DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
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IN REPLY REFER TO
NAVSEAINST 5100.3E
Ser 05P/299
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NAVSEA INSTRUCTION 5100.3E

From: Commander, Naval Sea Systems Command (SEA 05)

Subj: MERCURY, MERCURY COMPOUNDS, AND COMPONENTS CONTAINING MERCURY OR MERCURY COMPOUNDS; CONTROL OF

Ref:
(a) 29 CFR 1910.1200, Hazardous Communication Standard
(b) NMCPHC TM OEM 6260.01C, Reproductive and Developmental Hazards: A Guide for Occupational Health Professionals
(c) OPNAVINST 5100.19E, Navy Safety and Occupational Health (SOH) Program Manual for Forces Afloat, Volume 1, Parts I and II, of 30 May 2007
(d) S9086-WK-STM-020, Chapter 670, Volume 2
(e) OPNAVINST 5100.23G, Navy Safety and Occupational Health Program Manual, of 30 December 2005
(f) S9510-AB-ATM-010/U, Nuclear Powered Submarine Atmosphere Control Manual, Volume 1
(g) OPNAV M-5090.1, Environmental Readiness Program Manual, of 10 January 2014
(h) MIL-DTL-901E, Shock Tests, H.I. (High Impact) Shipboard Machinery, Equipment, and Systems, Requirements for
(i) NAVSEA 0989-064-3000, Cleanliness Requirements for Nuclear Propulsion Plant Maintenance and Construction
(j) 0948-LP-045-7010, NAVSEA Material Control Standard
(k) MIL-STD-2041D, Control of Detrimental Materials
(l) T9070-AL-DPC-020/077-2, NAVSEA Hazardous Material Avoidance Process
(m) BUMEDINST 6260.30B, Mercury Control Program for Dental Treatment Spaces, of 15 October 2015

1. Purpose. To minimize potential hazard to personnel and the environment, and damage to ship hardware resulting from the use of mercury, mercury compounds, and components containing mercury or mercury compounds by establishing requirements for their control.

2. Cancellation. NAVSEAINST 5100.3D of 26 January 1998 is superseded and hereby canceled.

3. Scope and Applicability. This instruction is applicable to all naval shipyards, ship repair facilities, supervisors of shipbuilding, conversion and repair, regional maintenance centers, and ships, and establishes minimum requirement for mercury control to prevent hardware degradation as a result of mercury contamination. It is not intended to supersede more stringent requirements which may be invoked by other documents.

4. Action

a. Commanding officers of naval shipyards, ship repair facilities, and ships must ensure that the requirements of this instruction are accomplished.

b. Supervisors of shipbuilding, conversion and repair and regional maintenance centers must ensure that the requirements of paragraph 7 pertaining to the control of mercury are incorporated into all new job orders for the repair and alteration of naval warships.

c. Ship acquisition program managers must ensure that applicable requirements of paragraph 7 pertaining to the control of mercury are incorporated into all contracts for new acquisitions.

5. Definitions

a. Boundary of containment. A continuous tight seal (barrier) to prevent the release of functional mercury during normal operation and maintenance. Examples include the exterior of a fluorescent lamp, glass capsule of a mercury switch, and container for mercury reagents. A double boundary of containment consists of two independent seals.

b. Functional mercury. Mercury or mercury compound(s) contained in equipment that is required for the equipment to operate properly, such as that found in mercury switches, fluorescent lamps, flat-panel monitors, thermostats, thermostat probes, small coin type batteries, barometers, and dental amalgams.

c. Hardware. Any article as defined in reference (a), container, piece of material, individual part, subassembly, assembly, component, or system to which mercury control requirements apply.

d. Mercury-free. Hardware is mercury-free if it does not contain functional mercury and is not contaminated by mercury or mercury compounds.

e. Portable. Items that are frequently transported during normal operation. Desk lamps, shop lights, and hand-held instruments are considered portable, while bulbs in stationary light fixtures are not. In general, items that require transport only during maintenance, installation, and removal of the items are not considered portable.

6. Background

a. Elemental mercury is a metal that is a liquid at room temperature. It weighs about 13.5 times as much as the same volume of water. At room temperature it has a viscosity on the same order as water and cannot be poured without splashing. When spilled, mercury breaks into tiny

beads that can lodge in cracks and crevices, collect in sink traps, mix with dust, penetrate porous materials, and cling to vertical surfaces.

b. Mercury may be damaging to hardware surfaces. It alloys with most solid metals (forms an amalgam) rendering them plastic and workable. Mercury and its compounds are especially corrosive to certain non-ferrous metals and their alloys, e.g., silver, copper, aluminum, and zinc.

c. In addition to its material degradation properties, mercury, whether in elemental form or in a compound, is highly toxic and poses a serious health hazard to exposed personnel. Mercury dust and vapor are toxic when inhaled and ingested. Mercury vapors can adversely affect the heart, kidney, liver, lungs, and the central nervous system. Skin contact with mercury may result in skin irritations, skin ulcers, or sores. Contact with mercury may also cause reproductive and developmental hazards as detailed in reference (b). The safety and health requirements in references (b), (c), (d), (e), and (f) must be followed; forces afloat must follow the requirements of references (c) and (d) as applicable for mercury handling and spill cleanup.

d. Mercury is likewise a severely damaging environmental pollutant, and is toxic to fresh and salt water marine organisms. Therefore, handling and release of mercury and mercury compounds must be controlled to minimize environmental exposures, and strict compliance with the requirements of references (d) and (g) must be enforced. All efforts must be made to ensure mercury does not enter any body of water or released into Ship's plumbing system through deck drains. Reference (g) allows overboard discharges only in exceptional circumstances.

e. Unlike many organic and inorganic compounds, whose environment, safety, and health (ESH) hazards can be reduced by chemical or biochemical degradation, ESH hazards of heavy metal compounds are due primarily to the metal, which is not degradable. Therefore, mercury and mercury compounds present a persistent hazard upon release.

7. Requirements. Requirements for the controlled use of mercury and prevention of mercury contamination are established below.

a. Specific requirements

(1) Mercury or mercury compounds must not be taken onboard naval warships except for functional mercury used in batteries, dental amalgams, fluorescent lamps, flat-panel monitors, required instruments, sensors or controls, weapon systems, and chemical analysis reagents specified by NAVSEA. Portable fluorescent lamps and portable instruments containing elemental mercury must be shock-proof per reference (h), and have mercury enclosed by a double boundary of containment. Some devices with liquid crystal display (LCD) screens utilize a fluorescent bulb backlight to illuminate the LCD screen. No additional restrictions or controls apply to devices with LCD screens, provided that the device is removed and sealed in plastic following any evidence that the backlight failed. For Submarines, any use of mercury containing items must be approved as required by reference (f).

(2) Mercury or mercury compounds must not contact hardware surfaces in systems covered by reference (i), submarine air systems, level I systems per reference (j), or the submarine safety program (SUBSAFE) surfaces during maintenance or repair. Such hardware is designated as mercury-free. All other hardware that could be structurally degraded by contamination with elemental mercury or reactive mercury compounds must be separated from it by sufficient distance, or boundaries of containment that effectively prevents contact in all but the most extreme circumstances.

(3) Any hardware surfaces in the above systems which are known or suspected to have come in contact with mercury or mercury compounds must be checked for evidence of structural degradation and external mercury contamination. The existence of external mercury contamination can be determined following reference (k).

(4) The presence of mercury in a product may be determined by checking product labeling on material safety data sheets or safety data sheets. Chemical analysis is not required.

(5) New acquisition and modernization programs must follow the process of reference (l) to avoid the use of mercury and mercury compounds. Reference (l) must also be used during logistics revisions and throughout system life-cycle management. If the use of mercury or mercury compounds cannot be avoided, a proper risk assessment and waiver request, if required, must be performed and submitted per reference (l). For systems covered by reference (i), submit the risk assessment and waiver request, if required, to Nuclear Propulsion (NAVSEA 08).

(6) Dental amalgam and mercury-contaminated items in dental treatment spaces must be handled and disposed of per reference (m).

(7) Disposal of mercury and mercury compounds must be per reference (g).

b. Reporting requirements. All cases where mercury or a mercury compound has contacted hardware surfaces required to be mercury-free must be reported to Dry Environmental Systems and Hazardous Materials (NAVSEA 05P5). Reports concerning systems covered by reference (i) must include NAVSEA 08 in the distribution. Reports must be in letter form and include the date and details of the contact, the surfaces contacted, the recovery actions taken, and the status of the affected surfaces

c. Procurement. The following clause must be included in procurement documents for pressure boundary parts or parts that contact system fluids in systems covered by reference (i); submarine air systems; level I systems per reference (j); or SUBSAFE surfaces during maintenance or repair: “Mercury or mercury containing compounds must not be intentionally added or come in direct contact with hardware or supplies furnished under this contract.”

8. Inquiries. Inquiries concerning this instruction, such as clarification for items that do not clearly fit the definitions in paragraph 5 or requirements in paragraph 7, may be addressed to

NAVSEA 05P5 or, where naval nuclear plant systems are directly involved, to NAVSEA 08, with a copy to NAVSEA 05P5.

9. Records Management. Records created as a result of this instruction, regardless of media and format, must be managed per Secretary of the Navy (SECNAV) Manual 5210.1 of January 2012.

10. Review and Effective Date. Per OPNAVINST 5215.17A, NAVSEA 05P5 will review this instruction annually on the anniversary of its effective date to ensure applicability, currency, and consistency with Federal, Department of Defense, SECNAV, and Navy policy and statutory authority using OPNAV 5215/40 Review of Instruction. This instruction will automatically expire 5 years after effective date unless reissued or canceled prior to the 5-year anniversary date, or an extension has been granted.

L. C. SELBY
By direction

Releasability and distribution:
This instruction is not cleared for public release and is available electronically only, via the NAVSEA Intranet Website located at https://navsea.portal.navy.mil