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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350-2000
and
Headquarters
United States Marine Corps
Washington, DC 20380-0001

IN REPLY REFER TO
OPNAVINST 3401.3A
OP-70/CMC (RDD)
8U638612
5 January 1989

OPNAV INSTRUCTION 3401.3A

Subj: NUCLEAR SURVIVABILITY OF NAVY AND MARINE CORPS SYSTEMS

Ref: (a) DODDIR 4245.4 OF 25 Jul 88, Acquisition of Nuclear Survivable Systems (NOTAL)
(b) OPNAVINST 5420.2P (NOTAL)
(c) DOD MILSTD-2169A (NOTAL)
(d) OPNAVINST 5000.42C (NOTAL)
(e) OPNAVINST 5000.49A (NOTAL)

Encl: (1) Definitions

1. Purpose. To establish policy and assign responsibility for implementing nuclear survivability into Navy and Marine Corps systems; and to incorporate survivability functions within the existing Navy decision process.

2. Cancellation. OPNAVINST 3401.3

3. Applicability and Scope. This instruction implements procedures established by references (a) and supplements references (b) through (e). It also applies to all major system acquisition programs (ACAT I) and any non-major systems deemed critical by the Ships and Aircraft Characteristics and Improvement Boards (SCIB, ACIB) by nature of their impact on strategic or tactical missions. It applies to new construction and operational ships, submarines and aircraft, including associated weapon systems and components, as well as United States Marine Corps (USMC) vehicles/equipment and shore based systems. Nuclear survivability initiatives encompass development, acquisition, deployment and support of systems/equipment improvements to prevent or minimize the broad degrading effects of nuclear engagement on mission performance. Application of nuclear survivability techniques shall be consistent with the Chief of Naval Operation's (CNO) and the Commandant of the Marine Corps' (CMC) operational readiness and warfighting sustainability goals.

4. Background. Reference (a) requires that nuclear survivability be included in the concept formulation, design, development, production, modernization, and operation of major systems that must perform critical missions in nuclear conflicts. Non-major systems which support a nuclear-survivable major system will have compatible nuclear survivability criteria. Reference (b) promulgates CNO Executive Board (CEB) procedures and assigns a survivability function to the SCIB and ACIB which are Special

Panels of the CEB. Reference (b) subsumes under the CEB structure the Warfare Requirements Board (WRB), whose mission includes an advisory role to the CNO on Top-Level Warfare Requirements (TLWR) and the warfighting effectiveness of combat systems. Reference (c) establishes Deparment of Defense (DoD) nuclear hardening policy for high-altitude electro-magnetic pulse (HEMP). Reference (d) establishes Department of the Navy (DoN) Research, Development and Acquisition (RDA) procedures. Reference (e) establishes requirements for Integrated Logistics Support Plans (ILSP).

5. Discussion. Nuclear survivability may be achieved through many techniques: hardening, proliferation, redundancy, reconstitution, avoidance and deception. Hardening, if selected, is less expensive if incorporated in the original design of the system and if accomplished in a selective manner in concert with other techniques. In broad terms it is necessary:

a. To define which systems must survive to provide an acceptable combat capability to the force;

b. To define the nuclear environment to which those mission critical systems are likely to be exposed;

c. To develop hardening thresholds;

d. To express those thresholds as specifications for developer use; and

e. To conduct a hardness assessment program which includes:

(1) tests and evaluation to confirm hardness of design;

(2) hardness assurance during production; and

(3) hardness maintenance and surveillance to prevent degradation of design during system service life.

6. Policy

a. Survivability shall be considered a fundamental design requirement of no less significance than other inherent system characteristics. The CNO's and CMC's goals are to maintain operational readiness and preserve warfighting capability in both peacetime and hostile environments.

b. One of the three following survivability categories will be assigned for each major system and supporting non-major

system, by following the documentation requirements of reference (a):

(1) "Nuclear survivability is required." That statement requires comprehensive survivability efforts and is appropriate for any system which must perform vital missions in nuclear conflicts.

(2) "Nuclear hardening is required, HEMP only." That statement requires hardening to HEMP effects only and may be appropriate for systems which are procured in large numbers and used in such a fashion that failure of a limited number is not serious, but a widespread or theater-wide failure could be critical. Those systems normally affect critical functions supporting strategic or tactical missions. Examples include fire control radars, weapon control components, warfare mission computers, command and control, communication and intelligence equipment, and critical ships service systems, etc. A supporting rational may be required and should be identified in the Mission Need Statement (MNS). HEMP standards are established by reference (c).

(3) "Nuclear survivability and hardening are not required." That statement may be appropriate for systems which have no role in a nuclear conflict or which are non-essential to warfighting capabilities. (An example might be a training aircraft with no combat mission.) A supporting rationale will be required and shall be identified in the MNS.

c. Deployable manned systems requiring survivability shall be designed or, where determined affordable, backfitted so that failure will not occur in a nuclear environment less severe than that in which personnel lose the ability to operate and maintain the equipment. Unless otherwise specified by the CNO or the CMC, loss is assumed to occur at nuclear environment levels which would result in 30 percent immediate temporary incapacitation of system personnel. Other system configurations, such as deployable unmanned and non-deployable, will achieve a degree of survivability necessary to operate in projected threat levels, dependent upon acceptable attrition rates, ease of replacement, reconstitution, repair and/or remanning.

d. For major system new starts, nuclear survivability shall begin in the Concept Exploration phase (Milestone 0) and shall continue throughout the life of the system.

e. As set forth in paragraph 7.b, overhaul and modernization programs shall employ practical applications of nuclear hardening

improvements, particularly in cases where known deficiencies exist.

f. Top-Level Warfare Requirements will address nuclear survivability, particularly with respect to integrated warfare requirements and cross-platform warfare issues.

g. Documentation requirements set forth in references (a) and (d) will be met at each milestone for major systems and those non-major systems deemed mission critical by the procedures described in paragraph 7.

7. Responsibilities

a. The Deputy Chief of Naval Operations (Naval Warfare) (OP-07) shall exercise primary responsibility and authority for the coordination, direction, and development of naval warfare survivability guidance and shall provide management focus to ensure balance among mission effectiveness versus projected threat, platform commonality, and affordability issues.

b. The Chair, Ship Characteristics and Improvement Board, and the Chair, Aircraft Characteristics and Improvement Board are the CNO's Executive Agents for implementing surface ship and aircraft survivability initiatives. In addition to responsibilities set forth in reference (b), and in conjunction with the warfare sponsors, the chairs shall:

(1) Provide continuous coordination and management focus to ensure the implementation of affordable nuclear survivability initiatives.

(2) Translate nuclear survivability policy into operationally relevant platform and weapon hardening system characteristics that support Top-Level Requirements (TLR).

(3) Based upon recommendation from resource sponsor, determine the nuclear hardening thresholds for major systems; also determine the nuclear hardening thresholds for non-major system which have operational impacts on critical functions supporting vital missions. If required, determine the range of survivability methods to be employed for the system.

(4) Include a formal determination as to the satisfaction of the Nuclear Survivability Criteria in the Low Rate Initial Production Report (LRIP) prior to Milestone III.

(5) Review the Hardness, Assurance, Maintenance and Surveillance (HAMS) plan for systems requiring hardening to achieve survivability.

(6) Review all survivability documentation prepared by sponsors for program milestone reviews.

(7) Include the WRB as an information addressee on all survivability issues and decisions

(8) In those instances where survivability involves either an integrated warfare requirement or a major cross-platform warfare issue, the governing CIB will request a recommendation from the WRB.

c. The Assistant Chiefs of Naval Operations shall:

(1) Under the provisions of reference (a) recommend to the SCIB or ACIB as appropriate the Nuclear Survivability Criteria:

(a) for each major acquisition program; and

(b) for any non-major systems determined to impact on critical functions supporting strategic or tactical missions.

(2) Ensure all documentation requirements of reference (a) and (d) are met.

(3) Ensure establishment of a HAMS plan and provide required programmatic support.

(4) When nuclear hardening is specified as a mode of survivability, the hardness criteria established by the SCIB and ACIB shall guide requirement and specification development.

(5) Prepare documentation for major programs undergoing formal milestone reviews by the Defense Acquisition Board.

(6) If specifically requested, provide nuclear survivability status to DoD per information requirements of reference (a).

d. The Commanders, Systems Commands (SYSCOMS) under the lead SYSCOM, Naval Sea System Command, shall:

(1) Support the CNO and CMC by providing comprehensive technical management, direction, coordination, assessment and focus for implementing nuclear survivability TLRs.

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(2) Appoint and maintain a SYSCOM nuclear survivability coordinator who shall function as a single point of contact for such matters.

(3) Establish and issue Navy nuclear hardening criteria.

(4) Develop appropriate methodologies to assess the feasibility, benefits and costs associated with implementing nuclear survivability improvements including, but not limited to Electromagnetic Pulse (EMP), Transient Radiation Effects on Electronics (TREE), Blast and Thermal (B/T) effects, Air Blast-Induced Shock (ABIS) and underwater shock.

(5) Ensure that nuclear survivability requirements are validated at the appropriate points of system development.

(6) Once a determination has been made for nuclear survivability, incorporate appropriate life-cycle maintenance into the ILSP under references (a) and (e).

(a) Ensure there is life-cycle maintenance of nuclear survivability in cases where hardness is the method used to achieve survivability.

e. The Chair, Warfare Requirements Board shall:

(1) When requested, advise the governing CIB on survivability involving integrated warfare requirements or major cross-platform issues.

(2) As advisor to the Deputy Chief of Naval Operations (Naval Warfare), ensure that Top-Level Warfare Requirements consider survivability in a nuclear environment.

f. The Director of Research and Development Requirements, Test and Evaluation (OP-098) shall:

(1) Ensure that Test and Evaluation Master Plans and Decision Coordinating Papers comply with reference (a) and that the issue of nuclear hardness requirements is addressed in documentation and program reviews. Development coordinators obtain assistance and inputs from OP-981N or PMS-423 (Theater Nuclear Warfare Project Office).

g. The United States Marine Corps shall:

(1) For programs developed for the USMC by agencies or DoD components outside the DON acquisition cycle, apply the survivability guidelines of that agency or component.

(2) Through adjunct membership of the Commanding General, Marine Corps Research, Development and Acquisition Command (MCRDAC) in the CIBs, monitor USN survivability issues that may impact on USMC operations.

(3) Through the Commanding General, Marine Corps Combat Development Command (MCCDC), determine the survivability criteria developed within the DON for USMC systems. In cases where hardening is considered essential to systems survivability, the hardening criteria established by the SCIB and ACIB will apply.

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DEFINITIONS

1. The terms used throughout this instruction are defined as follows:

a. Deployable System. A mobile system intended for use outside the 48 contiguous states and their associated airspace and territorial waters, during all or part of its service life.

b. Hardness Assurance. Procedures applied during the production of a system to ensure that the end product is in compliance with the hardness design specifications or requirements.

c. Hardness Maintenance. Procedures applied during the service life of a system to ensure that the systems's operation, logistics support and/or maintenance do not degrade the system's designed hardness.

d. Hardness Surveillance. A lifetime cycle of tests and inspections performed in order to evaluate the efficacy of hardness maintenance.

e. Nuclear Hardness. A quantitative description of the resistance of a system or component to malfunction (temporary or permanent) and /or degraded performance induced by a nuclear weapon environment. Hardness is measured by resistance to physical quantities such as overpressure, peak velocities, and energy absorbed. Hardness is established through adhering to appropriate design specifications and is verified by one or more test and analysis techniques.

f. Nuclear Hardening. The employment of any design or manufacturing technique which circumvents or mitigates the effects of an adverse nuclear environment; e.g., shielding and grounding against the electromagnetic pulse; vertical hock mounting against underwater shock.

g. Nuclear Survivability. The capability of a system to accomplish its mission during and/or after exposure to a nuclear environment. Survivability may be achieved by a number of methods, including proliferation, redundancy, avoidance, reconstitution, deception, and hardening.

h. Mission Critical System. Those system which must survive in order to provide an acceptable residual aggregate combat capability.