DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
7700 ARLINGTON BOULEVARD
FALLS CHURCH VA 22042

BUMEDINST 6270.8D
BUMED-N44
8 May 2025

BUMED INSTRUCTION 6270.8D

From: Chief, Bureau of Medicine and Surgery

Subj: OCCUPATIONAL HEALTH HAZARD ASSESSMENTS

Ref: (a) DoD Instruction 5000.02 of 23 January 2020
(b) DoD Directive 5000.01 of 9 September 2020
(c) DoD Instruction 6055.01 of 14 October 2014
(d) MIL-STD-882E, System Safety, 10 February 2000
(e) SECNAVINST 5000.2G
(f) DoD Instruction 6055.05 of 11 November 2008
(g) SECNAVINST 5100.10L
(h) OPNAVINST 5100.19F
(i) OPNAV M-5100.23 of 20 September 2023
(j) National Academies of Sciences Review of the U.S. Navy Environmental Health Center's Health-Hazard Assessment Process (ISBN 0-309-56273-2. 2000)
(k) NAVSEA S9510-AB-ATM-010
(l) OPNAV M-5090.1 of 25 June 2021
(m) SECNAV M-5510.1 of 24 June 2019
(n) DoD Instruction 5200.48 of 6 March 2020

Encl: (1) Health Hazard Assessment Standardized Reporting Requirements
(2) Requesting an Occupational Health Hazard Assessment from the Navy and Marine Corps Force Health Protection Command
(3) Health Hazard Assessment Guidance for Weapons Acquisition Program Managers

1. Purpose. To define the Health Hazard Assessment (HHA) program, revise policy and procedures for requesting HHAs, and identify roles and responsibilities of Navy Medicine under the authority of references (a) through (c). This instruction provides guidance to the Navy acquisition community to establish and sustain effective coordination with Navy and Marine Corps Force Health Protection Command (NAVMCFORHLTHPRTCMD), which manages the HHA program for the Department of the Navy. The identification and assessment of health hazards is part of the risk assessment and management process detailed in references (a) through (f). This instruction is a complete revision and should be reviewed in its entirety.

2. Cancellation. BUMEDINST 6270.8C.

3. Scope and Applicability. This instruction applies to all budget submitting office 18 commands. It may be referenced by acquisition program management authorities to request an

HHA, which can be used to assist the program in identifying health hazards as required in references (a) through (e) and determining which occupational health risks can be eliminated or mitigated, and which risks can be accepted. Per reference (a), acceptance of associated risks must be completed at a level of management authority commensurate with the risk.

4. Background. Per references (c) through (i), the Department of the Navy will provide early identification and mitigation strategies of recognized health hazards during development and fielding of operational platforms. Per reference (j) available at: https://www.ncbi.nlm.nih.gov/books/NBK225796/pdf/Bookshelf_NBK225796.pdf, the HHA program is a validated process that supports defense acquisition programs via an integrated effort intended to reduce occupational health hazard risks associated with use of materials and throughout the life cycle of materiel. This program performs assessments and recommends controls of identified health hazards associated with weapon systems, munitions, hazardous materials, fuels, equipment, clothing, training devices, and more. Navy Medicine provides this service for acquisition programs supporting submarines, surface vessels, aircraft, vehicles, weapons systems, and shore activities. The HHA is designed to assist with maintaining operational readiness, capabilities, and performance by reducing the risk of health hazards associated with use of materials and throughout the life cycle of materiel.

5. Discussion. Per reference (c), risk assessment and management is a cyclical process involving hazard anticipation and identification, risk assessment, identifying control options, making risk decisions, mitigating risk including control implementation, and evaluation of risk mitigation and control measures. HHAs will provide valuable information for the risk assessment process and can be requested by United States Navy (USN) and United States Marine Corps (USMC) activities to inform acquisition program managers of potential health effects during the use of a product, chemical, or the operation of equipment. Assessments may be requested to evaluate new products or processes, consider changes to previously evaluated products and processes, or address reformulations of products.

6. HHAs will provide standard information to the requesting command, which is detailed in enclosure (1). This information can be used as part of the risk assessment process detailed in references (c) through (i). Additional information may also be provided within the HHA at the request of the requesting command if approved to be within the mission and scope of the HHA program by the Head, Acquisition Technical Support Division of NAVMCFORHLTHPRTCMD.

7. Responsibilities

a. Public Health and Safety (BUMED-N44) must:

(1) Provide oversight and formulate Navy Medicine policy to ensure execution and sustainment of the HHA program.

(2) Coordinate with higher and adjacent commands to assist or improve opportunities for communication and execution in support of the HHA program.

b. Fleet Programs (BUMED-N10F)

(1) Must acknowledge and review Submarine Atmosphere Control Manual (SACM) certification HHAs for submarine materials submitted by the Submarine Material Review Board (SMRB) at NAVMCFORHLTHPRTCMD, as detailed in reference (k).

(2) Must endorse SACM certification HHA findings conducted by the SMRB that include a determination of usage category of materials, as defined in reference (k). The categories include permitted, limited, restricted, and prohibited usage.

(3) Must communicate SACM certification endorsement to Naval Sea Systems Command (NAVSEA) (SEA 05Z42) with copy to the HHA program manager at NAVMCFORHLTHPRTCMD.

(4) Must maintain liaison and effective communication with NAVMCFORHLTHPRTCMD for continued SACM certification HHA support.

c. Commander, NAVMCFORHLTHPRTCMD

(1) Must implement the HHA program.

(2) Must provide subject matter expertise to complete the HHAs in alignment with current scientific and public health knowledge with due consideration to the safety and health of Navy employees and demonstration of ethical standards.

(3) Must maintain standard operating procedure (SOP) for conducting HHAs. Periodically evaluate the effectiveness of the HHA program by soliciting customer feedback. Leverage results to inform policy, procedures, and programmatic improvements.

(4) Must detail standard health hazard information within the HHA as described in enclosure (1).

(5) Must communicate technical criteria to properly account for all required information pertinent to HHA requests and provide amplifying guidance to stakeholders including, but not limited to, a list of supporting documentation that is required before authorization of work. Required supporting documentation is detailed in enclosures (2) and (3) of this instruction.

(6) Must review historical health hazards data along with any readily available, relevant health surveillance and safety data which may identify health hazards on predecessor or similar systems.

(7) Must analyze the health hazard risk(s) and make recommendations to control identified health hazards as well as verify adequacy of those controls where feasible. Apply regulatory health standards to military-unique equipment, systems, and operations, where appropriate and when practicable.

(8) Must provide completed HHA report to customer on official letterhead.

(9) Must maintain an electronic database of HHA reports.

(10) Must monitor and sustain the SMRB, per the requirements of reference (k), to evaluate health hazards and potential impact to submarine atmosphere.

(11) Must conduct SACM certification reviews, as required by reference (k), utilizing the HHA program. Based on the circumstances of use and the chemical nature of the material, NAVMCFORHLTHPRTCMD in collaboration with NAVSEA, will determine whether an administrative assessment is acceptable or offgas testing is required when certifying a new material or system.

(12) If the SACM certification requires off gas testing, NAVMCFORHLTHPRTCMD and NAVSEA will determine the targeted off-gassed constituents and the testing requirements based on the information required, per reference (k).

(13) Must provide recommendation of a usage category for materials, as defined in reference (j), to BUMED-N10F for endorsement.

(14) Must coordinate with Commanding Officer, Naval Medical Research Unit - Dayton, to resolve data gaps in toxicological information identified by NAVMCFORHLTHPRTCMD that are necessary to adequately assess the risk to personnel from exposure to materials being reviewed during the HHA process. These data gaps may include toxicity testing (in vivo or in vitro systems) for endpoints of concern that are absent from the toxicity database or that are determined to be insufficient to adequately assess the risk.

(15) Must provide quarterly summary reports to BUMED-N44.

d. Commanding Officer, Naval Medical Research Unit – Dayton. Must coordinate, upon request from NAVMCFORHLTHPRTCMD, to resolve data gaps in toxicological information required to adequately assess the risk to personnel from exposure to materials being evaluated through the HHA program. These data gaps may include toxicity testing (in vivo or in vitro systems) for endpoints of concern that are absent from the toxicity database or that are determined to be insufficient to adequately assess the risk. Include anticipated resources required (e.g., financial resources, test subjects, staffing, etc.), and determine if the research will be conducted by the Naval Medical Research Unit – Dayton.

8. Request Process

a. USN and USMC activities will:

(1) Request HHAs as detailed in enclosures (2) and (3) of this instruction.

(2) Assemble the required information to support the HHA request and technical documentation requirements. Certain supporting documentation is mandatory, and if not provided within the request, the HHA will not be conducted.

(3) Prepare a formal, signed memorandum on letterhead to request an HHA, which must be sponsored by USN or USMC activity.

(4) Review the request for completeness, validating it against the requirements contained in enclosure (1) prior to submission.

(5) Submit all requests, test results, and documents to the Acquisition Technical Support Division within the Industrial Hygiene Department at NAVMCFORHLTHPRTCMD. Request letters and supporting technical documentation are accepted in electronic and paper formats. It is incumbent upon customers providing information and data to ensure that consolidation of that information and data will not result in an increase in security classification.

(6) Allow sufficient time to process the HHA request and provide the report.

(7) Resubmit the request once all of the required documentation has been compiled if previous submission was cancelled.

b. NAVMCFORHLTHPRTCMD will:

(1) Review submitted requests for completeness and notify the requesting agency or the manufacturer if additional information is needed.

(2) Process the request within a timely manner in accordance with the established SOP.

(3) Execute tasks to complete the assessment and provide the report in accordance with established SOP.

(4) Adhere to Navy requirements for handling information designated as “proprietary” or “business-sensitive” and disclosure matters, per reference (l).

c. Enclosures (2) and (3) provide more details of the request process, the review process, the cancellation policy, and documentation used to support the request. Refer to the HHA Web site

for the most up-to-date information (https://www.med.navy.mil/Navy-and-Marine-Corps-Force-Health-Protection-Command/Environmental-Health/Industrial-Hygiene/Acquisition-Technical-Support/Health-Hazard-Assessments-HHA/).

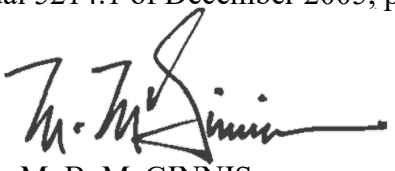
9. Records Management

a. Records created as a result of this instruction, regardless of format or media, must be maintained and dispositioned per the records disposition schedules located on the Department of the Navy Assistant for Administration, Directives and Records Management Division portal page at https://portal.secnav.navy.mil/orgs/DUSNM/DONAA/DRM/Records-and-Information-Management/Approved%20Record%20Schedules/Forms/AllItems.aspx.

b. For questions concerning the management of records related to this instruction or the records disposition schedules, please contact the local records manager or the OPNAV Records Management Program (DNS-16).

10. Review and Effective Date. Per OPNAVINST 5215.17A, BUMED-N44 will review this instruction annually around the anniversary of its issuance date to ensure applicability, currency, and consistency with Federal, Department of Defense (DoD), Secretary of the Navy and Navy policy and statutory authority using OPNAV 5215/40 Review of Instruction. This instruction will be in effect for 10 years, unless revised or cancelled in the interim and will be reissued by the 10-year anniversary date if it is still required, unless it meets one of the exceptions in OPNAVINST 5215.17A, paragraph 9. Otherwise, if the instruction is no longer required, it will be processed for cancellation as soon as the need for cancellation is known following the guidance in OPNAV Manual 5215.1 of May 2016.

11. Information Management Control. Reports required in this instruction are exempt from reports control per Secretary of the Navy Manual 5214.1 of December 2005, part IV, subparagraph 7k.



M. B. McGINNIS
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Releasability and distribution:
This instruction is cleared for public release and is available electronically only via the Navy Medicine Web site, https://www.med.navy.mil/Directives/

HEALTH HAZARD ASSESSMENT STANDARDIZED REPORTING REQUIREMENTS

1. HHAs will provide standard information to the requesting command. This information can be used as part of the risk assessment process detailed in this instruction.

a. In addition to specific usage information related to the product, chemical, or system, the standard information in subparagraphs 1a(1) through 1b(3) of this enclosure will be included in all HHAs:

(1) Toxicological literature search results for all identified chemical hazards. Toxicological literature search will be conducted per NAVMCFORHLTHPRTCMD SOP.

(2) Identification of carcinogens, which typically includes designations by:

(a) Occupational Safety and Health Administration carcinogens identified on the agency Web site: https://www.osha.gov/carcinogens/standards.

(b) National Toxicology Program, Report on Carcinogens, latest edition as known to be a human carcinogen or reasonably anticipated to be a human carcinogen.

(c) International Agency for Research on Cancer Monographs as Group 1 (the agent is carcinogenic to humans), Group 2A (the agent is probably carcinogenic to humans), and Group 2B (the agent is possibly carcinogenic to humans).

(d) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, latest edition as A1 (confirmed human carcinogen) and A2 (suspected human carcinogen).

(3) Identification of reproductive and developmental hazards, as identified in Navy and Marine Corps Public Health Center Technical Manual: Reproductive and Developmental Hazards: A Guide for Occupational Health Professionals and will also report any findings of reproductive or developmental hazards found from the toxicological literature search.

(4) Identification of ototoxicants, as detailed in Occupational Safety and Health Administration Safety and Health Bulletin, Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure of 8 March 2018, or discovered in the toxicological literature search.

(5) Identification of sensitizers as determined in the toxicological literature search.

(6) Guidance to control exposures to the identified hazards.

b. In general, there are three types of HHAs that may be performed. The HHA will also include information specific to each type of request.

(1) Chemical products and hazardous materials. The HHA will include an evaluation of the full product formulation, to include proprietary ingredients as detailed in enclosure (2) of this instruction.

(2) SACM certification Review HHAs. Submarine materials reviews conducted through the HHA process will result in a determination of usage category of materials, as defined in reference (k). The categories include permitted, limited, restricted, and prohibited usage categories.

(3) Weapons systems and ammunition. Pending test results received by NAVMCFORHLTHPRTCMD from the requesting activity, weapons HHAs will include an assessment of toxic contaminants and physical hazards as detailed in enclosure (3) of this instruction. A risk assessment code meeting the requirements of reference (d) for each hazard will be included in the HHA report. Further information regarding weapons system and ammunition HHAs can be found in enclosure (3) of this instruction.

REQUESTING AN OCCUPATIONAL HEALTH HAZARD ASSESSMENT FROM THE NAVY AND MARINE CORPS FORCE HEALTH PROTECTION COMMAND

1. Send all requests, test results, and documents to the NAVMCFORHLTHPRTCMD Industrial Hygiene Department. Request letters and supporting technical documentation are accepted in electronic and paper formats.

a. Electronic. Signed request letters from the USN or USMC sponsor and all supporting technical documents can be e-mailed to Head, Acquisition Technical Support Division at: usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-HHA@health.mil

b. Paper. Mail the information to:

Commander
Navy and Marine Corps Force Health Protection Command
Industrial Hygiene – HHA
620 John Paul Jones Circle, Suite 1100
Portsmouth, Virginia 23708-2103

c. FAX. Fax the request or documentation to (757) 953-0689. The fax cover sheet should be marked as Health Hazard Assessment (HHA) or Submarine Atmosphere Certification (SACM) Review HHA.

Please Note: All SACM Review HHA requests must come to NAVMCFORHLTHPRTCMD via Naval Sea Systems Command (NAVSEA) (SEA 05Z42). Submarine related HHA requests should be sent directly to NAVSEA SEA 05Z42 per the requirements of reference (k), Nuclear Powered Submarine Atmosphere Control Manual of 1 October 2020 in order to begin the HHA process. After NAVMCFORHLTHPRTCMD completes the SACM Review HHA, the HHA will be sent to NAVSEA SEA 05Z42 for decision making and distribution to the original requestor.

2. The HHA request letter must come from the Navy or Marine Corps sponsoring organization. NAVMCFORHLTHPRTCMD does not perform independent product reviews or endorsements and will not accept information directly from a supplier or manufacturer until we have the official request. The request letter should provide information on how the product will be used, the amount to be used per operation or application, special operating conditions and other information related to the specific Navy or Marine Corps application. The information in subparagraphs 2a through 2h of this enclosure is required for all HHAs (excluding weapons HHAs, where specific information relating to weapons HHAs can be found in this enclosure), if applicable:

a. Where the product will be used (specific ship or general class of ship; whether it is an exterior space, an interior space, flight deck, and location, such as a tank, hangar bay etc.).

b. How the product will be applied (for example, brush and roller painting versus spray painting (type of spray painting, for example plural system, compressed air, airless spray, high volume-low pressure, etc., mechanical means of application versus adhesive use, Q-tip versus syringe, etc.)

c. Who will be applying the product (Navy civil service employees, ships' forces, contractors).

d. The quantity of the product that will be applied.

e. If there is a possibility of temperature change to the applied product, and if so, list the maximum temperature (for example, adhesive applied to electrical components that may create heat, grease application to an engine that will create heat during operation).

f. Whether the product will be stored aboard a vessel, and if so, in what quantity and for how long.

g. Frequency of operation applying the product (provide one of the frequencies):

(1) Daily

(2) Number of days per week

(3) Number of days per month

(4) Number of days per quarter

(5) Number of days per year

h. Duration of applying the product in a day (choose one):

(1) Up to 15 minutes

(2) 15 to 30 minutes

(3) 30 to 60 minutes

(4) 1 to 2 hours

(5) 2 to 4 hours

(6) 4 to 6 hours

(7) 6 to 8 hours

(8) 8 to 10 hours

(9) More than 10 hours

3. For weapons HHA requests, the request letter must provide detailed usage of the weapon; information regarding industrial hygiene sample results in the form of toxic gases, impulse noise, and blast overpressure (BOP); and relevant DoD reports. For more detailed information on weapons HHAs requests, please review enclosure (3) of this instruction or contact via e-mail at usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-HHA@health.mil.

4. NAVMCFORHLTHPRTCMD does not begin the review process until both the request letter and the required technical documentation have been received. If the documentation is not received within 1month of the request, a courtesy reminder is provided by phone or e-mail to the requestor. If the information from the manufacturer or supplier is not received, the requesting activity will be sent a letter of cancellation. The requesting activity can resubmit the HHA request after they have obtained the required documentation.

5. Once the technical documentation package has been received, it is reviewed for completeness and the requesting agency, or the manufacturer will be notified if additional information is needed. NAVMCFORHLTHPRTCMD may agree to begin an HHA without all the documentation in special circumstances to expedite work or accommodate emergency situations. However, such exceptions will be approved on a case-by-case basis. If NAVMCFORHLTH-PRTCMD agrees to do a review with incomplete documentation, the sponsoring organization will be provided with an interim assessment letter that evaluates the information supplied and specifies what else is needed to complete the assessment.

6. Handling of Proprietary or Business Sensitive Information:

a. When performing HHAs for the USN and USMC, NAVMCFORHLTHPRTCMD strictly adheres to the DoD and DON requirements for handling information that is proprietary, competition sensitive, or business sensitive. This information is treated as controlled unclassified information and is handled as such. More information regarding controlled unclassified information can be found on the DoD Controlled Unclassified Information Program Web site, www.dodcui.mil.

b. The proprietary formulation will not be distributed to any other command or agency. The proprietary formulation is reviewed only to assess the potential health impacts of the chemical components. The proprietary ingredients will not be identified or discussed in the report by name, percent composition, or other specific identifiers. If it is necessary to address concerns about a proprietary ingredient, it will be referred to either by the general chemical class, e.g., amine, aldehyde, aromatic hydrocarbon, etc., or simply as "a proprietary chemical of the product."

c. NAVMCFORHLTHPRTCMD does not sign confidentiality agreements or similar documents with manufacturers.

7. The list of HHA technical documentation that must be supplied by the manufacturer or supplier for NAVMCFORHLTHPRTCMD to conduct an HHA is detailed in subparagraphs 7a through 7m of this enclosure:

a. Technical point of contact at the manufacturer or company supplying the product (name, address, phone number, and e-mail).

b. Technical points of contact from the government sponsoring organization that are major product users or consumers to provide application and use experience information.

c. Complete description of the product, including model, part number and any known trade names or synonyms. State whether the product is a reformulation, and if so, provide all identifying information for the previous product, including a copy of the HHA, if applicable.

d. Description of intended product application and storage, including amounts used; concentrations; application, use, and storage temperatures; cure times; dry times; and estimated number of uses per time (e.g., per work shift, per day, per week, etc.). Include any known "worst case" conditions. Please Note: To properly assess the potential health hazard impact of products according to their intended use, the details indicated in this section should leave no assumptions.

e. Technical specification and material specification sheets. Sales literature can also be helpful if it fully describes use and handling of the product.

f. Current Safety Data Sheet (SDS) for the product. The SDS must contain all data elements required by the Hazard Communication Standard, 29 CFR 1910.1200.

g. Complete product formula, including Chemical Abstract Service number. It is not acceptable to list generic ingredient names (e.g., "pigments – 45 percent"). Ingredients must total 100 percent.

h. Most current SDS for each ingredient (raw material), if applicable.

i. Copy of product label.

j. Copies of industrial hygiene or safety survey reports that address potential health hazards related to working with the material, if available. Of interest is information pertaining to adverse health effects documented for manufacturer employees during research and development, manufacture, or packaging and handling.

k. Copies of any known toxicity study reports related to the product, its ingredients, or its pyrolysis products, if available. Of particular interest are animal studies (laboratory) using the product or its pyrolysis products as the challenge agent(s). The full reference citation to the study is an acceptable alternative.

l. Copies of reports addressing the product's decomposition products and their concentrations during or following fires or other intense heat scenarios (high temperature use), if available. Reference citations for such reports are also acceptable.

m. Copies of SOPs related to mixing, using, or applying the product.

8. If you have any questions, contact NAVMCFORHLTHPRTCMD, Industrial Hygiene Department, Acquisition Technical Support Division. Please direct all communications to Head, Acquisition Technical Support Division:

Head, Acquisition Technical Support Division
(757) 953-0725; Defense Switch Network 377-0725
usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-HHA@health.mil

HEALTH HAZARD ASSESSMENT GUIDANCE FOR WEAPONS ACQUISITION PROGRAM MANAGERS

1. Send all requests, test results, and documents to the NAVMCFORHLTHPRTCMD Industrial Hygiene Department. Request letters and supporting technical documentation are accepted in electronic and paper formats.

a. Electronic. Signed request letters from the Navy or Marine Corps sponsor and all supporting technical documents can be emailed to Head, Acquisition Technical Support Division at: usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-HHA@health.mil

b. Paper. Mail the information to:

Commander
Navy and Marine Corps Force Health Protection Command
Industrial Hygiene - HHA
620 John Paul Jones Circle, Suite 1100
Portsmouth, Virginia 23708-2103

c. FAX. Fax the request or documentation to 757-953-0689. The fax cover sheet should be marked as Health Hazard Assessment (HHA).

2. The weapon HHA request letter must come from the Navy or Marine Corps sponsoring organization. NAVMCFORHLTHPRTCMD does not perform independent product reviews or endorsements and will not accept information directly from a supplier or manufacturer until the official request has been received.

3. The request letter should provide specific information of the weapon, including purpose of weapon, percentage of chemical composition, test data results for all potential physical and chemical exposures to be assessed, and the intended use of the weapon. Each area of information is critical to the risk assessment within the HHA, and is evaluated per reference (d). Insufficient information may cause uncertainty in the risk assessment leading to an elevated risk assessment code. The specific information identified in subparagraphs 3a through 3d(2) of this enclosure are required, when applicable:

a. Type of weapon (e.g. 40 mm MK 0 High Explosive Dual Purpose Airburst round).

b. Type of weapon system associated with the weapon (e.g. 40 mm MK 0 Automatic Grenade Launcher System).

(1) If the weapon HHA request is to be applied to multiple weapon systems, the test data should be collected on each weapon system to account for any potential differences in risk due to weapon system design (e.g. if the 5.56 mm MK 0 cartridge is requested to be

assessed for the M16, M4, M249, and M27, all four weapon systems must be tested with the MK 0 cartridge). Where the weapon will be used (e.g., ground forces on tripod mount in free field and from enclosure).

c. The anticipated number of rounds to be fired to meet objectives (e.g., weapon introductory will require 32 rounds fired per gunner from free field and 32 rounds fired per gunner from enclosure. Weapon qualification training will involve the same number of rounds fired two times per year).

(1) Rounds fired in testing should strongly correlate with the number of rounds anticipated to be fired during fielding. Consult with NAVMCFORHLTHPRTCMD when constraints to available rounds exist.

(2) The rate of fire for the weapon in testing should reflect the rate of fire for anticipated use during fielding. If the weapon is to be fired as single shots, burst firing, or fully automatic, the testing should measure any of these conditions that apply.

(a) The frequency of weapon use (e.g., the 40 mm MK 0 will require a one-time 64 initial rounds for familiarization and 128 rounds annually for qualification).

(b) The operational layout for weapon use (e.g., operation on the 40 mm MK 0 requires a two-man crew, the gunner, and an assistant gunner. The 40 mm MK 0 will be fired from the sitted position on a tripod mount for free field, and from a standing position on a gun mount for firing from enclosure). Please Note: If posture, mount, or platform vary for the weapon, the test conditions should be collected in a manner that reflects these different conditions to account for the potential change in exposure.

(c) Comprehensive description of weapon composition. This description should detail the chemical composition and percentage, or weight of components throughout the weapon, including in the propellant, primer, casing, projectile, delay, igniter, tracer, fuze, explosive module, etc. (e.g., the propellant of the 44 mm MK 0 is composed of ‘x’ percent nitroceullose and ‘x’ percent nitroglycerine; the primer contains ‘x’ percent lead styphnate and ‘x’ percent antimony; the tracer contains ‘x’ percent strontium carbonate and ‘x’ percent ethylene-vinyl acetate). Indicating the chemical composition with generic descriptions or manufacturer labels alone (e.g., double base propellant or Federal number ‘X’ primer) will not provide enough granularity for NAVMCFORHLTHPRTCMD to assess the potential exposure. Manufacturer safety data sheets should accompany any indication of energetic mixtures when the chemical composition of components cannot be fully described.

d. Test results addressing the various potential exposures to personnel while using the weapon. Testing would typically include a minimum of chemical and impulse noise measurements. Additional hazards may be necessary to test for if the potential for exposure exists (e.g., BOP), continuous noise, electromagnetic radiation, vibration, etc.).

(1) All testing should adhere to specific Test Operating Procedures (TOP) and, or military standards. If gaps exist in the TOPs or military standards, the NAVMCFORHLTHPRTCMD Industrial Hygiene Field Operators Manual can be utilized or consult with NAVMCFORHLTHPRTCMD directly.

(2) If it is unclear whether the hazard exists or how extensive the testing should be, consult with NAVMCFORHLTHPRTCMD prior to testing.

4. All test results collected by DoD commands, centers, labs, and facilities being provided for consideration in the HHA must have the organization's heading, document title, date, and proper security markings. Documentation provided through non-DoD sources should also contain the organization name, document title, and date. SDSs are required to meet information formatting, per the Hazard Communication Standard, 29 CFR 1910.1200. E-mails, phone conversations, and letters from weapon program managers, engineers, scientists, and specialists providing information or answers are considered expert opinion and can be referenced by NAVMCFORHLTHPRTCMD in the HHA.

5. Exposure criteria and risk evaluation methods can differ across the DoD, therefore, limitations may exist with some data sharing from other military departments. Although the list in subparagraphs 5a(1) through 5a(4) of this enclosure is not comprehensive, and exceptions may apply, the TOPs, military specifications, and other documents cited throughout this instruction should be considered as standard guidance for test procedure and risk characterization within the HHA.

a. Toxic Contaminants. A broad term often cited in TOPs referring to the chemical products and by-products that enter the atmosphere after firing the weapon. Toxic contaminants can be separated into the listed areas:

(1) Combustion Products. The products of combustion are the result of an exothermic reaction between a fuel and an oxidant to yield oxidized products usually in the form of gases. Chemicals that are considered a high priority for combustion products testing:

(a) Ammonia (NH_3)

(b) Carbon Dioxide (CO_2)

(c) Hydrogen Cyanide (HCN)

(d) Nitric Oxide (NO)

(e) Nitrogen Dioxide (NO_2)

(f) Sulfur Dioxide (SO_2)

(g) Carbon Monoxide (CO)

(2) Volatile Organic Compounds (VOC). VOCs represent carbon containing compounds that easily evaporate under standard temperature and pressure. There is a large list of potential VOCs that can be emitted during weapons firing. Measuring for all VOCs is not typically necessary for the purpose of the HHA, and the list can be narrowed with development of a sample plan. Common VOCs for consideration in the testing include:

(a) Benzene (C_6H_6)

(b) Acrolein (CH_2CHCHO)

(c) Toluene ($C_6H_5CH_3$)

(d) Xylene ($(CH_3)_2C_6H_4$)

(e) Formaldehyde (CH_2O)

(3) Metals. Metals and metallic compounds are integral to many components of the weapon energetics, casings, and body composition. Weapons identified as 'lead-free', 'green ammo', 'enhanced performance rounds', etc., do not eliminate the presence of toxic metals being detected in the air during firing. These labels are primarily addressed at reducing environmental impact during the manufacturing process and on the range. Metals yielded during firing is dependent upon what is in the initial composition, however, the amount measured is influenced by the reaction and air disbursement. Lead is a priority metal for testing as its presence in weapons is common. When applicable, other metals are measured during testing, including:

(a) Copper (Cu)

(b) Nickel (Ni)

(c) Tungsten (W)

(d) Aluminum (Al)

(e) Chromium (Cr)

(f) Strontium (Sr)

(g) Manganese (Mn)

(4) All toxic contaminant measurements should be tested in a manner to account for the most representative potential exposure to personnel while operating the weapon and in a standard

procedure-based format to ensure reproducibility of the testing and validity of the samples. The documents identified in subparagraphs 5a(4)(a) through 5a(4)(d) of this enclosure can be referenced for procedure and sampling plan information:

(a) TOP 02-2-622 Toxic Hazards Testing for Military Equipment and Materiel of 14 May 2020

(b) TOP 03-2-504A Safety Evaluation of Small Arms and Medium Caliber Weapons of 29 May 2013

(c) Industrial Hygiene Field Operators Manual, Technical Manual NMCPHC-TM6290.91-2 of 24 August 2022

(d) Industrial Hygiene Sampling Guide for Comprehensive Industrial Hygiene Laboratories, NMCPHC of 15 December 2021

b. Physical Hazards. The physical hazards typically encountered during weapons firing are impulse noise and BOP. These areas are further defined in subparagraphs 5b(1) through 5b(4) of this enclosure:

(1) Continuous Noise. Continuous noise, also referred to as steady state noise, or intermittent noise testing, is only necessary when a weapon or weapon system produces a sustained hazardous noise level that will cause prolonged exposure beyond the actual firing period. Continuous noise is typically associated with mechanical parts, engines, motor assemblies, or low-pressure changes within an air movement chamber, and not the rapid pressure changes due to chemical explosions occurring with weapons.

(2) Impulse Noise. Weapons are anticipated to exceed the exposure criteria of 140 decibels peak in nearly every situation, therefore testing is required to determine the potential impulse noise exposure to personnel. Risk assessment of impulse noise is evaluated different across the DoD, which places limitations on data sharing. To obtain risk mitigation acceptance under the Department of the Navy umbrella, all impulse noise testing should be in accordance with the most current DoD noise limit design criteria standard. NAVMCFORHLTHPRTCMD can evaluate impulse noise test results, per earlier DoD design standards and TOPs, but will not be able to adjust the risk assessment code. MIL-STD-1474E Department of Defense Design Criteria Standard Noise Limits of 15 April 2015 should be utilized for impulse noise testing.

(3) Hazardous Noise Contour. The hazardous noise contour refers to the distance from the weapon at which the noise criteria level is no longer exceeded. This value is calculated by NAVMCFORHLTHPRTCMD for single hearing protection and double hearing protection based on the impulse noise test results.

(4) BOP. Refers to the sudden onset of a pressure wave, above normal atmospheric pressure, which occurs from a blast (e.g., explosions and weapons firing events). The pressure wave is caused by the energy released during explosions and weapons firing. All weapons generate some level of BOP; however, the potential exposure is highly dependent upon the size of the weapon, design of the weapon, area of use, and position of personnel in relation to the blast source. It is highly recommended that BOP testing be conducted with any weapon HHA requests at this time. The documents in subparagraphs 5b(4)(a) through 5b(4) of this enclosure should be utilized for BOP procedure and consideration:

(a) International Test Operations Procedure 4-2-822 Electronic Measurement of Airblast Overpressure and Impulse Noise of 25 September 2000

(b) Department of Defense, Memorandum: Department of Defense Requirements for Managing Brain Health Risks from Blast Overpressure of 8 August 2024.