DEPARTMENT OF THE NAVY
SPACE AND NAVAL WARFARE SYSTEMS COMMAND
WASHINGTON, D.C. 20363-5100

SPAWARINST 5100.5C
SPAWAR 003-43
25 November 1987

SPAWAR INSTRUCTION 5100.5C

From: Commander, Space and Naval Warfare Systems Command

Subj: SPACE AND NAVAL WARFARE SYSTEMS COMMAND SYSTEM SAFETY PROGRAM

Ref: (a) DODINST 5000.36, subj: System Safety Engineering and Management (NOTAL)
(b) OPNAVINST 5100.24A, subj: Navy System Safety Program
(c) MIL-STD-882B, System Safety Program Requirements
(d) MIL-STD-1574, System Safety Program for Space and Missile Systems
(e) SPAWARINST 5100.8C, subj: Space and Naval Warfare Systems Command (SPAWAR) Headquarters and Field Activities Safety Program; Policies and Procedures regarding
(f) SPAWARINST 5100.9C: Enclosure (11), subj: Hazardous Materials Program
(g) NAVSEAINST 5100.3B, subj: Mercury, Mercury Compounds, and Components Containing Mercury or Mercury Conpounds; control of
(h) DODINST 6050.5, subj: Hazardous Material Information System
(i) SPAWARINST 5100.12A, subj: Navy Laser Hazards Prevention Program
(j) OPNAVINST 8023.2C, subj: U.S. Navy Explosives Safety Policies, Requirements, and Procedures (Department of the Navy Explosives Safety Policy Manual)
(k) DODINST 6055.11, subj: Protection of DOD Personnel from RF Radiation
(l) OPNAVNOTE 5100 Ser 45/5U394867, subj: Personnel Protection Policy for Exposure to Radio-Frequency Radiation (RFR)
(m) SPAWARINST 4200.6D, subj: Acquisition Planning
(n) System Effectiveness and Component Engineering Guidebook for the Preparation of Acquisition Packages
(o) EEEOO-BA-GYD-010 System Safety Checklist
(p) SPAWARINST 3960.3C, subj: Test and Evaluation

Encl: (1) Systems Effectiveness Safety Engineering Requirements Review Form

1. Purpose. To delineate the basic policies, specific directions and designation of responsibilities in developing and implementing the Space and Naval Warfare Systems Command system safety program requirements per directions contained in references (a) and (b).

2. Cancellation. SPAWARINST 5100.5B of 7 May 1980 and SPAWARINST 5100.3A of 6 February 1976 are cancelled.

3. Applicability. This program applies to the acquisition and modification of all systems, subsystems, equipments and facilities acquired by SPAWAR headquarters, field activities and laboratories. The term "acquisition" shall include research, development, test, evaluation, production, off-the-shelf, all phases of life-cycle and all funding categories. This instruction does not apply to the nuclear components of weapons and nuclear reactor propulsion or power plants, which are designed under unique and extensive interagency safety requirements.

4. Definitions. The definitions of reference (c) apply to this instruction.

5. Background. While safety should be an integral part of the overall effort in the development of military systems, safety deficiencies are frequently identified and corrected after the fact. The system safety concept evolved from recognition of the need to include within system management and engineering a separate and distinct discipline, whereby hazardous conditions could be anticipated and corrected early in the development of a system to reduce cost of corrective actions and minimize incidents which could cause personal injuries and/or impairment of operational readiness. References (c) through (p) have been developed to assure safe design and use of Navy hardware, software and facilities.

6. Policy. Per references (a) and (b), it is the policy of the Commander, Space and Naval Warfare Systems Command, that:

a. System hazards shall be identified, evaluated, and eliminated or controlled prior to the production and deployment phase for the equipment portion of a system and prior to the construction phase for the facilities portion of a system.

b. For all developments or acquisitions by SPAWAR headquarters, field activities and R&D centers, system safety programs shall be developed and implemented for system, subsystem, equipment and facility acquisitions, and modifications thereof, during all phases of the acquisition cycle, including all RDT&E programs.

c. System safety engineering and management efforts shall ensure the design of the safest systems consistent with mission requirements.

d. Management, supervisory, and operating personnel shall achieve an understanding of the system safety program by participation in established courses of instruction and related training programs.

7. Action

a. The Safety Engineering Division (SPAWAR 003-43) shall establish the general system safety design guidelines and management policy for SPAWAR hardware, software and facilities acquisitions as follows:

(1) Advise SPAWAR-12 of system safety requirements to be incorporated in reference (m) for acquisition plans. As a member of the acquisition planning council, SPAWAR 003-43 will ensure incorporation of system safety planning in acquisition plans as described in reference (m).

(2) Incorporate system safety requirements for equipment specifications, statements of work, and contract data requirements lists into reference (n).

(3) Assist program managers in developing system safety technical criteria guidelines for proposal review and evaluation, and contract award selection utilizing reference (n).

(4) Develop guidelines such as reference (o) for evaluating contractors' system safety efforts.

(5) Develop and manage tasks and work requests to perform system safety engineering investigation and analysis to establish SPAWAR system safety requirements and standards.

(6) Advise program managers regarding, safety approval or disapproval of engineering change proposals, waivers and deviations, and modifications to ensure system safety requirements are adequate.

(7) Provide system safety requirements in reference (p) for test and evaluation plans and test and evaluation master plans.

(8) Participate in Approval for Production (AFP) reviews with respect to system safety.

(9) Initiate investigation of system safety deficiencies in conjunction with project engineering to determine required corrective action. Review Electronics Information Bulletin (EIB) articles to ensure that they adequately address hazardous conditions and corrective action.

(10) Provide guidance on hazardous materials to ensure that their use is adequately controlled for the protection of life, health, and property as required by reference (f).

(11) Review directives, instructions, MIL-STDs and specifications to ensure the satisfactory inclusion of system safety engineering requirements.

(12) Establish and support system safety engineering research projects.

(13) Coordinate and maintain liaison, as necessary, with NAVSEA 06GN for radiological safety; with SPAWAR 32D for radio frequency and microwave radiation safety; with SPAWAR 003-44 and SPAWAR 32 for software system safety; and Safety Office, SPAWAR 00F, for hazardous material, laser safety, and Occupational Safety and Health Act (OSHA) requirements.

(14) Develop and implement system safety training and educational programs within the Command. Provide system safety training courses and arrange priorities for attendance for field activities and laboratory personnel.

b. Contracts Directorate (SPAWAR 12) shall:

(1) Ensure that all applicable procurement request documentation contains a completed Systems Effectiveness Safety Engineering Requirements Review Form, per enclosure (1), endorsed by SPAWAR 003-43. SPAWAR 12 will normally request participation and assistance from the PDs/PMWs "Principal for Safety" to assess system safety program requirements during contract negotiations using SPAWAR 003-43 as required.

(2) Ensure that source selection evaluation criteria for competitive projects shall include a separate evaluation factor for system safety. Consistent with safety risks this factor shall be weighted to ensure a positive effect on contractor selection and contract award. System safety should not be weighted less than performance considerations.

(3) Ensure that the mercury control clauses of reference (g) regarding functional mercury and mercury contamination are included in procurement documents. In procurements where NAVSEA approval for the use of functional mercury has been given, the permission for mercury clause shall be included in addition to the mercury control clause regarding mercury contamination. The procedure of enclosure (6) of reference (g) shall be followed when the vendor takes exception to the mercury exclusion clause.

(4) Ensure that any procurement involving lithium batteries is in conformance with reference (f). Lithium batteries shall not be used in Navy equipment without the express approval of NAVSEA 0652. All approval requests shall be routed via SPAWAR 00F.

(5) Ensure that Federal Acquisition Regulations (FAR) hazardous materials clauses and requirements for Material Safety Data Sheets are incorporated in all contracts involving hazardous materials per reference (f). Provide the resulting information to the program manager for action and to SPAWAR 003-43 in order that this information may be incorporated into the Hazardous Materials Information System (HMIS) of reference (h).

(6) Ensure that all purchases of lasers are in accordance with reference (i) and are approved by SPAWAR 00F.

(7) Ensure that the system safety program plan, safety reports or statements, and material safety data sheets required by contract are received and accepted as satisfactory by SPAWAR before payment is made.

c. SPAWAR 10F, SPAWAR 10K, SPAWAR 30, SPAWAR Program Directors. For hardware, software and facilities within their area of responsibility, development managers, project managers and acquisition managers shall:

(1) Starting at concept development and throughout the life cycle of the system, assign a trained system safety manager or principal for safety per references (a) and (b) and provide the name, code, and phone number to SPAWAR 003-43B. The term "System Safety Manager" or "Principal for Safety" is the functional title reserved for the individual holding primary responsibility for the planning and implementation of the system safety program for a given system or equipment. The following table is a guide for determining the number of projects to be assigned to each Principal for Safety:

Acquisition Category	Number of Programs
I and II	1
III	2
IV	6

Systems may share a Principal for Safety, who is permitted to have other duties, provided that these other duties do not interfere with the fulfillment of the system safety duties. The number of projects assigned to a Principal for Safety shall be such that the system safety performance on one project is not adversely affected by the system safety duties of the other projects. All Principals for Safety shall meet quarterly with SPAWAR 003-43, SPAWAR 003-44's software system safety representative and SPAWAR 32D's RF radiation safety representative. These meetings will be used to exchange safety information, discuss safety problems and ensure that solutions are implemented.

(2) Assess safety risks at program initiation to define safe operating limits and the scope and level of detail of system safety program requirements in accordance with reference (c) or (d).

(3) Ensure that system safety risk requirements, criteria, constraints, and needed program resources are addressed in each Tentative Operational Requirement (TOR), Development Options Plan (DOP), and Operational Requirement (OR) at time of origination and summarized in the Decision Coordinating/System Concept Paper in accordance with reference (c) or (d).

(4) Ensure that historical safety data (lessons learned) from previous system acquisitions are collected, documented and considered in designing systems and facilities. These data are usually available from the Naval Safety Center, SPAWAR 003-43 and program files.

(5) Prepare the requirements for system safety in acquisition plans in response to operational requirements in accordance with reference (m).

(6) Develop system safety requirements for hardware, software and facility specification, statement of work, and contract data requirements list (CDRL) starting at program initiation and continuing through production, deployment and disposal. Similar requirements, along with appropriate funding, shall be assigned in all tasking documents to Navy or other government activities for development and acquisition of systems and equipment. Guidance is provided in references (b) through (o) and summarized in reference (n).

(7) Identify hazardous materials which are used or planned for use in systems or equipment procured by SPAWARSYSCOM and ensure that their use is adequately controlled for the protection of life, health, and property as required by reference (f).

(8) Apply system safety requirements to in-house development, construction, modification and test programs. Guidance is provided in references (b) through (o).

(9) Ensure that government furnished equipment (GFE) specified in contracts is accompanied by appropriate hazard analyses, and is analyzed for hazards unique to the system configuration of the contract in accordance with reference (c) or (d).

(10) Ensure that a system safety program, tailored to the needs of the mission, is included in all procurement requests. When appropriate, establish contractor incentives and penalties. Contractual system safety

provisions shall be reviewed for currency and updated as needed prior to the start of each succeeding phase. Reference (n) provides the guidance.

(11) Ensure that system safety criteria appropriate to the needs of the mission are included in the hardware, software and facility specifications that are part of a procurement request. System safety criteria will be tailored from standards and instructions such as references (f) through (o).

(12) Ensure that pertinent and tailored system safety CDRLs are included in all procurement requests. Appropriate safety data item descriptions (DIDs) are available in the DOD Authorized Data List (DODADL) DI-SAFT series.

(13) Ensure that contractor and government activity system safety program plans, safety statements, analyses, reports and safety related test results are reviewed and evaluated for conformance to requirements and acceptability. Submit copy of all system safety related correspondence with contractors and government activities to SPAWAR 003-43B for oversight reviews. These actions shall include the entire life-cycle from development through use, maintenance and disposal.

(14) Ensure that a copy of all hazard analysis reports is sent to SPAWAR 003-43B for oversight reviews.

(15) Per reference (f), ensure that material safety data sheets are obtained and forwarded to users of hazardous materials or equipment containing hazardous materials and to developers of maintenance procedures for inclusion in maintenance requirements cards (MRCs) and technical manuals.

(16) Prepare system safety technical criteria for proposal evaluation, and ensure that the Principal for Safety participates in proposal reviews and serves as a member of the contract award review panel.

(17) Ensure review of system safety hazards at design and program reviews.

(18) Review contractor's compliance to system safety requirements during preliminary design reviews, critical design reviews, and preproduction reliability design reviews.

(19) Review engineering change proposals, waivers, deviations, and modifications to ensure system safety requirements are adequate, and already existing system safety considerations are not degraded.

(20) Provide system safety requirements for test and evaluation plans and test and evaluation master plans per reference (p). Ensure system safety requirements are addressed in all testing. Where normal testing is not sufficient to demonstrate safe operation, prepare and monitor special safety tests and evaluations. Evaluate Operational Test and Evaluation Force (OPTEVFOR) reports and recommended corrective action.

(21) Establish procedures for a formalized closed loop process, providing follow-up on identified hazards and implementing corrective action, to ensure the resolution of hazards in a timely manner. Maintain a permanent record of identified hazards and closeout actions.

(22) Ensure that all catastrophic and critical hazards are eliminated or adequately controlled prior to deployment; provide supporting documentation.

(23) Ensure that a permanent record of identified hazards, and resulting actions, is maintained. Formally document and maintain a permanent record of each management "decision to accept" the risks associated with an identified hazard. This record shall include all justifications and rationale for each hazard accepted.

(24) Report all outstanding hazards, along with the plan of action and milestones for resolution and control of those hazards, to SPAWAR 003-43B.

(25) Obtain safety information for inclusion on MRCs and ensure that the pertinent hazard information is included on the MRCs. Hazard warnings shall be located on MRCs in such a manner that the user of the card reads the warning before the maintenance step in which the hazard consequence occurs. Safety symbols shall be used as appropriate. Disposal and emergency actions shall also be included in MRCs.

(26) Verify that the required hazard information has correctly been included in the appropriate places on the MRCs.

(27) Investigate system safety deficiencies to determine required corrective action. Prepare Electronics Information Bulletin (EIB) articles or other documented procedures to inform equipment users of problems. Inform SPAWAR 10F of system, equipment or software problems that should be known by foreign users. SPAWAR 10F shall then forward this information to appropriate foreign governments.

(28) Ensure that periodic follow-up and appropriate action is taken to correct all equipment or software failures and facility deficiencies where safety is involved.

(29) Provide a follow-on system safety effort, after initial operational capability, to ensure that:

(a) There is a system safety program for installation and servicing of equipment and systems, including software.

(b) Mission or design changes made after deployment do not introduce hazards or degrade existing levels of system safety and that changes to enhance systems safety are implemented.

(c) Appropriate hazard analyses take place throughout the deployment phase of the system.

(d) Procedures prescribed in reference (f) for identifying, tracking, storing, handling, and disposing of hazardous materials and equipment associated with systems are developed and implemented.

(30) Submit system safety programs to applicable review boards, such as Laser Safety review Board (LSRB) and Weapons Systems Explosives Safety Review Board (WSESRB), for approval per references (i) and (j).

(31) Ensure special studies are conducted for system unique hazards, e.g., RF radiation safe limits compliance per references (k) and (l).

(32) Keep CNO (OP-09F) and Commander, Naval Safety Center, informed of the initiation of and schedule for all ACAT I and ACAT II programs including design reviews, inspections and System Safety Working Groups (SSWGs) and audits. Forward copies of system safety program documentation to CNO (OP-09F) and the Naval Safety Center.

(33) SPAWAR 10F shall recommend inclusion of all the above safety requirements on all FMS (Foreign Military Sales) programs. However, if the FMS customer refuses such requirements or prefers a varied composite of the requirements, SPAWAR 10F is authorized to waive requirements.

d. SPAWAR 003-412. SPAWAR 003-412 shall ensure that MRC policy and guidance requires pertinent safety information on MRCs and directs that the hazard warnings be located on MRCs in such a manner that the user of the card reads the warning before the maintenance step in which the hazard consequence occurs. They shall also require that pertinent safety symbols be used on MRCs.

e. SPAWAR Field Activities and R&D Centers. The Commander, Commanding Officer or Officer in Charge of each SPAWAR field activity or R&D center is responsible for assuring compliance with the policies stated herein and shall:

(1) Establish an activity system safety program, in consonance with the SPAWARSYSCOM program, to accomplish the objectives cited herein, particularly paragraphs 7b and 7c as they apply to the particular operation of the command. This program, or any exceptions thereto, shall be evaluated and approved by SPAWAR 003-43.

(2) Provide for system safety program orientation and training of affected personnel.

(3) Ensure the documentation of safety criteria, critical items and hazards identified during their RDT&E or other development efforts become a part of the project when it transitions to the next phase.

(4) Keep the applicable safety community aware of progress in development of devices, equipment, software and materials that enhance safety.

(5) Ensure that all funding received for RDT&E acquisition include appropriate funding for system safety, regardless of the source of funds.

(6) Submit to SPAWAR 003-43, within six months of the date of this instruction, their implementing instructions together with the name, location and phone number of the system safety manager for the activity.

GLENWOOD CLARK

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SYSTEMS EFFECTIVENESS SAFETY ENGINEERING REQUIREMENTS REVIEW FORM

EQUIPMENT_____ PR NUMBER_____

The following System Safety requirements for this procurement have been established and are consistent with stated operational needs. They are included in the equipment technical specification, statement of work and contract data requirements list (CDRL) as specific requirements.

STATEMENT OF WORK REQUIREMENTS:	Yes or Not Appl	Principal for Safety Approval	SPAWAR 003-43 Endorsement
System Safety Program	_____		
Tailored to life cycle phase and other requirements pertinent to system being acquired	_____		
System safety hazard analyses	_____		
Software programs included in hazard analysis	_____		
Inclusion of safety information required in training and technical documentation	_____		
Require that contractor system safety personnel participate in design reviews	_____		
Require that safety mishap reporting procedures be included in system safety program plan	_____		
Require that safety verification or validation be included in the contractor's test program	_____		
.....	_____		
CDRL REQUIREMENTS:			
System Safety Program Plan Required	_____		
Hazard Analyses Reports Required	_____		
Preliminary Hazard Analysis Report	_____		
Subsystem Hazard Analysis Report	_____		
System Hazard Analysis Report	_____		
Operating and Support Hazard Analysis Report	_____		
Safety Assessment Report Required	_____		
..... Report Required	_____		
EQUIPMENT TECHNICAL SPECIFICATION REQUIREMENTS:			
Safety Design Criteria	_____		
In accordance with SPAWAR requirements per enclosed checklist developed for this PR	_____		
Inclusion of safety verification in Test Programs	_____		
Leakage current test and test diagrams included	_____		
Battery packaging	_____		
.....	_____		

ENCLOSURE( )