25,000	150	75	50	37.5	30	25	15
50,000	300	150	100	75	60	50	30
100,000	600	300	200	125	120	100	60
200,000	1200	600	400	250	240	200	120
500,000	3000	1500	1000	625	600	500	300
1,000,000	6000	3000	2000	1250	1200	1000	600

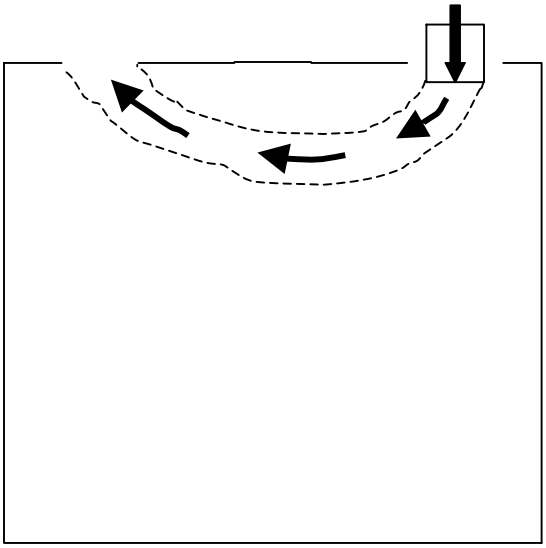
Job Aid # 200
Confined Space Entry Ventilation

What do you mean by ideal mixing?
Ideal mixing means that the clean air is blown throughout the tank and dilutes the contaminants. The contaminants are slowly removed with the air being blown out of the tank.

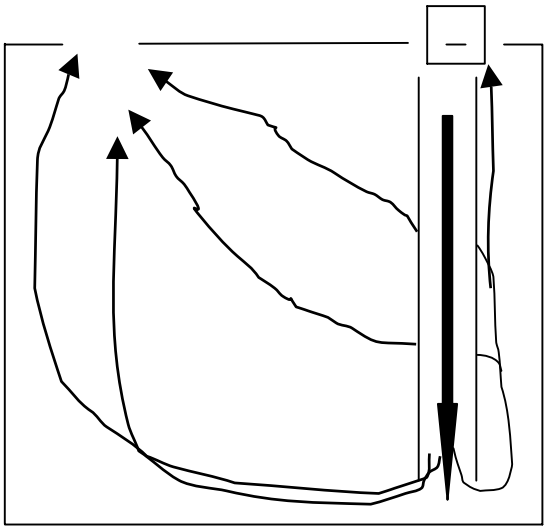
What prevents ideal mixing?
Short circuiting is the biggest obstacle to good mixing.



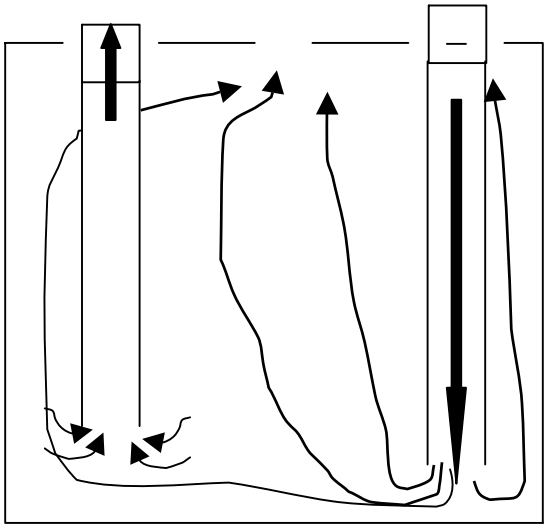
Short circuiting with forced mechanical ventilation in "blowing" mode, but one hatch.



Second hatch improves mixing, but short-circuiting may still be a problem.



Forced ventilation combined with ducting and a second hatch to improve mixing provides the best configuration for general mechanical ventilation.



A combination of local exhaust ventilation and supply general ventilation is best for welding.

SWP # 100.1
CONFINED AND ENCLOSED SPACES (GENERAL)

A. <u>INTRODUCTION</u>. Personnel working in a Marine Safety Office will normally encounter different types of confined spaces requiring entry. To protect yourself from injury during confined space entry situations, you must clearly understand the various programs which have been established to permit your entry into these dangerous environments. This safe work practice (SWP) will direct you to other safe work practices for guidance on the specific type of programs you must follow. This SWP replaces *SWP #100* in Appendix A of Marine Safety Manual (MSM), Volume I, Chapter 10, COMDTINST 16000.6.

B. <u>HAZARDS ASSOCIATED WITH CONFINED SPACE ENTRY</u>.

1. Low OXYGEN content is the most significant hazard associated with confined space entry.

2. RESIDUAL TOXIC CARGOES may be toxic or fatal if inhaled or absorbed through skin.

3. FLAMMABLE CARGO VAPORS may cause an explosion or fire.

4. FALLING/TRIPPING HAZARDS.

C. <u>EXAMPLES OF CONFINED SPACES NORMALLY ENCOUNTERED</u>.

1. Cargo tanks, fuel tanks or other spaces with limited access;

2. Spaces adjacent to cargo or fuel tanks such as voids, double bottoms or sides;

3. Compartments which have been sealed;

4. Non-ventilated compartments that have been freshly painted or coated;

5. Spaces containing cargoes that absorb oxygen (scrap iron, fresh fruit, molasses, vegetable oils, any organic matter which might decay);

6. Spaces underneath docks or narrow channels w/ high banks and limited air flow;

7. Bilges of vessels below floor plates;

8. Pumprooms and cofferdams;

9. Machinery or other structures that may not normally be thought of as a space, such as: large piping systems, engine crankcases, large heat exchangers, scavenging spaces, boiler mud or steam drums, etc.

SWP # 100.1
CONFINED AND ENCLOSED SPACES (GENERAL)

D. <u>SAFE WORK PRACTICES</u>.

1. When entering any confined space on board a vessel in a shipyard environment, the provisions of 29 CFR 1915 will apply. Refer to *SWP #110* for specifics of this type entry.

2. When entering a confined space on board a vessel where welding is or has been conducted the procedure in *SWP #111* will be followed.

3. When entering a pumproom, the procedure noted in *SWP # 120.1* will be followed.

4. When entering any confined space while aboard a vessel or rig offshore, the guidelines found in *SWP # 150* shall be followed until a more specific SWP is developed to be consistent with the outer continental shelf proposed regulations (33 CFR Subchapter N). When developed, the new SWP will be numbered *SWP #130*.

5. When entering any confined space to conduct an inspection while utilizing the rafting procedure, follow the guidelines found in *SWP # 140*.

6. When entering any confined space on board a vessel outside a shipyard and not undergoing repairs by shipyard personnel, the provisions of 29 CFR 1915 (Shipyard Regulations) still apply. The procedures in *SWP #150* shall be followed.

7. When conducting container inspections ashore, the provisions of *SWP # 160.1* shall be followed. (**Note:** *SWP160.1* replaced *SWP #160*. A formal change was not made to MSM, Vol. I, Chapter 10, but it was distributed to the field.)

8. Confined spaces should not routinely be entered during response or investigation activities. These situations are non-routine and often dynamic, requiring additional precautions to address potential hazards. If necessary to enter a confined space during these activities, the appropriate SWP shall be followed for the type of space being entered, all hazards must be addressed, and authorization must be received from the Commanding Officer. Strike Team assistance may be needed if the hazards cannot be completely removed from the space or entry is otherwise beyond the capability of local resources.

9. If the space to be entered is not on a vessel or in a shipyard, then the appropriate OSHA regulation will be 29 CFR 1910.146. The Safety and Environmental Health Officer (SEHO) from the ISC or MLC(kse) staff can provide assistance for entries under this regulation.

10. When entering any confined space not specifically noted above, the most appropriate SWP shall be adapted to afford the greatest degree of protection.

SWP # 110.1
CONFINED AND ENCLOSED SPACES: ENTRY IN THE SHIPYARD ENVIRONMENT

A. INTRODUCTION. CG personnel assigned to conduct entry into confined spaces in shipyards must have authorization for such activity from a designated work authorization supervisor. All CG personnel in shipyards shall comply with requirements established by the shipyard competent person and/or a National Fire Protection Association Certificated Marine Chemist. All spaces must be initially certified by a Marine Chemist. At the discretion of the Commanding Officer, shipyard competent persons may be allowed to maintain a Marine Chemist Certificate after a satisfactory review of the shipyard's competent person program. *Job Aid #100* was developed to assist units in evaluating shipyard health and safety, and competent person programs.

B. HAZARDS ASSOCIATED WITH CONFINED SPACE ENTRY.

1. Low OXYGEN content is the most significant hazard associated with confined space entry.
2. RESIDUAL TOXIC CARGOES may be inhaled or absorbed through skin.
3. FLAMMABLE CARGO VAPORS may cause an explosion or fire.
4. FALLING/TRIPPING HAZARDS.

C. EXAMPLES OF CONFINED SPACES NORMALLY ENCOUNTERED.

1. Cargo tanks or other spaces with limited access;
2. Spaces adjacent to cargo tanks such as voids;
3. Compartments which have been sealed;
4. Spaces which have been coated with a preservative;
5. Non-ventilated compartments that have been freshly painted or coated;
6. Spaces containing cargoes that absorb oxygen (scrap iron, fresh fruit, molasses, vegetable oils, any organic matter which might decay);
7. Fuel tanks;
8. Bilges of vessels below floor plates;
9. Double bottoms or sides; and
10. Pumprooms (See *SWP#120*).

SWP # 110.1
CONFINED AND ENCLOSED SPACES: ENTRY IN THE SHIPYARD ENVIRONMENT

D. <u>ENGINEERING CONTROLS</u>. Forced mechanical ventilation is the best method to control atmospheric hazards associated with confined space entry. For all confined spaces where it is practical, forced air ventilation shall be provided and configured in such a way to ensure thorough mixing throughout all reaches of the space. Unless otherwise specified in the body of the National Fire Protection Association Marine Chemist Certificate, tanks with clean, dry bottoms require at least 3 air changes before entry.

E. <u>STEPS PRIOR TO EACH ENTRY</u>.

1. Review the Material Safety Data Sheet/Chemical Hazard Response Information System or other data sheet for the last three cargoes/materials carried in the cargo space or adjacent space to be entered.

2. Verify that the space has been tested for oxygen, flammability, and toxic atmospheres. (Read the conditions of the Marine Chemist Certificate and the Competent Person Log). Ensure the toxic tests are consistent with the last three cargoes carried.

3. Verify that a minimum of three air changes have occurred.

4. Check the condition of your emergency escape breathing device if carriage is required.

5. Check operation of oxygen monitor.

6. Discuss emergency rescue procedures. Ensure that a means of rescue is readily available; this would require equipment and personnel to enter a space which is immediately dangerous to life and health.

F. <u>STEPS TO TAKE DURING ENTRY</u>.

1. Coast Guard personnel should be accompanied by the yard supervisor or person responsible for the work. Confined spaces should never be entered alone.

2. Carry a personal oxygen monitor or a combination oxygen/flammability/toxic meter when entering a confined space.

3. Carry an Emergency Escape Breathing Apparatus if there is a potential for a dynamic change in the environment such as a valve being opened and cargo entering the space, pumps running in an engine room, compressors operating in a compressor room aboard a gas ship, action of workers walking through muck in the bottom of the space and releasing hydrogen sulfide or other gases/vapors, space where inerted gas may be inadvertently introduced, etc. This equipment

will not normally be needed if the space is tested prior to entry and ventilation is maintained and there is no potential for sudden change in the environment.

4. Immediately leave the space if:

   a) Your personal monitor alarms;

   b) You feel dizzy or light-headed;

   c) The forced air ventilation stops or is apparently ineffective;

   d) If you sense any unexpected chemical through smell or dermal sensation that concerns you. This is a judgement call; however, you should depart any time there is a burning sensation in your lungs or you experience a shortness of breath. Any of these sensations may indicate a life-threatening situation and you must react promptly to avoid injury.

5. Climbing (other than ladders) shall be limited to the following vertical distances:

	W/Fall Arrest Equip	W/O Fall Arrest Equip
Steel Landing	Unlimited	6 ft
Water Landing	Unlimited	15 ft

G. ACTIONS TO BE TAKEN AFTER ENTRY.

1. Contact your unit immediately if you had to leave a space as noted above. Do not reenter any space until notification of appropriate senior personnel and direction from the designated work authorization supervisor (i.e, Chief of Inspections, Chief of Port Operations, etc.) is obtained.

2. Report any inconsistencies on the Marine Chemist Certificate to the designated work authorization supervisor and follow-up with a letter to Commandant (G-MSO-3) via District(m).

3. In the event of overexposure, personnel should be evacuated to appropriate medical facilities by the most expeditious means. Medical personnel should be provided with all known information on the suspected exposure, including concentration and duration of exposure. This should include the most probable route of exposure. Also provide the medical authority with the phone number to American Toxic Substance and Disease Registry (ATSDR). More specific guidance on medical procedures for acute exposures can be found in Chapter 12 of the Medical Manual, COMDTINST M6000.2(series).

SWP # 111
ENTERING CONFINED SPACES ON VESSELS IN SHIPYARDS WHERE WELDING IS BEING CONDUCTED

A. INTRODUCTION. Before CG personnel may enter confined spaces where welding is being conducted, the unit shall specifically address procedures for entering confined spaces where welding is being conducted in their unit Health and Safety Program. At a minimum, guidelines in this SWP shall be followed. CG personnel assigned to conduct entry into confined spaces where welding is being conducted must have authorization for such activity from the Commanding Officer. The Commanding Officer may delegate this authority to a designated work authorization supervisor. (The work authorization supervisor shall be at least at the Department Head level.)

B. HAZARDS ASSOCIATED WITH ENTERING CONFINED SPACES WHERE WELDING IS BEING CONDUCTED.

1. Low OXYGEN content is the most significant hazard associated with any confined space entry.
2. FLAMMABLE ATMOSPHERE due to leaking oxygen or acetylene bottles or vapors from cargo residues may cause an explosion or fire.
3. TOXIC vapors, gases, and fumes from the welding process, cargo residues or coatings may be present.
4. SLIP, TRIP & FALL.

C. EXAMPLES OF TOXIC BY-PRODUCTS OF WELDING PROCESSES.

1. Toxic gases and fumes produced by welding process vary depending on the type of welding process and the type of material being welded. Examples of common processes and materials are provided here. Before entering any confined space where welding is being conducted, review the MSDS for the electrodes. The shipyard repair supervisor or safety staff should be able to provide the MSDS. Contact your supervisor, SOHC or SEHO for assistance in obtaining or interpreting MSDS's if needed.
2. Examples of types of welding processes and the associated hazard (taken from the NIOSH *Criteria for a recommended standard: Welding, Brazing, and Thermal Cutting*):

Flame Cutting, welding	Carbon monoxide, nitric oxide and nitrogen dioxide
Gas Metal Arc Welding (GMAW) Aluminum (Al) or aluminum-magnesium (Al-Mg)	Ultraviolet (UV) radiation Ozone
GMAW/ stainless steel	Hexavalent chromium (VI)
GMAW, all types using carbon dioxide	Carbon Monoxide

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Gas tungsten arc welding/ Al or Al-Mg	UV radiation
Shielded metal arc welding (SMAW), low-hydrogen electrodes	Fluorides UV radiation
SMAW/ Iron or steel	Iron oxide UV radiation
SMAW/ stainless steel	Chromium (VI), Nickel UV radiation
Plasma Cutting/ aluminum	Noise, ozone

D. <u>ENGINEERING CONTROLS</u>. As stated previously, avoid entering confined spaces where welding is being conducted if at all possible. If welding has recently been completed in a confined space, forced mechanical ventilation should be used to make three complete air changes before entry is made. Use *Job Aid #200* to assist you in determining whether 3 complete air changes have been made. If the OCMI has determined that this is not feasible and a confined space must be entered while welding is being conducted, ensure that local exhaust ventilation is being used to remove the welding fumes. Forced mechanical supply ventilation should be provided through a different hatch to ensure adequate fresh air is being added to the space. OSHA regulations require that employees in confined spaces be protected by air line respirators if sufficient ventilation cannot be obtained without blocking the means for access and egress.

E. <u>ADMINISTRATIVE CONTROLS</u>. Shipyards must comply with OSHA regulations in 29 CFR 1915. Specifically, 29 CFR 1915.12(f) requires that employers (shipyard) exchange hazard information with other employers (Coast Guard) whose employees may enter the same spaces. If a welder is in a space and is not using an air line respirator, the shipyard should have information to document that adequate local exhaust and supply ventilation is being provided and the atmosphere in the space is less than the OSHA PEL or ACGIH TLV. (Compliance with ACGIH TLV's is not required by regulation, but is good industrial hygiene practice and is common in industry.) Coast Guard personnel shall request and review this information before entering a space where welding is being conducted. OSHA regulations regarding welding in shipyards may be found in 29 CFR 1915.51. OSHA PEL's may be found in 29 CFR 1915.1000-1450. ACGIH TLV's may be found in the TLV "Booklet" published by ACGIH. Your SOHC and SEHO have access to more information on welding health and safety hazards.

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F. PERSONAL PROTECTIVE EQUIPMENT. G-M policy remains that air purifying respirators are to be used only as secondary protection. No entry shall be made when toxics are known to exceed the OSHA PEL or ACGIH TLV. Air purifying respirators with HEPA cartridges may be used as secondary protection if desired by Coast Guard employees entering confined spaces where welding is being conducted. Every precaution shall be taken to ensure that OSHA PEL's and ACGIH TLV's are not exceeded even if the Coast Guard member chooses to wear an air purifying respirator with HEPA cartridge. **Note: The HEPA cartridge (now classified as P-100 cartridge) used to filter welding fumes does not filter welding gases including nitrogen oxides, and ozone which have very low PEL's/TLV's.**

G. STEPS PRIOR TO ENTRY.

1. Review the Marine Chemist Certificate and the shipyard Competent Person Log.
   a. Ensure the spaces to be entered have the following designations on the Marine Chemist Certificate: "SAFE FOR WORKERS," and "SAFE FOR HOTWORK" or "SAFE FOR LIMITED HOTWORK."
   b. If more than 24 hours have elapsed since the Marine Chemist certificate has been issued, complete the following:
      (1) Compare the readings in the Competent Person Log with those on the Marine Chemist's certificate to ensure conditions have not changed and all required tests have been performed. Review all readings since the space was originally certified. Resolve any questions on the Marine Chemist Certificate or shipyard Competent Person Log prior to entry. Request to witness new tests if necessary.
      (2) Review the calibration log for any instruments used by the competent person.
2. Discuss work activities being conducted inside and in the vicinity of the space to be entered with the yard foreman.
3. Obtain information on the type of welding, burning or cutting process being conducted.
   a. Obtain information on the type of gases and fumes produced by the welding, burning or cutting process. Obtain MSDS's if applicable.
   b. Obtain information on the health effects of the gases and fumes produced by the welding, burning or cutting process. (Refer to MSDS, SOHC, or SEHO.)
   c. Review information the shipyard has regarding levels of gases and vapors generated in the space given the type of welding, burning, cutting process, size of the space and ventilation configuration. [Note: Rarely, if ever, will two welding situations in a shipyard be exactly the same. Therefore, you

cannot be highly confident that the data obtained for a previous scenario is directly applicable to the current situation. However, data collected under similar conditions should be considered as part of your risk management decision making process.] Alternatively, units who need to repeatedly enter confined spaces where welding is being conducted under similar conditions should request a Health Risk Assessment of the welding gases and fumes from their SEHO.

d. Determine the OSHA PEL's and ACGIH TLV's for the gases and fumes generated by the welding, burning, and cutting process. Your SOHC and SEHO can provide assistance if needed.

4. Make your risk management decision:

a. Do not enter confined spaces that do not have mechanical ventilation. Local exhaust ventilation at the welder's position and forced mechanical supply ventilation at the opposite end of the tank are preferred. See *Job Aid #200* for additional guidance.

b. Do not enter confined spaces that are smoky or hazy with fumes. **NOTE: The absence of smoke or haze does not mean the space is safe to enter. Metal fumes produced in the welding process are less than 1 μm in diameter and are too small to be visible. Some gases which are also produced in the welding process, such as nitric oxide and ozone, are colorless and cannot be seen. Smoke or haze is only an indication that the ventilation may be inadequate to keep the invisible hazards below exposure limits.**

c. If local exhaust and supply ventilation appear to be adequate, (air in the space is clear, supply ventilation flow rate is sufficient, there are no welding odors at the entrance and none are anticipated in the area to be inspected) consider:

(a) PEL's and TLV's of gases and fumes produced by the process.

(b) Data available on the levels of gases and fumes generated in the space. Due to the possible interaction of the various welding emissions to produce adverse health effects, NIOSH recommends that exposures be reduced to the lowest feasible concentrations using state-of-the-art engineering controls and work practices. NIOSH also recommends exposure limits for individual chemical or physical agents be considered upper boundaries of exposure. [Note that without sampling data to confirm levels of gases and fumes in the space, you are relying on an <u>assumption</u> that ventilation is adequate. Consider the health effects of the gases and fumes (reversible or irreversible, highly toxic or less toxic, immediate health effect or delayed health effect that may "sneak up" on you, and the length of time the inspector will be in space.)]

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(c) Degree of need to enter the space and inspect while welding is being conducted.

(d) If you consider the entry necessary and the gases and fumes are adequately removed by the ventilation system, request permission to enter the space from your work authorization supervisor.

H. STEPS DURING ENTRY.

1. Maintain communication with watch outside the confined space.
2. Carry personal environmental monitors if required by unit (oxygen alarm as a minimum).
3. Carry a whistle or other device to sound an alarm.
4. Carry an Emergency Escape Breathing Apparatus if there is a potential for a sudden change in the space's atmosphere. This would include entering a space to witness a soap test of a repair in which the adjacent, pressed up space is not designated "SAFE FOR WORKERS" by the Marine Chemist. Another common example would be entering a ballast tank with the adjacent tank full of cargo and/or inerted. The inspector must exercise judgement when determining the circumstances when the space's atmospheric conditions may become dynamic.
5. Immediately leave the space if:
   a. A personal monitor alarms;
   b. You feel dizzy or light-headed;
   c. The forced air ventilation stops or is apparently ineffective;
   d. You sense any unexpected chemical through smell or dermal sensation that concerns you. This is a judgement call; however, you should depart any time there is a burning sensation in your lungs or you experience a shortness of breath. Any of these sensations may indicate a life threatening situation and you must react promptly to avoid injury.
6. Climbing (other than ladders) shall be limited to the following vertical distances:

	W/ Fall Arrest Equip	W/O Fall Arrest Equip
Steel Landing	Unlimited	6 ft
Water Landing	Unlimited	15ft

SWP # 111
ENTERING CONFINED SPACES ON VESSELS IN SHIPYARDS WHERE WELDING IS BEING CONDUCTED

I. STEPS AFTER ENTRY.

1. Record in your personal inspection log the chemicals/hazards to which you were potentially exposed. These chemicals can be obtained from the Marine Chemist Certificate. You should also note the length of exposure. This information will be needed to complete the forms for your occupational medical surveillance and evaluation program exam. You should also record activities such as sand blasting with silica sands, welding fumes, curing paints, recently applied coatings, etc.
2. If you left a confined space for reasons noted in paragraph H.5.a-d above, immediately contact your unit. Do not reenter any space until notification of appropriate senior personnel and direction from the designated work authorization supervisor is obtained.
3. In the event of overexposure, evacuate personnel to appropriate medical facilities by the most expeditious means. Medical personnel should be provided with all known information on the suspected exposure, including concentration and duration of exposure. This should include the most probable route of exposure. Also provide the medical authority with the phone number to the Agency for Toxic Substances and Disease Registry (ATSDR) (1-800-447-1554). More specific guidance on medical procedures for acute exposures can be found in Chapter 12 of the Medical Manual, COMDTINST M6000(series).

SWP # 120.1
CONFINED AND ENCLOSED SPACES: PUMPROOM ENTRY ABOARD VESSELS OUTSIDE THE SHIPYARD ENVIRONMENT

A. INTRODUCTION. CG personnel assigned to conduct entry into pumprooms on vessels outside of shipyards must have authorization for such activity from a designated work authorization supervisor. Entry into pumprooms will normally be necessary for tank vessel examinations, to clear outstanding requirements, cargo monitor examinations or pollution investigations. All pumprooms are required to have exhaust ventilation systems capable of taking suction from below lower deck plates and at various levels throughout the pumproom. CG personnel are prohibited from entering pumprooms with non-functional ventilation systems unless specifically authorized by the designated work authorization supervisor on a case by case basis. Pumprooms are unique due to the potential for a rapid change in atmosphere due to a pump or other failure and subsequent release of cargo. Coast Guard personnel are trained or equipped to evacuate pumprooms during these types of emergencies.

B. HAZARDS ASSOCIATED WITH CONFINED SPACE ENTRY.

1. Low OXYGEN content is the most significant hazard associated with confined space entry.

2. RESIDUAL TOXIC CARGOES may be inhaled or absorbed through skin.

3. FLAMMABLE CARGO VAPORS may cause an explosion or fire.

4. FALLING/TRIPPING HAZARDS.

5. RAPIDLY CHANGING ATMOSPHERE could occur due to pump failure.

C. ENGINEERING CONTROLS. Regulation 59 in chapter II-2 of SOLAS 74/78 requires that all cargo pumprooms be mechanically ventilated and have a minimum capacity of 20 air changes per hour. CG personnel should verify that the ventilation system is adequately drawing air from the space. A good rule of thumb indication that the ventilation is operating properly is there should be noticeable air movement entering through the door to the upper pumproom. If there is no movement, you should question the operation of the system. While descending into the pumproom, you should verify the integrity of the ventilation ducting at each level. If the duct work is damaged or has openings in the upper levels, there may not be sufficient ventilation in the lower portions of the space.

D. STEPS PRIOR TO EACH ENTRY.

1. Review the Material Safety Data Sheet/Chemical Hazard Response Information System or other data sheet for the all cargoes being carried.

2. Review the Marine Chemist Certificate to verify that the space has been tested for oxygen, flammability, and toxic atmospheres. Ensure the Certificate was issued

within the last 24 hours and conditions have not changed (most importantly that the pumps have remained secured).

3. Calibrate and test the multigas detector required for entry. The meter should be able to detect oxygen and flammability. For sour crude cargoes, the detector should also detect hydrogen sulfide.

4. Check the condition of your emergency escape breathing device. An EEBA is required due to the possibility of a changing atmosphere.

5. Check the operation of personal oxygen monitor if carried in addition to the multigas meter.

6. Verify the operation of the ventilation system. It must be in operation at least 15 minutes prior to entry.

7. Verify that no work is being conducted in the pumproom.

8. Discuss pumproom entry procedures with the vessel's officers. Verify the presence of a litter and hoisting arrangement prior to entry. Also verify the ability of the crew to don and utilize the vessel's self-contained breathing apparatus. This is required by regulation 17 of chapter II-2 of SOLAS 74/78 as a part of the fireman's outfit.

E. STEPS TO TAKE DURING ENTRY.

1. Coast Guard personnel should be accompanied by a ship's officer or vessel representative.

2. Carry the combination oxygen/flammability/toxic meter and EEBA when entering the pumproom.

3. Verify air movement at entrance to the pumproom.

4. Carry a whistle or other device to sound an alarm.

5. Verify the status of the ducting at every level of the pumproom and terminate entry if ventilation is not intact.

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CONFINED AND ENCLOSED SPACES: PUMPROOM ENTRY ABOARD VESSELS OUTSIDE THE SHIPYARD ENVIRONMENT

6. Immediately leave the space if:

   a) Your personal monitor alarms;

   b) You feel dizzy or light-headed;

   c) The forced air ventilation stops or is apparently ineffective;

   d) If you sense any unexpected chemical through smell or dermal sensation that concerns you. This is a judgement call; however, you should depart any time there is a burning sensation in your lungs or you experience a shortness of breath. Any of these sensations may indicate a life-threatening situation and you must react promptly to avoid injury.

7. Climbing (other than ladders) shall be limited to the following vertical distances:

	W/Fall Arrest Equip	W/O Fall Arrest Equip
Steel Landing	Unlimited	6 ft
Water Landing	Unlimited	15 ft

F. ACTIONS TO BE TAKEN AFTER ENTRY.

1. Contact your MSO/MIO/COTP immediately if you had to leave a space as noted above. Do not reenter any space until notification of appropriate senior personnel and direction from the designated work authorization supervisor (i.e, Chief of Inspections, Chief of Port Operations, etc.) is obtained.

2. Report any inconsistencies on the Marine Chemist Certificate to the designated work authorization supervisor and follow-up with a letter to Commandant (G-MSO-3) via District(m).

3. In the event of overexposure, personnel should be evacuated to appropriate medical facilities by the most expeditious means. Medical personnel should be provided with all known information on the suspected exposure, including concentration and duration of exposure. This should include the most probable route of exposure. Also provide the medical authority with the phone number to American Toxic Substance and Disease Registry (ATSDR). More specific guidance on medical procedures for acute exposures can be found in Chapter 12 of the Medical Manual, COMDTINST M6000.2(series).

SWP # 150
CONFINED AND ENCLOSED SPACES: ENTRY ABOARD VESSELS OUTSIDE OF SHIPYARDS

A. <u>INTRODUCTION</u>. CG personnel assigned to conduct entry into confined spaces aboard vessels must have authorization for such activity from a designated work authorization supervisor. All CG personnel shall comply with requirements established by the National Fire Protection Association Certificated Marine Chemist. Vessels outside of shipyards often have problems complying with the rescue team requirements in 29 CFR 1915 due to the unavailability of locally trained confined space rescue teams. This SWP has additional levels of safety in order to allow alternate procedures for Coast Guard military personnel to complete required inspections.

B. <u>HAZARDS ASSOCIATED WITH-CONFINED SPACE ENTRY</u>.

1. Low OXYGEN content is the most significant hazard associated with confined space entry.
2. RESIDUAL TOXIC CARGOES may be inhaled or absorbed through skin.
3. FLAMMABLE CARGO VAPORS may cause an explosion or fire.
4. FALLING/TRIPPING HAZARDS.

C. <u>EXAMPLES OF CONFINED SPACES NORMALLY ENCOUNTERED</u>.

1. Cargo tanks or other spaces with limited access;
2. Spaces adjacent to cargo tanks such as voids;
3. Compartments which have been sealed;
4. Spaces which have been coated with a preservative;
5. Non-ventilated compartments that have been freshly painted or coated;
6. Spaces containing cargoes that absorb oxygen (scrap iron, fresh fruit, molasses, vegetable oils, any organic matter which might decay);
7. Fuel tanks;
8. Bilges of vessels below floor plates;
9. Double bottoms or sides; and
10. Pumprooms.

SWP # 150
CONFINED AND ENCLOSED SPACES: ENTRY ABOARD VESSELS OUTSIDE OF SHIPYARDS

D. <u>ENGINEERING CONTROLS</u>. Forced mechanical ventilation is the best method to control atmospheric hazards associated with confined space entry. For all confined spaces where it is practical, forced air ventilation shall be provided and configured in such a way to ensure thorough mixing throughout all reaches of the space. Unless otherwise specified in the body of the National Fire Protection Association Marine Chemist Certificate, tanks with clean, dry bottoms require at least 3 air changes before entry.

E. <u>STEPS PRIOR TO EACH ENTRY</u>.

1. Review the Material Safety Data Sheet/Chemical Hazard Response Information System or other data sheet for the last three cargoes/materials carried in the cargo space or adjacent space to be entered.

2. Require the space to be tested by a Marine Chemist immediately prior to entry. Verify that the space has been tested for oxygen, flammability, and toxic atmospheres. Read the conditions of the Marine Chemist Certificate and ensure conditions have not changed. Ensure the toxic tests are consistent with the last three cargoes carried.

3. Ensure that no transfer operations have occurred since the space was certified.

4. Verify that a minimum of three air changes have occurred.

5. Check the condition of your emergency escape breathing device if carriage is required. If adjacent tanks contain cargo or are inerted then an EEBA should be carried

6. Check operation of personal oxygen monitor.

7. Discuss emergency rescue procedures with the ship's officers. If a rescue team meeting the requirements of 29 CFR 1915.12(e)(1) is not available then:

    a. Ensure that the ship's crew is able to don and utilize the vessel's self-contained breathing apparatus as required by regulation 17 of chapter II-2 of SOLAS 74/78 as part of the fireman's outfit;

    b. Pre-stage SCBA's so that they are readily available;

    c. An attendant shall remain outside the space and maintain communication with the entrants. The attendant should also have the ability to sound the alarm to render assistance if necessary;

SWP # 150
CONFINED AND ENCLOSED SPACES: ENTRY ABOARD VESSELS OUTSIDE OF SHIPYARDS

d. A Marine Chemist can be required to accompany the Coast Guard personnel if so desired or if the situation dictates it to be the preferred course of action, e.g., the condition of the vessel or training of the crew is poor, increasing the possibility of unsafe conditions.

NOTE: If the alternate procedures are used for the rescue team required by 29 CFR 1915.12 then Coast Guard civilian personnel may not enter under these conditions, since they are required to meet all OSHA regulations.

F. STEPS TO TAKE DURING ENTRY.

1. Coast Guard personnel should be accompanied by the vessel representative. Confined spaces should never be entered alone.

2. Carry a personal oxygen monitor or a combination oxygen/flammability/toxic meter when entering a confined space.

3. Carry an Emergency Escape Breathing Apparatus if there is a potential for a dynamic change in the environment such as a valve being opened and cargo entering the space, pumps running in an engine room, compressors operating in a compressor room aboard a gas ship, action of workers walking through muck in the bottom of the space and releasing hydrogen sulfide or other gases/vapors, space where inerted gas may be inadvertently introduced, etc. This equipment will not normally be needed if the space is tested prior to entry and ventilation is maintained and there is no potential for sudden change in the environment.

4. Climbing (other than ladders) shall be limited to the following vertical distances:

	W/Fall Arrest Equip	W/O Fall Arrest Equip
Steel Landing	Unlimited	6 ft
Water Landing	Unlimited	15 ft

SWP # 150
CONFINED AND ENCLOSED SPACES: ENTRY ABOARD VESSELS OUTSIDE OF SHIPYARDS

5. Immediately leave the space if:

   a. Your personal monitor alarms;

   b. You feel dizzy or light-headed;

   c. The forced air ventilation stops or is apparently ineffective;

   d. If you sense any unexpected chemical through smell or dermal sensation that concerns you. This is a judgement call; however, you should depart any time there is a burning sensation in your lungs or you experience a shortness of breath. Any of these sensations may indicate a life-threatening situation and you must react promptly to avoid injury.

G. ACTIONS TO BE TAKEN AFTER ENTRY.

1. Contact your MSO/MIO/COTP immediately if you had to leave a space as noted above. Do not reenter any space until notification of appropriate senior personnel and direction from the designated work authorization supervisor (i.e, Chief of Inspections, Chief of Port Operations, etc.) is obtained.

2. Report any inconsistencies on the Marine Chemist Certificate to the designated work authorization supervisor and follow-up with a letter to Commandant (G-MSO-3) via District(m).

3. In the event of overexposure, personnel should be evacuated to appropriate medical facilities by the most expeditious means. Medical personnel should be provided with all known information on the suspected exposure, including concentration and duration of exposure. This should include the most probable route of exposure. Also provide the medical authority with the phone number to American Toxic Substance and Disease Registry (ATSDR). More specific guidance on medical procedures for acute exposures can be found in Chapter 12 of the Medical Manual, COMDTINST M6000.2(series).