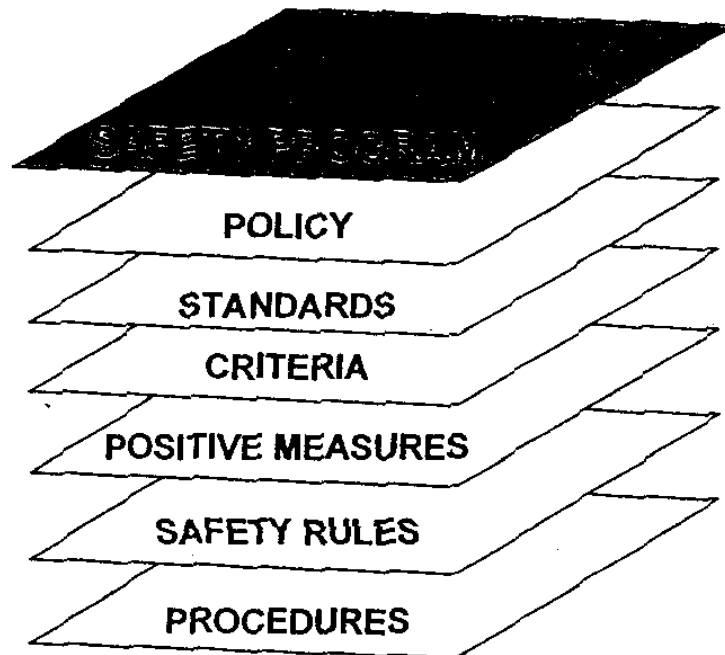




DOD 3150.2-M

DoD Nuclear Weapon System Safety Program Manual



December 1996

Assistant to the Secretary of Defense for
Nuclear and Chemical and Biological Defense Programs



ATOMIC ENERGY

ASSISTANT TO THE SECRETARY OF DEFENSE
3050 DEFENSE PENTAGON
WASHINGTON, DC 20301-3050



December 23, 1996

FOREWORD

This Manual is issued under the authority of DoD Directive 3150.2, "DoD Nuclear Weapon System Safety Program," December 23, 1996. It prescribes procedures for implementation of the Department of Defense Nuclear Weapon System Safety Program.

This Manual applies to the Office of the Secretary of Defense (OSD), the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, and the Defense Agencies (hereafter referred to collectively as "the DoD Components"). It applies to all nuclear weapons and nuclear weapons systems for which the DoD Components have developmental, custodial, or operational responsibilities. It is essential that the users of this Manual consult the referenced source documents, as appropriate.

This Manual is effective immediately and is mandatory for use by all the DoD Components.

Send recommended changes to the Manual, through appropriate channels, to the following:

Office of the Assistant to the Secretary of Defense for Nuclear and Chemical
and Biological Defense Programs
Attn: Nuclear Safety Specialist
The Pentagon, Room 3E1074
Washington, DC 20301-3050

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A handwritten signature in black ink, appearing to read "Harold P. Smith, Jr.", written in a cursive style.

Harold P. Smith, Jr.



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REFERENCES

- (a) [DoD Directive 4540.5](#), "Movement of Nuclear Weapons by Noncombat Delivery Vehicles," June 14, 1978
- (b) [DoD Directive 5210.41](#), "Security Policy for Protecting Nuclear Weapons," September 23, 1988
- (c) [DoD Directive 3150.2](#), "DoD Nuclear Weapon System Safety Program," December 23, 1996
- (d) [DoD Directive 5210.42](#), "Nuclear Weapon Personnel Reliability Program (PRP)," May 25, 1993
- (e) [DoD Directive 5134.8](#), "Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB))," June 8, 1994
- (f) DoD C-5210.41-M, "Nuclear Weapon Security Manual (U)," April 1994
- (g) DoD Directive 5100.52, "DoD Response to an Accident or Significant Incident Involving Radioactive Materials," December 21, 1989
- (h) DoD 5100.52-M, "Nuclear Weapon Accident Response Procedures (NARP)," September 1990
- (i) Technical Publication 25-1, "DoD Nuclear Weapons Technical Inspection System," January 1, 1986
- (j) [DoD 8910.1-M](#), DoD Procedures for Management of Information Requirements, November 1986
- (k) DoD Directive S-5200.16, "Objectives and Minimum Standards for Communications Security Measures Used in Nuclear Command and Control Communications (U)," September 22, 1970
- (l) DoD Directive S-5210.81, "United States Nuclear Weapons Command and Control (U)," June 18, 1991
- (m) DoD Directive S-3150.7, "Controlling the Use of Nuclear Weapons," June 20, 1994
- (n) Section 179 of title 10, United States Code
- (o) Memorandum of Agreement between the Department of Defense and the Department of Energy, March 21, 1953, and as supplemented, September 5, 1984
- (p) [DoD Directive 3150.1](#), "Joint Nuclear Weapons Development Studies and Engineering Projects," December 27, 1983
- (q) [DoD Instruction 5030.55](#), "Joint AEC-DoD Nuclear Weapons Development Procedures," January 21, 1974
- (r) [DoD Directive 5000.1](#), "Defense Acquisition," March 15, 1996

- (s) DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," March 1996
- (t) Memorandum of Understanding between the Department of Defense and the Department of Energy," March 17, 1992
- (u) Technical Publication 0-1, "Numerical Index to Joint Nuclear Weapons Publications (Including Related Publications)," January 1, 1995¹
- (v) Technical Publication 20-5, "Plutonium Contamination Standards," February 7, 1977¹
- (w) Technical Publication 20-7, "Nuclear Safety Criteria," September 1, 1986¹
- (x) Technical Publication 20-11, "General Firefighting Guidance," September 20, 1991¹
- (y) Technical Publication 5-1, "Unsatisfactory Report System," December 1, 1993¹

¹ Available from the Defense Special Weapons Agency; FCDSWA Attn: FCPSP, 1680 Texas Street, SE, Kirtland AFB, NM 87117-5669

DL1. DEFINITIONS

DL1.1.1. Abnormal Environments. Environments as defined in a weapon's stockpile-to-target sequence (STS) and military characteristics (MCs) in which a nuclear weapon or a nuclear weapon system is not expected to retain full operational reliability.

DL1.1.2. Access. Close physical or electrical proximity to a nuclear weapon in such a manner as to allow the opportunity to tamper with or damage a nuclear weapon. For example, a person would not be considered to have access if an escort or a guard were provided for either the person or the weapon when the person is in close proximity to the weapon.

DL1.1.3. Arming. Readyng a nuclear weapon so that a fuzing signal will operate the firing system; includes operation or reversal of safing items.

DL1.1.4. Certification. A determination by the applicable Service that procedures, personnel, equipment, facilities, and organizations are capable of safely performing assigned nuclear weapon functions and missions.

DL1.1.5. Custody. Responsibility for the control of, transfer and movement of, and access to nuclear weapons. Custody may include accountability.

DL1.1.6. DoD Nuclear Weapon System Safety Program. A program integrating safety policy, organizational responsibilities, and formalized procedures throughout a nuclear weapon system's life cycle to protect nuclear weapon systems. The program involves identifying, evaluating, controlling, and reducing risks related to nuclear weapons. Positive measures are used to enhance the safety of nuclear weapon systems.

DL1.1.7. Emergency. An unexpected occurrence or set of circumstances in which personnel or equipment unavailability, due to accident, natural event, or combat, may demand immediate action that may require extraordinary measures to protect, handle, service, transport, jettison, or employ a nuclear weapon.

DL1.1.8. Inadvertent Launch Analysis (ILA). Methodology for analyzing technical malfunctions, acts of God, and human errors that could result in an inadvertent use of a nuclear weapon.

DL1.1.9. Jettison. The intentional separation of an unarmed weapon from its delivery system or transport carrier in response to an emergency.

DL1.1.10. Launching. Propulsion of a missile with a nuclear warhead into flight beyond the immediate area of the launching site. Specific definitions for each nuclear weapon or nuclear weapon system will be provided in the concept of operations, as appropriate.

DL1.1.11. Life-Cycle Process. The breadth of activities applicable to a nuclear weapon throughout its lifetime, which includes development, testing, production, transportation, acceptance, storage, maintenance, upgrades, retirement, and dismantlement, as well as approved operations.

DL1.1.12. Normal Environments. The expected logistical, storage, and operational environments defined in the STS document and the MCs which the weapon system is required to survive without degradation in operational reliability.

DL1.1.13. Nuclear Weapon. A device in which the explosion results from the energy released by reactions involving fission or fusion (of atomic nuclei).

DL1.1.14. Nuclear Weapon System. A nuclear weapon and a means for delivering it to the target, with associated support equipment, facilities, procedures, personnel, and any vehicles peculiar to the system used for weapon transport.

DL1.1.15. Nuclear Weapon System Safety. The application of engineering and management principles, criteria, and techniques to protect nuclear weapons against the risks and threats inherent in their environments within the constraints of operational effectiveness, time, and cost throughout all phases of their life cycle.

DL1.1.16. One-Point Safe. A nuclear weapon is one-point safe if, when the high explosive (HE) is initiated and detonated at any single point, the probability of producing a nuclear yield exceeding 4 pounds of trinitrotoluene (TNT) equivalent is less than one in 10^6 .

DL1.1.17. Positive Measures. Design features, safety rules, procedures, accident prevention or mitigation measures, or other controls including physical security and coded systems, used collectively or individually, to enhance safety and to reduce the likelihood, severity, or consequences of an accident, unauthorized act, or deliberate threat.

DL1.1.18. Prearming. Nuclear weapon system operations that configure a nuclear weapon so that arming, launching, or releasing will start the sequence necessary to produce a nuclear detonation.

DL1.1.19. Prevent. As used in the DoD nuclear weapon system safety standards, "prevent" means to minimize the possibility of occurrence of an undesired event. It does not imply absolute assurance that the event will not occur.

DL1.1.20. Releasing. The separation of a missile or gravity bomb with a nuclear warhead, for use in its intended mode of operation, from a delivery aircraft.

DL1.1.21. Security. Protection against loss of custody, theft, or diversion of a nuclear weapon system; protection against unauthorized access; or protection against unauthorized actions, vandalism, sabotage, and malevolent damage.

DL1.1.22. Stockpile-to-Target Sequence (STS). A DoD-developed document that delineates the logistic and employment concepts and normal and credible abnormal environments involved in the delivery of a nuclear weapon from the stockpile to the target.

DL1.1.23. Survivability. The capability of the nuclear weapon and supporting systems to endure and to maintain the ability to perform assigned nuclear missions.

DL1.1.24. Unauthorized Launch Analysis (ULA). Methodology for analyzing elements that can lead to an unauthorized use of a nuclear weapon.

DL1.1.25. Use Control. The positive measures that allow the authorized use and prevent or delay unauthorized use of nuclear weapons, and is accomplished through a combination of weapon system design features, operational procedures, security, and system safety rules.

AL1. ABBREVIATIONS AND/OR ACRONYMS

AL1.1.	<u>AEC</u>	Atomic Energy Commission
AL1.2.	<u>ATSD(NCB)</u>	Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs
AL1.3.	<u>DNSI</u>	Defense Nuclear Surety Inspections
AL1.4.	<u>DNWS</u>	Defense Nuclear Weapons School
AL1.5.	<u>DoD</u>	Department of Defense
AL1.6.	<u>DoE</u>	Department of Energy
AL1.7.	<u>DRAAG</u>	Design Review and Acceptance Group
AL1.8.	<u>DSWA</u>	Defense Special Weapons Agency
AL1.9.	<u>EAM</u>	Emergency Action Message
AL1.10.	<u>EC</u>	Emergency Capability
AL1.11.	<u>FAD</u>	First Assets Delivered
AL1.12.	<u>HE</u>	High Explosive
AL1.13.	<u>ILA</u>	Inadvertent Launch Analysis
AL1.14.	<u>INSS</u>	Interim Safety Study
AL1.15.	<u>IOC</u>	Initial Operational Capability
AL1.16.	<u>ISS</u>	Initial Safety Study
AL1.17.	<u>JNWPS</u>	Joint Nuclear Weapons Publication System
AL1.18.	<u>JTA</u>	Joint Test Assembly
AL1.19.	<u>LPO</u>	Lead Project Officer
AL1.20.	<u>MAIS</u>	Major Automated Information System
AL1.21.	<u>MAR</u>	Major Assembly Release
AL1.22.	<u>MCs</u>	Military Characteristics
AL1.23.	<u>MDAP</u>	Major Defense Acquisition Program
AL1.24.	<u>MOA</u>	Memorandum of Agreement
AL1.25.	<u>MOU</u>	Memorandum of Understanding
AL1.26.	<u>NARP</u>	Nuclear Accident Response Procedures
AL1.27.	<u>NATO</u>	North Atlantic Treaty Organization
AL1.28.	<u>NNAP</u>	Non-Nuclear Assurance Program
AL1.29.	<u>NWC</u>	Nuclear Weapons Council
AL1.30.	<u>NWCSSC</u>	Nuclear Weapons Council Standing and Safety Committee

AL1.31. <u>NWSP</u>	Nuclear Weapon Stockpile Plan
AL1.32. <u>NWSSG</u>	Nuclear Weapons System Safety Group
AL1.33. <u>NWSSR</u>	Nuclear Weapons System Safety Report
AL1.34. <u>NWTI</u>	Nuclear Weapons Technical Inspection
AL1.35. <u>OSD</u>	Office of the Secretary of Defense
AL1.36. <u>OSR</u>	Operational Safety Review
AL1.37. <u>PAL</u>	Permissive Action Link
AL1.38. <u>PNAF</u>	Prime Nuclear Airlift Force
AL1.39. <u>POG</u>	Project Officer Group
AL1.40. <u>POSS</u>	Pre-Operational Safety Study
AL1.41. <u>PRA</u>	Probabilistic Risk Assessment
AL1.42. <u>PRP</u>	Personnel Reliability Program
AL1.43. <u>PSS</u>	Preliminary Safety Study
AL1.44. <u>QART</u>	Quality Assurance and Reliability Test Program
AL1.45. <u>S²</u>	Safety and Security
AL1.46. <u>SSS</u>	Special Safety Study
AL1.47. <u>STS</u>	Stockpile-to-Target Sequence
AL1.48. <u>TNT</u>	Trinitrotoluene
AL1.49. <u>TP</u>	Technical Publication
AL1.50. <u>TSS</u>	Transportation Safety Study
AL1.51. <u>TSS</u>	Transportation Safety Study
AL1.52. <u>ULA</u>	Unauthorized Launch Analysis
AL1.53. <u>UR</u>	Unsatisfactory Report
AL1.54. <u>U.S.</u>	United States
AL1.55. <u>U.S.C.</u>	United States Code
AL1.56. <u>USSTRATCOM</u>	U.S. Strategic Command

C1. CHAPTER 1

THE DoD NUCLEAR WEAPON SYSTEM SAFETY PROGRAM ELEMENTS

C1.1. INTRODUCTION

C1.1.1. Nuclear weapon systems require special safety consideration because of their political and military importance, their destructive power, and the potential consequences of an nuclear weapon accident or unauthorized act. Therefore, nuclear weapon systems must be protected against risks and threats inherent in their peacetime and wartime environments. To achieve nuclear weapon system safety and to maintain the public trust by protecting public health, safety, and the environment, it is critical that safety be considered as early as possible during weapon development and continue to be considered throughout the life-cycle of the weapon. The process by which nuclear weapon system safety is ensured is through the effective management of the DoD Nuclear Weapon System Safety Program.

C1.1.2. The DoD Nuclear Weapon System Safety Program integrates safety policy, organizational responsibilities, and the conduct of safety-related activities throughout the DoD nuclear weapon system's life cycle; i.e., transportation activities in DoD Directive 4540.5 and security activities in DoD Directive 5210.41 (references (a) and (b)).

C1.2. THE DoD NUCLEAR WEAPON SYSTEM SAFETY PROGRAM ELEMENTS

C1.2.1. The DoD Nuclear Weapon System Safety Program consists of key elements for program guidance, system evaluation and safety assurance, and for the conduct of safe nuclear weapon system operations.

C1.2.2. Those key elements are, as follows:

C1.2.2.1. DoD Nuclear Weapon System Safety Standards. Four qualitative standards are used in the evaluation of the safety of a nuclear weapon system beginning as early as possible during development and continuing throughout a weapon system's life cycle. Those standards are stated in Chapter 2.

C1.2.2.2. DoD Nuclear Weapon System Safety Policy. DoD safety policy is based on years of experience with nuclear weapons and the scientific development of

new and innovative technologies and assessment techniques. It is developed jointly between the Office of the Secretary of Defense, Chairman of the Joint Chiefs of Staff, the Defense Agencies, the Military Departments, and the Military Services with the common goal of providing maximum safety consistent with operational requirements. DoD policy guidance is provided in Chapter 2.

C1.2.2.3. DoD Nuclear Weapon Safety Design Criteria. Quantitative safety design criteria are established by the Department of Defense, issued in weapon specific MCs, and implemented by the Department of Energy (DoE) in coordination with the Project Officers Group (POG). They are used during nuclear weapon design, to ensure one-point safety, and to lower premature detonation probabilities and component malfunctions.

C1.2.2.4. Positive Measures. Positive measures are design features, safety rules, procedures, accident prevention or mitigation measures, or other controls including physical security and coded control systems, used collectively or individually, to enhance safety and to reduce the likelihood, severity, or consequences of an accident, unauthorized act, or deliberate threat. Positive measures do not provide absolute assurance against an accident or unauthorized act, but provide acceptable assurance for continuing safe operation of the nuclear weapon system.

C1.2.2.5. Safety Rules. Safety rules are comprised of general and specific provisions applicable to a nuclear weapon system for conducting approved operations while ensuring maximum safety consistent with operational or logistic requirements. The process to develop and to expeditiously approve safety rules is described in Chapter 5. Appendix 1 specifies the general nuclear weapon system safety rules applicable to all nuclear weapon systems.

C1.2.2.6. Technical Procedures. Technical procedures are the explicit directions which must be followed to conduct operations with nuclear weapons. Technical procedures are documented in Service technical publications and Joint Nuclear Weapons Publication System (JNWPS) Technical Publications (TP). Technical procedures are further addressed in Chapter 11.

C2. CHAPTER 2

DoD NUCLEAR WEAPON SYSTEM SAFETY STANDARDS, POLICY, AND CRITERIA

C2.1. GENERAL

Directive 3150.2 (reference (c))¹ establishes DoD nuclear weapon system safety standards and safety policy. This Chapter elaborates on the policy and provides additional guidance and criteria.

C2.2. DoD NUCLEAR WEAPON SYSTEM SAFETY STANDARDS

Four DoD Nuclear Weapon System Safety Standards shall serve as the foundation for all nuclear weapons safety matters, as follows:

C2.2.1. There shall be positive measures to prevent nuclear weapons involved in accidents or incidents, or jettisoned weapons, from producing a nuclear yield.

C2.2.2. There shall be positive measures to prevent DELIBERATE prearming, arming, launching, or releasing of nuclear weapons, except upon execution of emergency war orders or when directed by competent authority.

C2.2.3. There shall be positive measures to prevent INADVERTENT prearming, arming, launching, or releasing of nuclear weapons in all normal and credible abnormal environments.

C2.2.4. There shall be positive measures to ensure adequate security of nuclear weapons, under DoD Directive 5210.41 (reference (b)).

C2.3. DoD NUCLEAR WEAPON SYSTEM SAFETY POLICY

It is DoD policy that:

C2.3.1. Nuclear weapon systems shall require special consideration because of their political and military importance, their destructive power, and the potential consequences of an accident or unauthorized act.

¹ Extracts from reference (c) are denoted in bold type

C2.3.2. Nuclear weapon systems shall be evaluated throughout their DoD life cycles for compliance with the four DoD Nuclear Weapon System Safety Standards, through a formal studies and review process.

C2.3.2.1. Formal safety evaluation programs shall be established by the Military Department(s), which include comprehensive and thorough safety studies and reviews by Nuclear Weapon System Safety Groups (NWSSG), to ensure that design features and procedural safeguards meet the four DoD nuclear weapon system safety standards. (See Chapter 5.)

C2.3.2.2. Nuclear weapon systems shall be evaluated to ensure procedural safeguards minimize exposure of nuclear weapons to credible abnormal environments during the STS.

C2.3.3. Nuclear weapon systems shall be designed or improved to the maximum extent practical with current and approved advanced safety technologies, consistent with cost and operational feasibility.

C2.3.3.1. Quantifiable design criteria will be applied for one-point safety and premature detonation.

C2.3.3.2. Stockpile improvement initiatives will evaluate the feasibility of incorporating current safety technologies in existing nuclear weapon systems.

C2.3.4. Nuclear weapons systems shall be designed, maintained, transported, stored, and employed to incorporate maximum safety consistent, with operational requirements.

C2.3.5. Procedures, personnel, equipment, facilities, and organizations shall be certified before conducting operations with nuclear weapons or nuclear weapon systems.

C2.3.5.1. Certification will be in accordance with Service standards and procedures.

C2.3.5.2. Personnel certification will be accomplished through training and an evaluation of individual technical proficiency and implementation of the requirements in Personnel Reliability Program (PRP) directives. (See Chapter 7.)

C2.3.5.3. Certification of equipment, including computer hardware,

firmware, and software, will verify that the design and operation of the equipment enables safe operation of the nuclear weapon system.

C2.3.5.4. Certification of nuclear weapon facilities and organizations will include successful completion of a Nuclear Weapons Technical Inspection (NWTI). (See Chapter 12.)

C2.3.5.5. Re-certification of procedures, equipment, or facilities will be required before operations can resume if significant modifications are made to the procedures, equipment or facilities. This requirement extends to operations with U.S. nuclear weapons or U.S. nuclear weapon systems when used by North Atlantic Treaty Organization (NATO) allies.

C2.3.6. Safety rules, technical and operational procedures, and other positive measures shall be developed and approved for each nuclear weapon system, through a formal approval process, and shall apply to each nuclear weapon or nuclear weapon system in the custody of the Department of Defense.

C2.3.6.1. Safety rules, drafted by Military Department NWSSGs and formally proposed by the Military Department, shall be reviewed through a coordination process and approved by the Secretary of Defense. Approved safety rules are required for all operations in the STS of each nuclear weapon system, including operations by Allied forces with U.S. nuclear weapons. Safety rules do not in themselves provide the authority to conduct operations but comprise the framework and constraints for conducting operations. The adherence to approved safety rules is mandatory during all weapon system operations, except in the event of an emergency. The Military Department shall incorporate approved safety rules in applicable directives or TPs. (See Chapter 5.)

C2.3.6.1.1. Safety rules must be in effect before the Military Department accepts custody of the nuclear weapon from the DoE.

C2.3.6.1.2. New or revised operations or procedures, governed by safety rules, shall not be used before approval of applicable safety rules.

C2.3.6.1.3. The Military Departments may impose restrictions that are more strict than those contained in safety rules, but may not unilaterally change the safety rules.

C2.3.6.1.4. Safety rules remain in effect until rescinded by the Chairman

of the Joint Chiefs of Staff. A copy of the recision notice shall be provided to the Secretary of Defense.

C2.3.6.1.4.1. Technical and operational procedures, and other positive measures, recommended by findings of a NWSSG in a safety study or review, shall be formally reviewed by the Military Department.

C2.3.6.1.4.2. Technical and operational procedures and other positive measures, developed independently by the Military Department, will be evaluated for their impact on safety through a formal approval process.

C2.3.6.1.4.3. Technical and operational procedures will be certified periodically for all operations throughout the STS.

C2.3.6.1.4.4. Nuclear weapon systems shall meet the DoD Nuclear Weapon System Safety Standards or positive measures shall be implemented to permit continued safe operations, consistent with operational requirements.

C2.3.7. Personnel involved in nuclear operations shall receive appropriate training and will be continually evaluated, as required by DoD 5210.42 (reference (d)).

C2.3.8. Nuclear weapon system safety, security, survivability, and use control are interrelated. Decisions concerning one shall not be made without consideration of the effect of those decisions on the others. (See Chapters 7 and 8.)

C2.3.8.1. Security procedures for nuclear weapon systems shall be maintained to assure the system meets the requirements of the fourth safety standard.

C2.3.8.2. Survivability design features and procedures, used to ensure that nuclear weapon systems endure and perform assigned missions, shall also assure the systems continue to meet the four DoD Nuclear Weapon System Safety Standards.

C2.3.8.3. Use control design features and procedures must ensure positive control of the nuclear weapon system without the degradation of safety, to ensure that the system continues to meet the four DoD Nuclear Weapon System Safety Standards.

C2.3.9. Nuclear weapons and nuclear weapon systems shall not be intentionally exposed to abnormal environments, and there shall be no deviation from established procedures, except in an emergency. That policy does not abrogate nor abridge the authority and responsibility of commanders and custodial

personnel to deviate from standards set forth herein during actual emergencies as necessary to ensure the safety, security, control, or custody of nuclear weapons.

C2.4. DoD NUCLEAR WEAPON SAFETY CRITERIA

C2.4.1. Quantitative one-point safety criteria for warhead design specifications, normally included in nuclear weapon MCs, are summarized as follows:

C2.4.1.1. The probability of achieving a nuclear yield greater than 4 pounds TNT equivalent shall not exceed one in 10^6 in the event of a detonation initiated at any one point in the high explosive system.

C2.4.1.2. One-point safety shall be inherent in the nuclear system design and shall be obtained without the use of a nuclear safing device.

C2.4.2. Quantitative premature detonation probability criteria for safe warheads state:

C2.4.2.1. The probability of a premature nuclear detonation of a warhead due to warhead component malfunctions, in a mated or unmated condition, in the absence of any input signals except for specified signals (e.g., monitoring and control), shall not exceed:

C2.4.2.1.1. Prior to launch, for the normal storage and operational environments described in the STS, 1 in 10^9 per warhead lifetime.

C2.4.2.1.2. Prior to launch, for the abnormal environments described in the STS, 1 in 10^6 per warhead exposure or accident.

C2.4.2.2. The probability of a premature nuclear detonation of a warhead due to warhead component malfunctions after launch and prior to the receipt of the final warhead arming signal shall not exceed 1 in 10^4 . (That is a generalized, minimum standard that may require amplification when applied to a specific weapon. Additional premature probability criteria may be included for the after launch situation depending on the various degrees of safety required for the specific employment concepts.)

C2.4.3. Quantitative premature detonation probability criteria for safe bombs state the following:

C2.4.3.1. The probability of a premature nuclear detonation of a bomb due to bomb component malfunctions, in the absence of any input signals except for specified signals (e.g., monitoring and control), shall not exceed:

C2.4.3.1.1. Prior to receipt of the pre-arm signal, for normal storage and operational environments described in the STS, 1 in 10^9 per bomb lifetime.

C2.4.3.1.2. Prior to receipt of the pre-arm signal, for the abnormal environments described in the STS, 1 in 10^6 per bomb exposure or accident.

C2.4.3.2. The probability of a premature nuclear detonation of a bomb due to bomb component malfunctions, after the receipt of the pre-arm signal, which will endanger the delivery aircraft, shall not exceed 1 in 10^3 . (Other detailed criteria for this operational environment depend on the specific bomb and its method of employment and therefore must be evaluated for the MCs for that particular weapon.)

C3. CHAPTER 3

DoD NUCLEAR WEAPON SYSTEM SAFETY PROGRAM RESPONSIBILITIES

C3.1. GENERAL

DoD nuclear weapon system safety responsibilities are assigned in DoD Directive 3150.2 (reference (c)).² This Chapter elaborates on those responsibilities and provides additional guidance.

C3.2. RESPONSIBILITIES

C3.2.1. The Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB)) shall do the following:

C3.2.1.1. Be responsible to the Secretary of Defense for all matters associated with nuclear weapon system safety under DoD Directive 5134.8 (reference (e)), establish safety policy, and monitor compliance with the DoD Nuclear Weapon System Safety Program.

C3.2.1.1.1. Request special safety studies and safety assessments.

C3.2.1.1.1.1. Review safety assessment recommendations.

C3.2.1.1.1.2. Recommend temporary compensatory measures when required to address special safety concerns for nuclear weapon system operations.

C3.2.1.1.2. Monitor the conduct of the DoD Nuclear Weapon System Safety Training Program.

C3.2.1.1.3. Ensure that nuclear weapon safety is addressed in DoD Directives 4540.5 and 5210.41, and DoD C-5210.41-M (references (a), (b), and (f)).

C3.2.1.1.4. Provide safety topics of special interest to the Chairman of the Joint Chiefs of Staff to be addressed during NWTIs and monitor the effectiveness of NWTIs to assess unit compliance with the DoD Nuclear Weapon System Safety Program.

² Extracts from reference (c) are denoted in bold type.

C3.2.1.1.5. In the event of an accident or incident, ensure that positive measures are developed to prevent a future occurrence.

C3.2.1.1.6. Monitor the effectiveness of the PRP and DoD Directive 5210.42 (reference (d)) to support the DoD Nuclear Weapon System Safety Program.

C3.2.1.1.7. Provide assistance during the Service nuclear weapon system certification process.

C3.2.1.1.8. Serve as proponent for and monitor compliance with this Manual.

C3.2.1.2. Serve as the OSD principal point of contact with the DoD Components, the DoE, the Department of State, the Joint DoD-DoE Nuclear Weapons Council, and other Government Agencies in executing safety responsibilities. Communication with the Combatant Commands shall be through the Chairman of the Joint Chiefs of Staff.

C3.2.1.2.1. Serve as principal point of contact in the OSD for annual reports, Military Department nuclear weapon system safety reports, and safety rules packages.

C3.2.1.2.2. Provide input to the Annual Report to the President on Nuclear Weapon Surety.

C3.2.1.2.3. Coordinate Military Department safety rules packages with the DoE.

C3.2.1.2.4. Approve administrative changes to safety rules.

C3.2.1.2.5. Provide guidance and direction for safety related requirements for Quality Assurance and Reliability Test Program (QART) testing and monitor results of safety validations and reliability point estimates.

C3.2.1.2.6. Oversee non-nuclear assurance program (NNAP) activities and coordinate with the DoE for the provision of NNAP support.

C3.2.1.2.7. Respond to joint Nuclear Weapons Council (NWC) safety actions.

C3.2.1.2.8. Serve as the DoD Executive Agent for the independent joint advisory committee chartered to provide high-level advice to the Secretary of Defense, the Secretary of Energy, and the NWC on nuclear weapon system surety matters (e.g., safety, security, reliability, and control).

C3.2.2. The ATSD(NCB) shall ensure that the Director, Defense Special Weapons Agency (DSWA), shall do the following:

C3.2.2.1. Provide technical advice and assistance to the OSD, the Chairman of the Joint Chiefs of Staff, and the Secretaries of the Military Departments in the execution of the DoD Nuclear Weapon System Safety Program.

C3.2.2.1.1. Provide safety assessment support to the DoD Components, including conducting tests to verify safety data, as requested.

C3.2.2.1.1.1. Develop and evaluate safety risk assessment methodologies, models, and probabilities of occurrence for credible accident scenarios and assess mitigating factors, as requested.

C3.2.2.1.1.2. Conduct assessments and tests to define STS environments in support of the DoD Components, as requested.

C3.2.2.1.2. Serve as the DoD lead agent for coordination of DoD accident response planning with other Federal Agencies, in accordance with DoD Directive 5100.52 and DoD 5100.52-M (references (g) and (h)).

C3.2.2.1.3. Respond to NWC safety actions.

C3.2.2.2. Support the Military Departments and the Combatant Commands on nuclear weapon system safety matters.

C3.2.2.2.1. Coordinate with the Services on their nuclear weapon system TPs, as requested, and coordinate with Military Departments and the DoE on safety-related JNWPS TPs and other publications that have joint safety applications.

C3.2.2.2.2. Coordinate with the Chairman of the Joint Chiefs of Staff on TPs that refer to the Chairman of the Joint Chiefs of Staff or implement policies under his purview.

C3.2.2.2.3. In coordination with the Military Departments, pursue

exploratory development-level programs of research, development, test, and evaluation for enhancing safety and security at nuclear weapon storage and maintenance facilities.

C3.2.2.2.4. Provide a member for all Service-conducted NWSSG studies.

C3.2.2.3. Develop and maintain nuclear weapon safety databases as requested by a Military Department.

C3.2.2.4. In coordination with the Military Departments, Chair a joint-Service working group to define requirements for the maintenance of nuclear weapon safety databases. With the concurrence of the Military Departments, this activity may include requirements for the compiling, storing, and retrieving data used in safety evaluation and assessment models.

C3.2.2.5. Develop, implement, and operate a DoD nuclear weapon system safety training program described in Chapter 9.

C3.2.2.5.1. Develop additional courses as required in coordination with the Military Departments.

C3.2.2.5.2. Coordinate with the DoE for support on selected topics in the DoD Nuclear Weapon System Safety Training Program and for the nomination of DoE officials to receive DoD Nuclear Weapon System Safety Training Program courses.

C3.2.2.6. Conduct Defense Nuclear Surety Inspections (DNSI) for the Chairman of the Joint Chiefs of Staff, as described in Chapter 12, below, and TP 25-1 (reference (i)).

C3.2.3. The Secretaries of Military Departments shall do the following:

C3.2.3.1. Ensure the safety and security of all nuclear weapons and nuclear weapon systems for which the Military Department has a life-cycle management responsibility.

C3.2.3.1.1. Develop detailed technical and operational procedures that, with approved safety rules and other positive measures, govern all nuclear weapon operations, including weapons transport and storage and maintenance, throughout the STS. Those procedures will be in place before a new or modified weapon is received and remain in effect until custody is relinquished to the DoE.

C3.2.3.1.2. Develop safety rules and other positive measures to ensure that maximum safety is achieved, consistent with operational requirements and the DoD nuclear weapon system safety standards.

C3.2.3.1.3. Publish nuclear weapon system safety procedures in JNWPS or Service TPs.

C3.2.3.1.4. Respond to NWC safety actions.

C3.2.3.1.5. Implement PRP regulations and directives to ensure that assigned personnel meet the requirements specified in DoD Directive 5210.42 (reference (d)).

C3.2.3.1.6. Ensure that NNAP activities are conducted on all test assemblies.

C3.2.3.1.7. In the event of an accident or incident, develop positive measures to prevent a future occurrence.

C3.2.3.2. Conduct nuclear weapon system safety studies, reviews and safety assessments on U.S. nuclear weapons and Allied systems using U.S. nuclear weapons to support the DoD Nuclear Weapon System Safety Program.

C3.2.3.3. Ensure that nuclear weapons technical inspections are conducted.

C3.2.3.4. Establish safety design and evaluation criteria for nuclear weapon systems.

C3.2.3.5. Conduct safety certifications of nuclear weapon systems, including DoD support equipment and software that affect nuclear safety.

C3.2.3.5.1. Ensure early identification of new or modified items requiring nuclear safety design certification.

C3.2.3.5.2. Establish nuclear weapon system safety certification and decertification procedures for combat delivery vehicles, transport vehicles, software, critical components, and support equipment to be used with nuclear weapons and nuclear weapon systems.

C3.2.3.5.3. Maintain a list of nuclear weapon system safety-certified equipment and software.

C3.2.3.6. In coordination with the Defense Special Weapons Agency, participate in a joint-Service working group to define requirements for the maintenance of nuclear weapon safety databases.

C3.2.4. The Chairman of the Joint Chiefs of Staff shall do the following:

C3.2.4.1. Advise the Secretary of Defense on nuclear weapon system safety matters.

C3.2.4.2. Coordinate with the Military Departments, the Combatant Commands, the Defense Agencies, the OSD, and the other Government Agencies on nuclear weapon system safety matters.

C3.2.4.2.1. Coordinate safety rules packages, as described in Chapter 5.

C3.2.4.2.2. Respond to NWC safety actions.

C3.2.4.3. Establish nuclear weapons technical inspection policy and monitor implementation of the inspection system.

C3.2.5. The Commanders of the Combatant Commands shall do the following:

C3.2.5.1. Ensure the safety and security of all nuclear weapons and nuclear weapon systems for which the Combatant Command has responsibility.

C3.2.5.1.1. Ensure that procedures, equipment, facilities, units, and organizations under their cognizance are certified before conducting operations with nuclear weapon systems.

C3.2.5.1.2. Ensure that command units that assemble, test, maintain, transport, store or employ nuclear weapons, their associated components and their ancillary equipment, are inspected at regular intervals.

C3.2.5.1.3. Ensure that actions taken in response to a nuclear accident or significant incident are conducted with nuclear weapon safety as a major criterion in determining response actions.

C3.2.5.1.4. Implement PRP regulations and directives to support the DoD Nuclear Weapon System Safety Program and ensure that assigned personnel meet the requirements specified in DoD Directive 5210.42 (reference (d)) and this Manual.

C3.2.5.1.5. Respond to NWC safety actions.

C4. CHAPTER 4

NUCLEAR WEAPON SYSTEM SAFETY CERTIFICATION

C4.1. GENERAL

C4.1.1. Nuclear weapon system safety certification is the process that ensures that nuclear weapons and weapon systems are designed, built, and used in a safe manner. By "safe," it is meant that the equipment does not impose abnormal environments, inadvertently provide unintended signals, or aid in providing unauthorized signals to the weapon.

C4.1.2. All procedures, personnel, equipment, facilities, and organizations shall be safety certified before conducting any operations that involve a nuclear weapon. Any significant modification to procedures, equipment, or facilities will require recertification before being used in the operational weapon system. That requirement extends to NATO nuclear weapon systems and operations with U.S. nuclear weapons as well.

C4.1.3. This Chapter also establishes the requirement for NNAP to preclude the possibility of a nuclear warhead being used in a nonnuclear test.

C4.2. CERTIFICATION GUIDELINES

C4.2.1. Personnel Certification. Personnel certification shall be accomplished through training and an evaluation of individual technical proficiency by the Services.

C4.2.2. Certification of Organizations and Facilities That Will Handle Nuclear Weapons. Certification of nuclear weapon facilities and organizations for use shall include successful completion of an NWTI. (See Chapter 12.)

C4.2.3. Nuclear Weapon Safety Certification. The DoE is responsible for the safety design, test, and analysis of nuclear weapons. A review to ensure that a weapon meets its design requirements (including safety) is accomplished by a joint Design Review and Acceptance Group (DRAAG). After successful completion of the DRAAG, the DoE documents safety certification in the Final Design Development Report. The Department of Defense accepts the weapon as certified. However, safety is further addressed through Service NWSSG and POG activities.

C4.2.4. Nuclear Weapon System Safety Certification. The Services oversee the safety certification process for nuclear weapon systems. They develop the policy and establish nuclear weapon system safety design criteria. The weapon system program manager is responsible for the safety design, development, analysis, and testing of nuclear weapon systems. The weapon system program manager evaluates nuclear surety to identify hardware, software and procedures to be used with a nuclear weapon or nuclear weapon system. The Services will ensure that independent analyses are conducted of the weapon system's data and the operating command's procedures. Those analyses are performed against the system safety design criteria, and recommendations on nuclear safety design certification will be provided. The completion of the above certification process, with the completion of the appropriate nuclear weapon system safety study or review and the Secretary of Defense approval of safety rules, qualifies the system for use. The Service reviews the data from the weapon system program manager and the independent evaluation and provides safety certification. That certification is documented in Service publications.

C4.2.5. Safety Certification of DoE-Developed Support Equipment. The DoE is responsible for the nuclear safety design, test, and analysis of nuclear support equipment and software developed by the DoE for a specific nuclear weapon. The Services evaluate use of DoE-developed nuclear weapons support equipment. Approval of a nuclear retrofit order and its incorporation into the JNWPS manual constitutes nuclear safety certification for the Department of Defense. However, the equipment may be reviewed by the Service NWSSGs, which may restrict use of DoE safety certified weapons or equipment if they feel the equipment is not safe in a Service operational context.

C4.2.6. Safety Certification of DoD-Developed Support Equipment. Safety certification is required of DoD-developed equipment that is used to handle nuclear weapons, all specialized equipment (components designed specifically for use with nuclear weapons), and all nonspecialized equipment (components used with nuclear weapons but not specifically designed for that purpose). The weapon system program managers are responsible to the Service for the safety design, analysis, and testing of equipment or software to meet Service safety criteria. The weapon system program managers submit the data documenting compliance with nuclear safety criteria for a Service-designated independent technical review. That independent analysis provides a safety certification recommendation to the Services. The Service then certifies the equipment or software, documenting the certification in a Service publication, or rejects certification and sends the package back to the weapon system program managers for additional action.

C4.3. THE NONNUCLEAR ASSURANCE PROGRAM (NNAP)

C4.3.1. The NNAP is a verification system that ensures that test assemblies are nonnuclear. That safety positive measure is implemented with the goal of preventing inadvertent nuclear detonation. The Military Departments perform some unique test programs, independent from the DoE, that require denuclearized test assemblies and should exercise the intent of the NNAP also.

C4.3.2. Those test units are designed to simulate the nuclear weapon in its operational configuration as much as possible. Actual arming, fuzing, and firing system components, weapon case structures, and detonators can be used. Those test assemblies and the test units housing them will look like actual warheads. Additionally, during flight tests, those units are expected to operate as if they were an actual nuclear weapon, except for the lack of a nuclear detonation. The test conditions simulate actual operational scenarios to the maximum extent possible. Those conditions create the possibility, however unlikely, that an actual warhead could be inadvertently assembled into a test unit and subsequently tested as a part of the operational test program.

C4.3.3. There are three parts to the NNAP process for verifying that a test assembly is not a nuclear weapon. Those three methods are to be used in combination with each other. They are, as follows:

C4.3.3.1. Inspection of Tamper-Evident Seals. Tamper evident seals will be inspected (on those weapons equipped with such seals) to verify serial numbers and for alterations or damage to ensure that the test assembly configuration has not been altered or substituted.

C4.3.3.2. Inspection of Engineered Signatures. The physical or electrical characteristics that differentiate between a nuclear weapon and a test assembly will be inspected. Those include external differences, such as engraved markings, electrical connections and antennas, as well as internal differences that may be verified with instrumentation.

C4.3.3.3. Radiation Detection Instrument Measurements. Nuclear emissions from each test assembly will be measured as close as practical to the timing of the test to ensure that the test assembly does not contain plutonium, or other special nuclear materials (other than depleted uranium).

C4.3.4. For joint tests, the DoE is responsible for providing joint test assemblies, tamper-evident seals, signature information, and radiation detection equipment. As additional verification that joint test assemblies are nonnuclear, the DoE permanently marks them as test assemblies.

C5. CHAPTER 5

SAFETY STUDIES AND REVIEWS

C5.1. GENERAL

The Military Department evaluates system safety throughout the life cycle of a nuclear weapon system, including Allied systems that will use U.S. nuclear weapons, for which the Military Department has cognizance. One method used is periodic safety studies and reviews performed by a Military Department NWSSG. A NWSSG evaluates current information about the nuclear safety of the weapon system, observes weapon system operations, and makes assessments of the nuclear weapon system on DoD nuclear weapon system safety policy and standards. A NWSSG may recommend draft safety rules, technical and operational procedures, and other positive measures to maximize safety consistent with operational requirements. This Chapter describes NWSSGs and their activities, and identifies the different types of safety studies and reviews. It provides the guidelines for the conduct of safety studies and reviews and outlines the process for the preparation, coordination, and approval of associated safety documentation.

C5.2. NUCLEAR WEAPON SYSTEM SAFETY GROUPS

C5.2.1. General. Detailed nuclear weapon system safety studies and reviews are conducted periodically throughout the DoD life cycle of a nuclear weapon system by NWSSGs. A NWSSG is convened for a particular study or review by the Military Department and is operated for its duration by the Military Department. A NWSSG Chair is selected by the convening Military Department. NWSSGs provide one means of assessment of nuclear weapon system safety but have no oversight responsibility. NWSSG member organizations remain informed through their applicable chains of command. Based on its evaluations, the NWSSG may also recommend draft safety rules for operation of the nuclear weapon system to ensure that it continues to meet the four DoD Nuclear Weapon System Safety Standards. Alternately, the NWSSG may draft safety rules that permit continued operations with an identified vulnerability while maximizing safety consistent with operational requirements. The NWSSG is disbanded when the Military Department accepts its report, which serves as the basis for the Military Department's Nuclear Weapon System Safety Report (NWSSR).

C5.2.2. Composition. The NWSSG is composed of military and civilian

professionals from the Military Departments, the U.S. Strategic Command (USSTRATCOM), the DSWA, and the DoE. Other Combatant Commands or any additional commands and Agencies with responsibility for nuclear weapon system safety may be included as considered applicable by the Military Department. Members will be assigned for the duration of the study or review.

C5.2.3. Responsibilities. NWSSG members shall do the following:

C5.2.3.1. Be knowledgeable of safety policy and procedures.

C5.2.3.2. Identify, analyze, and provide assessments of pertinent nuclear weapon system safety-related information and operations.

C5.2.3.3. Be able to convey to the NWSSG the unique operational requirements of their organization, parent command, and the Department of Defense.

C5.2.3.4. Independently formulate their judgments when assessing whether the system meets the DoD nuclear weapon system safety policy and standards.

C5.2.3.5. The Chair of the NWSSG is responsible for all aspects of a given safety study or review, including preparation, conduct, and reporting. The Chair shall conduct the study in the schedule and scope specified by the convening authority and ensure complete coverage of safety-related issues. The Chair is also responsible for ensuring that all minority opinions are recorded in the NWSSG report.

C5.2.4. Member Qualifications

C5.2.4.1. The NWSSG Chair should be a military grade O-6 or civilian equivalent (or at a minimum be a military grade O-5, or senior, or civilian equivalent), and have nuclear weapon experience necessary to meet their responsibilities.

C5.2.4.2. NWSSG members shall have the following:

C5.2.4.2.1. Minimum military grade O-4 or civilian equivalent. Exceptions will be approved by the Chair.

C5.2.4.2.2. Extensive operational or technical experience with nuclear weapon systems and experience or training in evaluation techniques applicable to the DoD nuclear weapon system safety standards.

C5.2.4.2.3. No direct responsibility for the design, development, or production of the specific nuclear weapon system under evaluation.

C5.2.4.3. NWSSG members are encouraged to complete the applicable curriculum of the safety training program outlined in Chapter 9.

C5.2.5. Membership Roles

C5.2.5.1. The Military Department member(s), USSTRATCOM member, or other invited Combatant Command members, as applicable, provide a combination of operational experience and technical expertise to support thorough evaluation of nuclear weapon system safety.

C5.2.5.2. The USSTRATCOM member, or other invited Combatant Command members, as applicable, provide current knowledge in nuclear weapon mission requirements.

C5.2.5.3. The DSWA member will represent the interests of the Chairman of the Joint Chiefs of Staff and the OSD.

C5.2.5.4. The DoE member represents the nuclear weapon design and development aspects of nuclear weapon system safety and provides technical knowledge of the warhead.

C5.2.6. NWSSG Advisors

C5.2.6.1. Advisors may be invited by NWSSG members, as approved by the Chair.

C5.2.6.2. Advisors must have relevant technical knowledge of nuclear weapon systems, or specific technical knowledge or operational experience with the design, development, production, or operation of the nuclear weapon system under evaluation.

C5.2.6.3. Advisors are encouraged, but are not required, to have completed the safety training program outlined in Chapter 9.

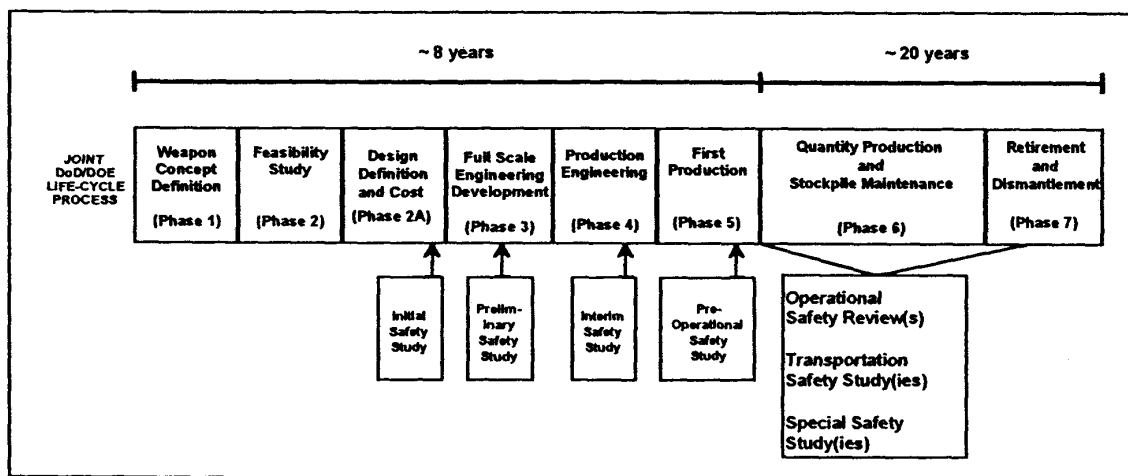
C5.2.6.4. Advisors do not have a formal voice in NWSSG proceedings and may not submit findings, observations, or minority opinions. They are encouraged to make contributions to NWSSG briefings, discussions, and deliberations, through the

member whom they represent, to clarify points of discussion on issues raised by their sponsor or another NWSSG member. Advisors may participate in such discussions, but their input will be limited by their advisor status.

C5.3. TYPES OF STUDIES AND REVIEWS

C5.3.1. The different types of safety studies and reviews include: Initial Safety Study (ISS), Preliminary Safety Study (PSS), Interim Safety Study (INSS), Pre-Operational Safety Study (POSS), Operational Safety Review (OSR), Special Safety Study (SSS), and Transportation Safety Study (TSS). Those studies and reviews, when conducted, are normally performed in relation to specific phases of the joint DoD/DoE life-cycle process (figure C5.F1., below).

Figure C5.F1. Integration of Safety Studies and Reviews with the Joint DoD/DoE Life-Cycle Process



C5.3.2. Appendix 2 describes the purpose, timing, and scope of each study and review. It also identifies the linkages between the safety program and joint DoD/DoE life-cycle activities. Additional information on the joint DoD/DoE life-cycle process and its relationship to the DoD Nuclear Weapon System Safety Program is in Chapter 10.

C5.4. STUDY AND REVIEW PROCEDURES

C5.4.1. Prestudy and Review Requirements

C5.4.1.1. The Military Department shall request and consider

recommendations from the NWSSG member organizations regarding the scope and agenda of the study or review and shall distribute a convening letter and an agenda to member organizations.

C5.4.1.2. A Military Department data package shall be provided to NWSSG member organizations at least 30 days before the start of a study or review. That package includes at a minimum:

C5.4.1.2.1. Technical description and concept of operations for the nuclear weapon system. That information subsequently becomes "Part A" of the Military Department safety rules package.

C5.4.1.2.2. Description of the safety features incorporated into the nuclear weapon system. That information subsequently becomes "Part B" of the Military Department safety rules package.

C5.4.1.2.3. Current or draft safety rules or draft changes to current safety rules as proposed by the Military Department. That information is "Part C" of the Military Department safety rules package.

C5.4.1.3. The Military Department shall request, through the ATSD(NCB), that the DoE provide the following information at the study site:

C5.4.1.3.1. Warhead descriptions including history of alterations and modifications, status of the Major Assembly Release (MAR), and operating modes.

C5.4.1.3.2. A summary of the warhead design safety features, including use control, that support the weapon safety theme.

C5.4.1.3.3. An assessment of how the design safety features support the MCs and the DoD nuclear weapon system safety standards, including a summary of environments in which inherent weapon design characteristics alone are inadequate to meet the MCs.

C5.4.1.4. The Military Department shall review the following material and make it available to the NWSSG at the study site, as applicable:

C5.4.1.4.1. JNWPS TPs and Service technical manuals.

C5.4.1.4.2. Pertinent material from previous Military Department NWSSRs on the specific nuclear weapon system, including approved findings and recommendations.

C5.4.1.4.3. The most recent POG and DRAAG reports.

C5.4.1.4.4. A summary of relevant accidents and incidents, nuclear weapons technical inspection results, and unsatisfactory reports.

C5.4.1.4.5. Technical nuclear safety analyses, as available, that address system features, interfaces, operations such as transportation, and applicable risk assessments.

C5.4.1.4.6. Applicable operations orders, operations plans, directives, and related materials.

C5.4.2. Conduct of the Study or Review

C5.4.2.1. Activities. The NWSSG shall conduct a safety study or review, in accordance with this Manual and Military Department implementing instructions. The NWSSG shall do the following:

C5.4.2.1.1. Review the Military Department data package.

C5.4.2.1.2. Review the status of relevant findings, recommendations, and open corrective actions from previous Military Department NWSSRs.

C5.4.2.1.3. Receive technical and operational briefings on the weapon system under study.

C5.4.2.1.4. Determine if the nuclear weapon system may be operated safely in the concept of operations. Observe operations with applicable support equipment in a representative sample of operational environments (and in substantially unique operational environments).

C5.4.2.1.5. Review technical and operational procedures in TPs and in safety rules, in view of observed operations.

C5.4.2.1.6. Examine the STS document, with particular emphasis on storage, maintenance, transportation, and employment operations, to determine that all relevant activities that have safety aspects are reviewed.

C5.4.2.1.7. Review potential hazards in normal and abnormal environments identified in the STS document for impact on safety.

C5.4.2.1.8. Review the process for the authentication of nuclear control orders at the delivery unit level.

C5.4.2.1.9. Review results and recommendations of available inadvertent and unauthorized launch analyses and related software and physical security analyses.

C5.4.2.1.10. Examine safety-related use control matters in the context of the second safety standard.

C5.4.2.1.11. Examine safety-related security matters in the context of the fourth safety standard.

C5.4.2.2. Determinations. The NWSSG shall determine if the nuclear weapon system is being operated in a manner that meets the DoD nuclear weapon system safety policy and standards.

C5.4.2.2.1. If the system meets the standards, the NWSSG shall draft, if applicable, new safety rules or changes to current safety rules or recommend other positive measures to further ensure maximum safety consistent with operational requirements.

C5.4.2.2.2. If the system may not be verified to meet DoD nuclear weapon system safety standards, the NWSSG shall:

C5.4.2.2.2.1. Draft safety rules or other positive measures stating their benefits that will permit continued operations.

C5.4.2.2.2.2. Determine operational impacts if the safety rule or other positive measure is not adopted.

C5.4.2.2.3. If the system does not meet the standards, the NWSSG shall do the following:

C5.4.2.2.3.1. Determine nuclear weapon system limitations and constraints that do not allow safe operation of the system; and either,

C5.4.2.2.3.2. Determine draft safety rules or other positive measures that will allow the system to meet the standards; or,

C5.4.2.2.3.3. Draft safety rules that permit continued operations with an identified vulnerability while maximizing nuclear weapon system safety consistent with operational requirements.

C5.4.2.2.4. In cases where a weapon system does not meet or cannot be verified to meet the standards, the NWSSG also will identify the following:

C5.4.2.2.4.1. Affected part(s) of the STS.

C5.4.2.2.4.2. Applicable accident scenario(s), abnormal environment(s), or other factors causing nonconformance with the standards and including the following:

C5.4.2.2.4.2.1. Plausible sequences of events that may lead to those undesirable situations.

C5.4.2.2.4.2.2. System response(s), if known, to the abnormal environment or other factors causing nonconformance with the standards (e.g., nuclear yield, HE detonation, prearming, launching, or releasing). Credible combinations of abnormal environments should be identified where possible.

C5.4.2.2.4.3. Procedures and hardware, if any, that are identified as "deficient."

C5.4.2.2.4.4. Specific limitations imposed on system operations will be identified and justified in the safety rules package.

C5.4.2.2.5. If the NWSSG majority determines that hazardous conditions exist, the NWSSG Chair may recommend immediate constraints on nuclear weapon system operations or cessation of operations for the nuclear weapon system. If such action is recommended, the Military Department shall be notified through the fastest means of communication. Notification shall include minority opinions. The NWSSG must also recommend the conditions that must be satisfied before operations may resume.

C5.4.2.3. Reporting Requirements. The NWSSG shall prepare a NWSSG report, in accordance with the format specified in Appendix 3.

C5.4.2.3.1. The "record paper copy" report must be signed by all members participating in the safety study or operational review. The NWSSG report shall not be changed following the signature of the NWSSG members other than to correct administrative errors.

C5.4.2.3.2. The report shall be forwarded to the Military Department in 2 weeks following completion of the study. Copies of the NWSSG report shall be distributed to NWSSG member organizations.

C5.4.3. Post-Study or Review Requirements

C5.4.3.1. On receipt of the NWSSG report, the Military Department shall do the following:

C5.4.3.1.1. Notify the ATSD(NCB) of the completion of the study.

C5.4.3.1.2. Approve or disapprove, with applicable rationale, the findings and recommendations in the NWSSG Report. The Military Department may require the NWSSG to provide additional information. A corrective action shall be identified for each approved recommendation, as appropriate.

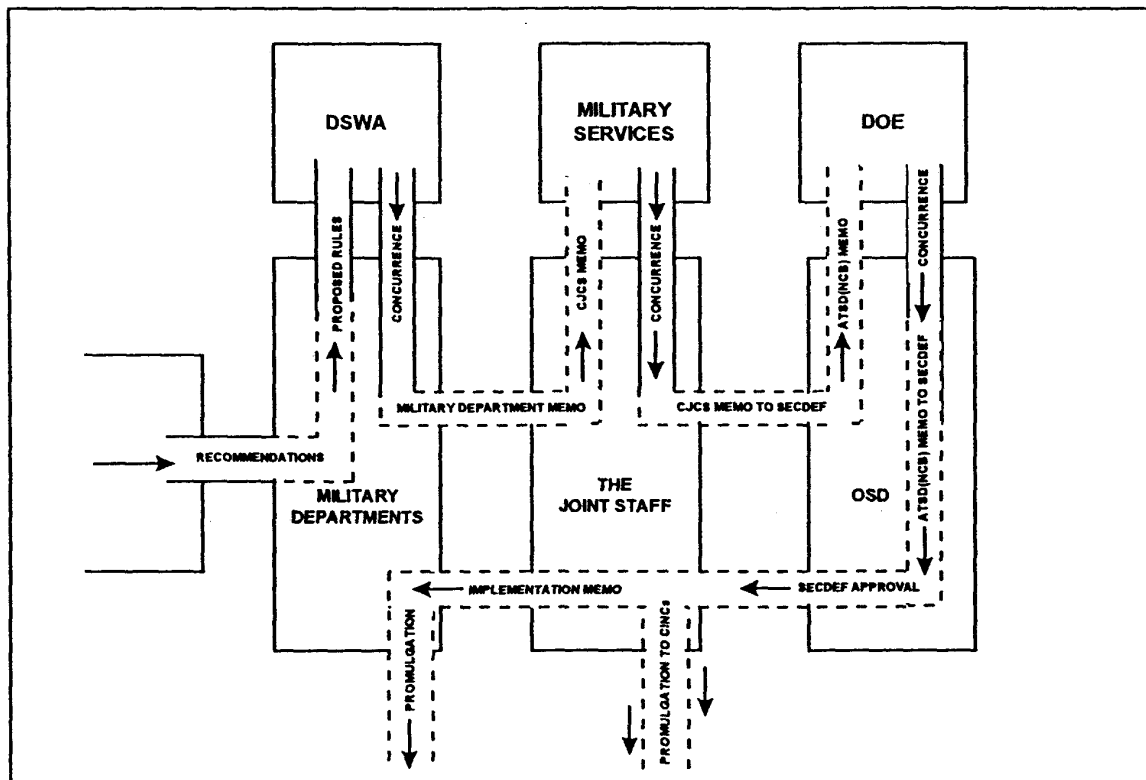
C5.4.3.1.3. Use the NWSSG report, including minority reports, as the basis for preparation of a Military Department NWSSR and a safety rules package, in accordance with the formats specified in Appendix 3, as applicable.

C5.4.3.2. The Military Department shall distribute the Military Department NWSSR in 4 months of receipt of the NWSSG report, or in time to support the coordination of the safety rules package, whichever comes first, to: the ATSD(NCB); the NWSSG member organizations; the Chairman of the Joint Chiefs of Staff; and the Military Department nuclear weapon system lead project officer (or managers, as applicable) for information.

C5.5. MILITARY DEPARTMENT SAFETY RULES PACKAGE

When the NWSSG report includes draft safety rules or changes to existing safety rules, the Military Department shall, simultaneously with the preparation of the NWSSR, prepare a Military Department safety rules package for separate coordination and approval. (See figure C5.F2., below.) The format for the safety rules package is in Appendix 3.

Figure C5.F2. Safety Rule Coordination Process



C5.5.1. The safety rules package coordination and approval process must be conducted as expeditiously as possible and includes the following:

C5.5.1.1. An internal review by the Military Department of the draft safety rules recommended by the NWSSG and preparation of a safety rules package presenting Military Department-proposed safety rules.

C5.5.1.2. Military Department coordination with the Defense Special Weapons Agency participating in the study.

C5.5.1.3. The Chairman of the Joint Chiefs of Staff coordination with all Services, concurrence by the Chairman of the Joint Chiefs of Staff, and a recommendation for approval by the Chairman of the Joint Chiefs of Staff to the Secretary of Defense.

C5.5.1.4. ATSD(NCB) coordination with the DoE. The DoE recommendations will be coordinated with the Chairman of the Joint Chiefs of Staff, the Military Department, and the DSWA.

C5.5.1.5. Recommendation for approval by the ATSD(NCB) to the Secretary of Defense.

C5.5.1.6. Approval of proposed safety rules by the Secretary of Defense.

C5.5.1.7. Distribution of the safety rules by the Chairman of the Joints Chiefs of Staff to the DoD Components, as applicable.

C5.5.1.8. Implementation of safety rules by the DoD Components, as applicable.

C5.5.2. The following guidelines apply to all safety rules package processing:

C5.5.2.1. Proposed alterations to the safety rules package during processing must be coordinated with the applicable Military Department before transmittal to the DoE for coordination. Issues arising from DoD coordination of safety rules packages shall be resolved by the ATSD(NCB).

C5.5.2.2. The Secretary of Defense approval of all safety rules is contingent on Parts A and B of the safety rules package remaining substantively unchanged from the Military Department Data Package considered during the safety study or review.

C5.5.2.3. The Chairman of the Joint Chiefs of Staff may request that the Secretary of Defense grant interim approval of the proposed safety rules when circumstances dictate approval in a time period that does not permit completion of the formal coordination process. The ATSD(NCB) will provide the interim safety rules package to the DoE with a 7-day suspense. Interim approval of safety rules will be effective for a maximum of 6 months and does not negate the requirement for final processing of a safety rules package. Interim approval of safety rules permits acceptance of custody, routine peacetime storage, maintenance, training, inspection, transportation, and deployment activities. It does not permit nuclear weapons to be

used in exercises, nor does it permit operations with nuclear weapons except in response to a valid nuclear release order. If final processing of safety rules is not completed in the 6-month period, the Military Department must request an extension.

C5.5.2.4. Approved safety rules shall be disseminated by the Chairman of the Joint Chiefs of Staff to the applicable DoD Components. Unless otherwise specified, safety rules and revisions to approved safety rules shall be implemented within 30 days of Secretary of Defense approval. System-specific safety rules must be in effect before the DoD Components can accept custody of, or conduct any operations with, nuclear weapon systems.

C5.5.2.5. Safety rules remain in effect until rescinded by the Chairman of the Joint Chiefs of Staff. The Secretary of Defense shall be informed of any rescission.

C5.5.3. Administrative Changes

C5.5.3.1. An administrative change is a nonsubstantive change to the safety rules, such as changes in nomenclature, deletion of weapons or delivery vehicles from the inventory, or word changes that do not affect substance.

C5.5.3.2. Administrative changes to safety rules are proposed by the Military Department, shall be coordinated with the DSWA and the Chairman of the Joint Chiefs of Staff, and are approved by the ATSD(NCB). Proposed administrative changes must be accompanied by appropriate rationale.

C5.5.3.3. Administrative changes must meet the following specifications:

C5.5.3.3.1. There is no change in established safety policy or judgments on the nuclear weapon system.

C5.5.3.3.2. There is no substantive change to the concept of operations on which safety rules are based.

C5.5.3.3.3. There is no change to the nuclear safety features in either the weapon(s) or the delivery vehicle.

C5.5.3.3.4. There is no change to specific restrictions as in the approved safety rules.

C5.5.3.4. Administrative changes, when approved, will be provided to the DoE.

C5.6. INFORMATION REQUIREMENTS

C5.6.1. The Military Department shall provide an Annual Safety Status Report to the ATSD(NCB) on July 1. The Report shall describe the status of open corrective actions for each of the approved NWSSG findings and recommendations from completed studies and reviews. Information copies of the report will be provided to the Chairman of the Joint Chiefs of Staff and the DoE.

C5.6.2. The information requirement identified above has been assigned DoD Internal Report Control Symbol DD-A&T(A)1994, *Annual Safety Status Report*, in accordance with DoD 8910.1-M (reference (j)). Additional reports of finding, plans, policies, procedures, publications and courses of action described in this Manual are exempt under section 5.4. of (reference (j)).

C6. CHAPTER 6

NUCLEAR WEAPON SYSTEM SAFETY ASSESSMENTS

C6.1. GENERAL

C6.1.1. The STS document of a nuclear weapon system provides the operating environments that the nuclear weapon system may encounter, either as part of or independent of its delivery vehicle. Testing is conducted on the weapon system to assess the effects of as many of those environments as possible. Credible combinations of abnormal environments pose an additional risk to nuclear weapon systems and have not been tested extensively for their combined effects.

C6.1.2. The Military Departments will use qualitative and quantitative assessment techniques to evaluate the risk throughout the STS. Those assessments identify external influences on all components and/or equipment that, through natural occurrence, faulty design, misuse, failure, degradation, and/or manufacturing defects, may result in noncompliance with a nuclear safety standard. Those assessments also include a determination of the modes of failure and the effects on safety when failure occurs in systems, subsystems, components, or software. The NWSSGs will consider the results of those assessments during their evaluations of system safety.

C6.1.3. This Chapter presents three assessment techniques; i.e., Probabilistic Risk Assessment (PRA); ULA; and ILA. The DoD Nuclear Weapon System Safety Program encourages the development and use of other safety assessment methodologies.

C6.2. PROBABILISTIC RISK ASSESSMENT (PRA)

C6.2.1. A PRA provides a quantitative analysis of weapon system safety activities. It uses variables such as frequency of accidents, degree of severity of a possible accident, probability of exposure to the population and possible effects of an accident to identify where positive measures can be taken to reduce risk. Those positive measures then serve as the basis for assessing and rendering judgments on the reduction of risks associated with a nuclear weapon system activity.

C6.2.1. A PRA report may include recommendations for system design modifications or operating procedure changes. When available, PRA reports shall be provided to the NWSSG. The NWSSG will use the PRA reports to help evaluate the

nuclear weapon system's compliance with the first and third DoD nuclear weapon system safety standards.

C6.3. UNAUTHORIZED LAUNCH ANALYSIS (ULA)

C6.3.1. In the context of an ULA, the term "unauthorized launch" refers to deliberate launching or releasing of a nuclear missile or bomb (except jettisoning) before execution of an emergency war order. An ULA provides a qualitative or quantitative assessment of a specific nuclear weapon system safety risk. The purpose of the ULA, while recognizing that the chance of an unauthorized launch cannot be completely eliminated, is to ensure that the possibility of such an event is minimized to the fullest extent possible.

C6.3.2. The objective of an ULA is to reveal facts about a nuclear weapon system's design and the potential vulnerabilities of the design and its operation, which will form the basis for a determination on the likelihood of such an event. The systems are evaluated for human actions which may affect nuclear safety design safeguards. The ULA reports shall be made available to the NWSSG and shall be controlled on a strict "need to know" basis. The NWSSG will use the ULA reports to help evaluate the nuclear weapon system's compliance with the second DoD nuclear weapon system safety standard and to make recommendations for system design modifications and/or operating procedure changes.

C6.3.3. An ULA is normally conducted for each nuclear weapon system or launch platform as soon as sufficient weapon system design data is available to complete a thorough evaluation. ULAs shall be updated periodically as the weapon system is modified and, will be verified as current, in support of required safety studies.

C6.3.4. An ULA considers all subsystems of the entire weapon system (e.g., missiles, bombs, launch platforms, weapon control and launching systems, and support systems).

C6.4. INADVERTENT LAUNCH ANALYSIS (ILA)

C6.4.1. In the context of an ILA, the term "inadvertent launch" refers to the accidental or unintentional launching or releasing of a nuclear missile or bomb in either a normal or credible abnormal environment. An ILA investigates how an unforeseen launch of a nuclear weapon could occur. It is usually based on a fault tree analysis or probabilistic risk analysis approach. It may or may not be quantitative and identifies

things that can go wrong, the likelihood of occurrence, and probable outcomes. Its purpose, while recognizing that the chance for an inadvertent launch may not be completely eliminated, is to ensure that the possibility of such an event is minimized to the fullest extent possible throughout the STS.

C6.4.2. The objective of an ILA is to reveal facts about a nuclear weapon system's design that will form the basis for a determination concerning the likelihood of such an event. The systems are evaluated for human actions, component failures, and combinations thereof that may affect nuclear safety design safeguards. ILA reports shall be made available to an NWSSG. The NWSSG will use the ILA results to help evaluate the nuclear weapon system's compliance with the third DoD nuclear weapon system safety standard.

C6.4.3. An ILA is normally conducted for each nuclear weapon system or launch platform when sufficient weapon system design data is available to complete a thorough evaluation. ILAs will be updated periodically as the weapon system is modified and in support of required safety studies.

C6.4.4. An ILA considers all subsystems of the entire weapon system (e.g., missiles, bombs, launch platforms, weapon control and launching systems, and support systems).

C7. CHAPTER 7

NUCLEAR WEAPON SECURITY

C7.1. GENERAL

This Chapter highlights security policy and measures for personnel reliability established to comply with the fourth nuclear weapon system safety standard.

C7.2. SECURITY POLICY

C7.2.1. DoD security policy is addressed under major topics in DoD Directive 5210.41 and DoD C-5210.41-M (references (b) and (f)) that include nuclear weapon protection, custody and control, access, personnel, assessments evaluations and inspections, weapon storage areas and facilities, and structure and building security. Selected security policy statements that are related to nuclear safety include the following:

C7.2.1.1. Nuclear weapons require special protection because of their political and military importance, their destructive power, and the consequences of an unauthorized action.

C7.2.1.2. Nuclear weapons and nuclear weapon systems shall be protected to prevent unauthorized access, damage or sabotage, unauthorized destruction, loss of custody, capture or theft, and unauthorized use during all phases of their life cycle.

C7.2.1.3. Safety and survivability shall be significant considerations in the design of security systems.

C7.2.1.4. Personnel who are selected to perform nuclear duties in peacetime and in wartime shall have demonstrated the highest degree of individual reliability in terms of trustworthiness, conduct, behavior, and responsibility.

C7.2.2. The objectives of security, which support the fourth safety standard, are to prevent unauthorized access to nuclear weapons; prevent damage or sabotage to nuclear weapons; prevent loss of custody; and prevent to the maximum extent possible radiological contamination caused by unauthorized acts or damage, or security operations necessary to capture or recover a weapon.

C7.2.3. Procedures for implementation of those policies are detailed in (references (b) and (f)) that provide detailed information and guidance for items such as locks, fences, guard forces, response forces, and personnel (including custodial, maintenance, and guard) access procedures.

C7.3. PERSONNEL RELIABILITY PROGRAM (PRP)

C7.3.1. DoD Directive 5210.42 (reference (d)) directs the DoD Components to ensure that the highest standards of individual reliability are demonstrated by personnel performing duties associated with nuclear weapons or nuclear components. It places emphasis on allegiance, integrity, trustworthiness, conduct, and behavior, as well as on responsibility of the highest order for those personnel employed in designated PRP positions.

C7.3.2. The PRP is applicable to personnel who control, handle, have access to, or control access to nuclear weapons, nuclear weapon systems, nuclear components, or sealed authenticators. While adherence to PRP procedures during the transition to war and during wartime may be impractical, particularly in a combat theater, the intent of the PRP shall apply.

C8. CHAPTER 8

NUCLEAR WEAPONS USE CONTROL

C8.1. GENERAL

The second DoD nuclear weapon system safety standard refers to positive measures to prevent the deliberate prearming, launching, or releasing of nuclear weapons except when directed by competent authority. The positive measures that allow the authorized use and prevent or delay unauthorized use of nuclear weapons are referred to as "use control." Use control is accomplished through a combination of weapon system design features, operational procedures, security, and system safety rules.

C8.2. USE CONTROL MEASURES

C8.2.1. Use control features may be included in the warhead or weapon system, and may be complemented by system operation. Warhead design features usually include a coded control device such as permissive action links (PAL), which require coded inputs to enable prearming circuitry and delay deliberate unauthorized human acts from achieving a nuclear detonation while facilitating authorized use; command disablement, which, when activated, disables critical warhead components; and active protection systems, which may detect attempts to tamper with the warhead and initiate actions that disable critical warhead components.

C8.2.2. Weapon system features include the Code Enable System, which requires specific coded inputs to enable prearming circuitry for bombs, cruise missiles aboard strategic bombers and submarines, and the Positive Enable System, which requires specific coded inputs before launch of intercontinental ballistic missiles. System operation design features involve the removal and separate secure storage of critical weapon or weapon system components until after receipt of an Emergency Action Message (EAM) authorizing use.

C8.2.3. The requirement to maintain positive control of nuclear weapons does not change during advanced conditions of readiness or war. In NATO, major NATO commanders convey mission authority to non-U.S. delivery units and U.S. Commanders convey transfer and release authority to U.S. custodial units. On receipt of a valid nuclear control order through both venues, the U.S. custodial unit will transfer the weapon(s) to the applicable Allied employment unit. The U.S. custodial unit retains custody and responsibility for accountability until a nuclear control order

authorizing release is received. (Normally, transfer and release are received simultaneously). When release for use or expenditure is authorized, the custodial unit retains responsibility for accountability.

C8.2.4. Use control and safety are inseparable. Nuclear weapon system design for use control purposes must be assessed for its ability to satisfy safety requirements consistent with operational requirements. DoD Directives S-5200.16, S-5210.81, and S-3150.7 (references (k) through (m)) also apply.

C9. CHAPTER 9

DoD NUCLEAR WEAPON SYSTEM SAFETY TRAINING PROGRAM

C9.1. GENERAL

The objective of the DoD Nuclear Weapon System Safety Training Program (hereafter referred to as the Safety Training Program) is to enhance nuclear weapon system safety by broadening the knowledge of DoD Nuclear Weapon System Safety Program participants in technical and programmatic safety matters. It is intended to provide uniformity to safety program activities and to ease the nuclear weapons safety interactions between the Department of Defense and the DoE.

C9.2. DoD TRAINING PROGRAM OUTLINE

C9.2.1. Scope. The Safety Training Program is comprised of three curricula that emphasize different aspects of safety to support the needs of personnel associated with the DoD Nuclear Weapon System Safety Program. Those curricula are tailored to individual responsibilities and levels of participation in the DoD Nuclear Weapons System Safety Program.

C9.2.2. Training Curricula Personnel with nuclear weapon safety responsibilities should complete the applicable curriculum.

C9.2.2.1. Curriculum 1. That curriculum is for senior officials responsible for nuclear weapon system safety policy-related decisions. Those officials typically will include senior DoD Nuclear Weapon System Safety Program participants as well as the DoD Component representatives to NWC safety activities. The Safety and Security (S²) Executive Course, available at the Defense Nuclear Weapons School (DNWS), satisfies that requirement.

C9.2.2.2. Curriculum 2. That curriculum is for action officers responsible for nuclear weapon policy formulation and implementation. Those officers typically will include action level Nuclear Weapon System Safety Program participants as well as the DoD Component representatives or observers to NWC action-level activities.

C9.2.2.3. Curriculum 3. That curriculum is for DoD NWSSG members. Members are encouraged to complete that curriculum before they participate in safety studies and reviews if they have not had previous NWSSG experience. NWSSG

advisors are encouraged to complete the curriculum. That curriculum is also available for nuclear weapon system lead project officers and POG Chairs to ease coordination between the joint DoD/DoE nuclear weapon life-cycle process and the DoD Nuclear Weapon System Safety Program.

C9.2.3. Program of Instruction. The Safety Training Program shall include, as a minimum, elements of instruction on the following topics:

C9.2.3.1. The DoD Nuclear Weapon System Safety Program.

C9.2.3.1.1. A detailed review of the safety studies and review process, including guidance from higher authority.

C9.2.3.1.2. A discussion of the technical implementation of safety philosophy and positive measures, both for active weapons and for weapons in inactive storage awaiting dismantlement.

C9.2.3.1.3. Safety policies, standards, positive measures, rules, procedures, and documentation related to the DoD Nuclear Weapon System Safety Program.

C9.2.3.2. Historical overview of nuclear weapon system safety.

C9.2.3.3. Sources of authority.

C9.2.3.4. Safety roles and responsibilities of DoD and joint DoD and/or DoE organizations.

C9.2.3.5. Safety aspects of joint life-cycle activities.

C9.2.3.6. Safety design principles, technology, and environments.

C9.2.3.7. Safety aspects of security and use control.

C9.2.3.8. Safety assessments.

C9.2.3.9. Hazards.

C9.3. PROGRAM PLAN

A program plan will be developed and maintained by the Defense Nuclear Agency. Specific course information may be obtained from the Registrar, Defense Nuclear Weapons School, 1900 Wyoming Blvd SE, Kirtland AFB, NM 87117-5669.

C10. CHAPTER 10

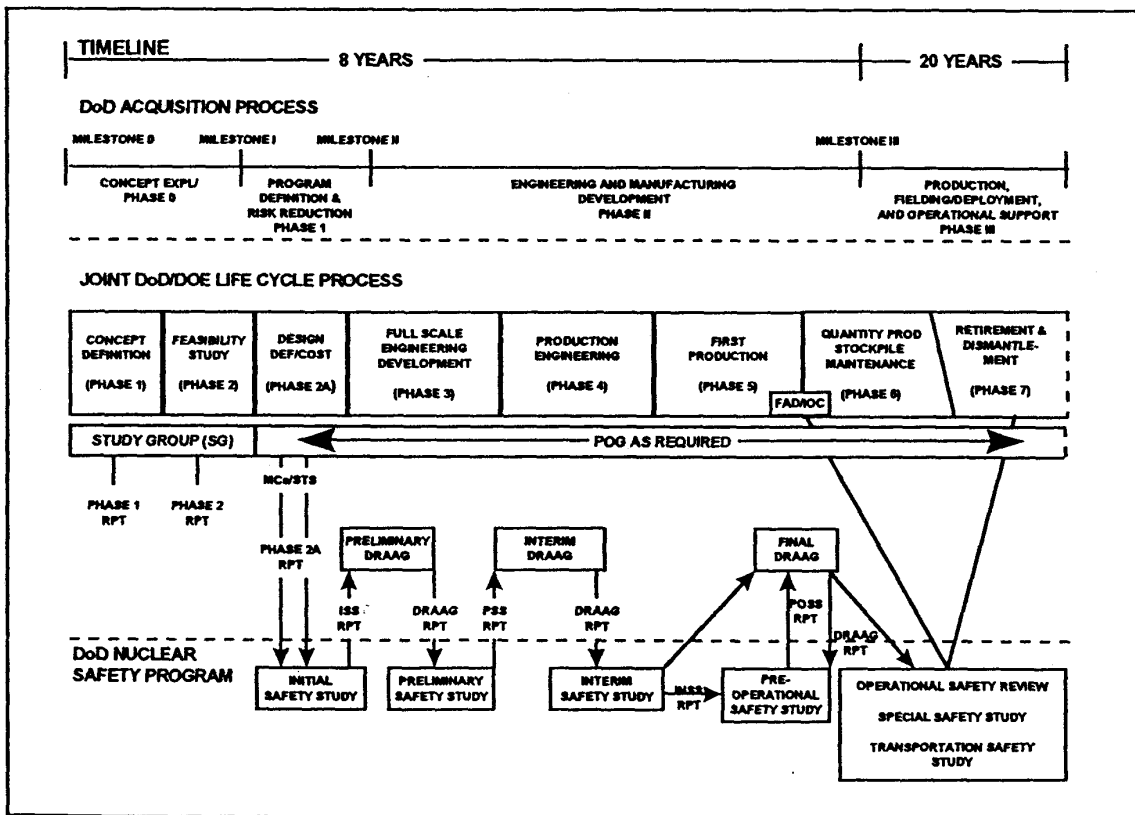
THE JOINT NUCLEAR WEAPON LIFE-CYCLE PROCESS

C10.1. GENERAL

C10.1.1. This Chapter addresses each phase of the joint DoD-DoE nuclear weapon life-cycle process (hereafter referred to as the joint life-cycle process) from a safety perspective, to ensure that the joint life-cycle process and the DoD Nuclear Weapon System Safety Program are integrated.

C10.1.2. The joint life-cycle process consists of seven distinct phases ranging from concept development through retirement and dismantlement. Through that life-cycle process, nuclear weapons are developed, maintained, improved (through modification), and retired. The close alignment of the DoD Nuclear Weapon System Safety Program with the joint life-cycle process ensures that nuclear weapon safety is maintained throughout all phases of a weapon's life-cycle. (See figure C10.F1., below.)

Figure C10.F1. Interrationalship of DoD Safety Program, the Joint DoD/DoE Life-Cycle Process and the DoD Acquisition Process



C10.1.3. The Joint Nuclear Weapons Council was established and given specific responsibilities by Section 179 of 10 U.S.C. (reference (n)), as amended. Its subordinate committee, the Nuclear Weapons Council Standing and Safety Committee (NWCSSC), acts as the point of contact for the Department of Defense and the DoE on all atomic energy matters that either Department determines to be related to nuclear weapon research, development, production, maintenance, dismantlement, allocation of nuclear material, and nuclear weapon safety matters. The NWC is required to report on the status of the safety of the nuclear stockpile to the Congress annually.

C10.1.4. The DoD life-cycle functions, responsibilities, and procedures for nuclear weapons are governed by the 1953 joint DoD and DoE Memorandum of Agreement (MOA) as amended; DoD Directive 3150.1; and DoD Instruction 5030.55 (references (o) through (q)).

C10.1.5. DoD nuclear weapon system development activities are conducted in accordance with the DoD acquisition process, as described in DoD Directive 5000.1 and DoD 5000.2-R (references (r) and (s)). The interrelationship between the DoD

Nuclear Weapon System Safety Program, the joint life-cycle process, and the DoD acquisition process is illustrated in figure C10.F1., above.

C10.2. JOINT LIFE-CYCLE ACTIVITIES

C10.2.1. Two design documents are developed early in the life-cycle process of each nuclear weapon.

C10.2.1.1. MCs specify the DoD performance requirements and physical characteristics for a nuclear weapon before design and development by the DoE. Safety parameters are specifically addressed, as the principal competing characteristic. Other parameters are operational, physical, functional, environmental, vulnerability, and reliability.

C10.2.1.2. The STS defines a nuclear weapon system's logistical and employment concepts and related normal and abnormal environments. It may also define the logistical flow involved in moving nuclear weapons to and from various locations for a variety of peacetime functions. Each nuclear weapon system is evaluated for safety under those logistic and employment environments.

C10.2.2. The joint life-cycle process for nuclear weapons provides for the formation of joint Military Department and DoE study groups and Service led POGs, as well as for the formation of DoD DRAAGs. DoD Directive 3150.2 (reference (c)) and this Manual address the linkage of study group, POG, and DRAAG activities with the DoD Nuclear Weapon System Safety Program.

C10.2.2.1. Early in the life-cycle process, a joint DoD-DoE study group is formed to assess the technical feasibility of a nuclear weapon concept. Later, a joint POG is formed to coordinate the integration of the warhead and the weapon system. The cognizant Military Department assigns a lead project officer (LPO) to Chair the POG. Once established, the POG continues to meet, as necessary, throughout the life cycle of the nuclear weapon.

C10.2.2.1.1. The functions of the POG are to coordinate the design, development, test, evaluation, and other nuclear weapon life-cycle activities performed by the Military Departments and the DoE. The POG examines issues and determines technological and/or interface tradeoffs related to safety, security, use control, cost, performance, reliability, and other significant matters.

C10.2.2.1.2. POG subgroups are organized, as necessary, to meet

particular needs of a nuclear weapon program. The safety subgroup is specifically established by the lead project officer of the POG, according to DoD Instruction 5030.55 (reference (q)) to ensure, by reviewing weapon and weapon system design concepts and other relevant information, that a nuclear weapon demonstrates compliance with all applicable safety standards and criteria. Modifications of the safety parameters of MCs are recommended by the POG safety sub-group as necessary throughout the weapon development process.

C10.2.2.2. The DRAAG provides an independent review of a proposed DoE nuclear weapon design to determine whether that design complies with safety and other requirements specified in the MCs and the STS. DRAAG reviews normally are conducted following the completion of draft Weapon Development Reports by the DoE. The DRAAG should also consider the latest NWSSG report, if available. Subsequent to each review, the DRAAG forwards reports through the cognizant Military Department to the NWC containing findings and recommendations on the acceptability or nonacceptability of the weapon design. DRAAG reports are also used by NWSSGs as inputs in safety studies of the nuclear weapon.

C10.3. PHASE 1 - WEAPON CONCEPT DEFINITION STUDY

During Phase 1, the DoD Agency or the DoE explores, or the two jointly explore, the possibility of initiating the development of a new nuclear weapon or modifying an existing weapon. A Phase 1 study group conducts that effort and may form a separate subgroup to address safety matters, as follows:

C10.3.1. For a DoD-led Phase 1, the DoD Agency shall direct the study group to do the following:

C10.3.1.1. Consider weapon system life-cycle safety in the development of outline MCs and draft STS documents.

C10.3.1.2. Specifically address safety in its Phase 1 report, including the following:

C10.3.1.2.1. Safety technologies that have application to the nuclear weapon system under consideration.

C10.3.1.2.2. How the new weapon will meet the nuclear weapon system's general safety theme.

C10.3.1.2.3. How the new weapon design tentatively will meet the DoD nuclear weapon system safety standards.

C10.3.1.2.4. How the likelihood of fissile material release or dispersal will be minimized.

C10.3.2. The Military Department shall provide a copy of the Phase 1 report to the NWSSG conducting the ISS, as applicable.

C10.3.3. A copy of the Phase 1 report, if conducted, should accompany the Phase 2 study request to the NWCSSC.

C10.4. PHASE 2 - FEASIBILITY STUDY

During a Phase 2 study, a study group investigates the technical feasibility of developing or modifying a nuclear warhead to meet military needs, as follows:

C10.4.1. The Military Department shall direct the study group to do the following:

C10.4.1.1. Form a surety working group to define the safety, security, and use control requirements and themes.

C10.4.1.2. Identify safety technologies that could be applied to the weapon system.

C10.4.1.3. Address weapon safety in preliminary draft documents, including outline MCs and draft STS.

C10.4.1.4. Specifically address safety in the Phase 2 report, including the following:

C10.4.1.4.1. Safety technologies examined during the study.

C10.4.1.4.2. Safety themes proposed by the DoE design Agencies.

C10.4.1.4.3. How the new weapon system will meet DoD nuclear weapon system safety standards.

C10.4.1.4.4. How the likelihood of plutonium release or dispersal will be minimized.

C10.4.2. The Military Department shall provide a copy of the Phase 2 report to the NWSSG conducting the ISS.

C10.4.3. A copy of the Phase 2 report shall be submitted to the NWCSSC and a request to begin Phase 2A must be approved by the NWCSSC before action is taken.

C10.5. PHASE 2A - DESIGN DEFINITION AND COST STUDY

Phase 2A and all subsequent phases are conducted by a joint DoD-DoE POG. Some Phase 2 activities may continue into Phase 2A to resolve issues on the technical feasibility and cost implications of developing or modifying a nuclear weapon. As required, the POG will report its actions to the NWCSSC, as follows:

C10.5.1. The LPO directs the POG to do the following:

C10.5.1.1. Form a nuclear weapon system safety subgroup; that subgroup shall exist for the lifetime of the POG.

C10.5.1.2. Examine the weapon safety design in conjunction with the DoD nuclear weapon system safety standards.

C10.5.1.3. Address safety implications of updates to draft MCs and the draft STS, and of refinements to nuclear weapon design definitions, decision cost estimates, cost and/or benefit tradeoff studies, and cost-effectiveness analyses.

C10.5.1.4. Specifically address safety in its Phase 2A report, including the following:

C10.5.1.4.1. Safety issues addressed during the study.

C10.5.1.4.2. The safety design theme for the nuclear weapon system at a level of detail that will permit the Military Department to validate the safety aspects of the nuclear weapon system. That specific safety theme will be examined by the NWSSG in the subsequent ISS.

C10.5.2. The Military Department shall provide a copy of the Phase 2A report to the NWSSG conducting the ISS.

C10.5.3. A copy of the Phase 2A report shall be submitted to the NWCSSC. A request for initiation of Phase 3 must be approved by the NWCSSC, the NWC, and the Secretary of Defense and the Secretary of Energy before action may be taken.

C10.6. PHASE 3 - FULL-SCALE ENGINEERING DEVELOPMENT

Besides the POG, the Department of Defense establishes a DRAAG to determine acceptability. During Phase 3, the DoE develops a nuclear warhead design that is safe, reliable, producible, and maintainable. That phase culminates in the release of design information by the national laboratory team to DoE production plants. POG activities continue to be monitored by the NWCSSC, as follows:

C10.6.1. The LPO directs the POG to do the following:

C10.6.1.1. Examine weapon concepts with the DoD nuclear weapon system safety standards.

C10.6.1.2. Examine the approved MCs and STS and the ISS NWSSR for safety considerations.

C10.6.1.3. Specifically address safety in a report that includes the following:

C10.6.1.3.1. Safety issues addressed during Phase 3.

C10.6.1.3.2. A level of detail that permits the Military Department to validate the safety design aspects of the nuclear weapon system.

C10.6.2. The Military Department shall direct the preliminary DRAAG to consider the ISS NWSSR in the preparation of the preliminary DRAAG report. In turn, the preliminary DRAAG report will be provided to the NWSSG conducting the PSS. The need and timing for this study will be determined by the using Service.

C10.6.3. The Military Department shall do the following:

C10.6.3.1. Conduct the PSS following publication of the preliminary DRAAG report.

C10.6.3.2. Forward the nuclear weapon system Phase 3 POG report(s), preliminary DRAAG report, and Military Department PSS NWSSR to the ATSD(NCB).

C10.7. PHASE 4 - PRODUCTION ENGINEERING

That phase is conducted by the DoE, with the support of the Department of Defense. During Phase 4, the DoE develops specifications necessary to produce a manufacturable nuclear weapon. The POG continues to meet to finish Phase 3 activities and provide an annual report to the NWCSSC. The DRAAG continues its activities to consider the DoE design. Activities continue to be monitored by the NWCSSC, as follows:

C10.7.1. The Military Department shall direct the Interim DRAAG to consider the PSS NWSSR in the preparation of the Interim DRAAG report. In turn, the interim DRAAG report will be provided to the NWSSG conducting the next safety study.

C10.7.2. The Military Department shall do the following:

C10.7.2.1. Conduct the INSS, if necessary, following the publication of the interim DRAAG report (see Appendix 2).

C10.7.2.2. Forward the Interim DRAAG report to the Military Department and the INSS NWSSR, when available, to the ATSD(NCB).

C10.8. PHASE 5 - FIRST PRODUCTION

That phase is conducted by the DoE, with the support of the Department of Defense. During Phase 5, the DoE begins building nuclear weapons while working to achieve a desired production rate. The POG and its safety subgroup meet, as necessary. The DRAAG continues its activities. Phase 5 ends with the DoE MAR, which states that the war reserve weapon is satisfactory for release to the Department of Defense for operational capabilities and uses. An Emergency Capability (EC) release is a special category in the MAR that is used when all MAR prerequisites have not been satisfied, but an emergency capability requirement has been established by the Department of Defense. Any request for an EC release must verify that the safety standards are met. Activities continue to be monitored by the NWCSSC, as follows:

C10.8.1. Before accepting custody of a nuclear weapon, the Department of Defense shall ensure that the following conditions are met as follows:

C10.8.1.1. A successful POSS must have been conducted.

C10.8.1.2. Nuclear weapon safety rules must be approved and in place.

C10.8.1.3. Receiving organizations must possess the approved safety rules and pertinent technical publications sufficiently in advance to allow for unit training.

C10.8.1.4. Procedures, personnel, equipment, facilities, and organizations must be certified.

C10.8.1.5. Nuclear weapons technical inspections must have been completed.

C10.8.2. The DRAAG shall consider the ISS and the POSS NWSSRs, if available, in the preparation of the final DRAAG report.

C10.8.3. The final DRAAG report will be provided to the NWSSG conducting the next safety study or review, and to the ATSD(NCB) for applicable distribution.

C10.9. PHASE 6 - QUANTITY PRODUCTION AND STOCKPILE MAINTENANCE AND EVALUATION

C10.9.1. The DoE declares the beginning of Phase 6 based on the requirements for production in the Nuclear Weapons Stockpile Plan (NWSP). In that phase, the DoE completes production and the Department of Defense accepts custody of the remaining nuclear weapons to meet the requirements of the stockpile plan. Chapter 11 of this Manual provides additional guidance on nuclear weapon system safety activities during Phase 6. The NWCSSC monitors all Phase 6 activities.

C10.9.2. The Military Department will conduct the safety studies and reviews described in Chapter 5 to provide continuing DoD safety oversight.

C10.9.3. The POG members and the NWCSSC shall be provided copies of Military Department NWSSRs.

C10.10. PHASE 7 - RETIREMENT

C10.10.1. In that phase, nuclear weapons are retired from the stockpile and returned to DoE custody for dismantlement and disposal. Safety study requirements will continue, and pertinent safety rules will apply, until the DoE assumes custody. Those requirements apply specifically to nuclear weapons that have been disassociated from their nuclear weapon system. The NWCSSC monitors all Phase 7 activities.

C10.10.2. If no operational requirement remains for a nuclear weapon, and the weapon has been retired yet remains in DoD custody, safety rules apply until the DoE assumes custody. The POG will establish additional technical procedures, weapon modifications, operations and documentation to maximize safety, if necessary. When the DoE has assumed custody for all retired weapons of that type, the applicable safety rules should be rescinded.

C11. CHAPTER 11

NUCLEAR WEAPON LOGISTIC SAFETY

C11.1. GENERAL

Nuclear weapon logistic activities are important aspects of the DoD Nuclear Weapon System Safety Program because it is during storage, maintenance, and transport activities that the handling of nuclear weapons takes place. Additionally, we constantly are striving to prevent nuclear weapon accidents and incidents. The use of safe and approved procedures is vital to the overall safety of the stockpile. This Chapter provides an overview of the safety concerns that may occur during those activities and that regularly are reviewed by Service NWSSGs. JNWPS publications, Military Department publications, and the safety rules are the primary sources for those procedures.

C11.2. JOINT NUCLEAR WEAPON PUBLICATION SYSTEM

C11.2.1. The Services and the DSWA shall maintain the JNWPS publications on nuclear weapons, associated materiel, and related components. The JNWPS also includes supplemental information and data considered applicable by the DoE and the Military Departments. It provides authoritative policy, procedures, information, and data for nuclear weapon operations, maintenance, support, and management to the DoE, the DSWA, and the Military Departments.

C11.2.2. The JNWPS operates under a MOU (reference (t)). Under JNWPS, individual Military Departments and the DoE authenticate JNWPS publications for which they have an application. TP 0-1 (reference (u)) lists, defines, and indicates the status of JNWPS publications.

C11.2.3. Each JNWPS publication contains applicable safety precautions, warnings, and notes.

C11.3. JNWPS SAFETY-RELATED PUBLICATIONS

C11.3.1. TP 20-5 (reference (v)) prescribes joint DoD and DoE guidelines on decontamination when an environment is contaminated by plutonium as a result of an accident involving a nuclear weapon.

C11.3.2. TP 20-7 (reference (w)) establishes nuclear and explosive safety criteria relative to the transportation, storage, handling, and processing of nuclear weapons. It also provides criticality and popcorn safety, tritium safety and monitoring requirements, and procedures for plutonium safety criteria waivers.

C11.3.3. TP 20-11 (reference (x)) provides technical guidance and information for firefighting operations that involve nuclear weapons. It includes information to help identify nuclear weapons and determine hazards, and guidance for initiating, continuing, or discontinuing firefighting efforts.

C11.3.4. Technical Publication 45 Series. That series of TPs outlines guidance on transportation operations with nuclear weapons including the shipment of nuclear weapons materiel by safe-secure trailer or air, the military criteria for shipment, the transport of hazardous nuclear ordnance materiel, and shipping and identification data for stockpile major assemblies.

C11.3.5. JNWPS publications applicable to specific weapons address assembly, testing, maintenance, and storage procedures and provide the baseline for safety considerations in various storage facilities. JNWPS publications that have particular applicability to storage operations include the following TPs:

C11.3.5.1. TP 20-7 (reference (w)), as described in subsection C11.2.2., above, the TP 100 series, which address general supply and supply management procedures, and TPs promulgated by Military Departments technical manuals, contain additional storage requirements for specific nuclear weapon systems.

C11.3.5.2. The TP 40 series provides general maintenance and modernization procedures. Each of those publications has a preface that lists safety precautions, warnings, and notes. Those publications provide explicit detail in both words and pictures on weapon maintenance and operations.

C11.3.6. TP 5-1 (reference (y)) provides guidance on the Unsatisfactory Reports (UR) System. URs are submitted by operational units to report any conditions that could cause system failures, radiation exposure of personnel, or deterioration of nuclear weapon material. They can be designated as "priority" or "routine." Safety and operational matters requiring an immediate response are handled as priority URs, with responses provided in 72 hours by the most expeditious means. URs for Military Department-designed weapon lifting devices and test and handling equipment are acted on as stipulated by the applicable Military Department publications.

C11.3.7. The TP 60 Series provides explosive ordnance disposal procedures.

C11.4. NUCLEAR WEAPON TRANSPORTATION

C11.4.1. Transportation of nuclear weapons is an integral part of the STS. The application of safety rules, technical and operational procedures, and other positive measures minimize weapon vulnerabilities during transport operations. The process for developing those rules, procedures, and measures includes the conduct of a TSS by a NWSSG, as outlined in Chapter 5 and Appendix 2 of this Manual.

C11.4.2. DoD Directive 4540.5 (reference (a)) provides policies and responsibilities for the transport of nuclear weapons. It provides guidance for the safe movement of nuclear weapons by U.S. transport aircraft, barges, and by ground transport carriers (including trucks and DoE-owned safe-secure trailers).

C11.4.3. The requirements of the DoD Nuclear Weapon System Safety Program apply to all nuclear weapon transport carriers, including Prime Nuclear Airlift Force (PNAF) aircraft.

C11.4.4. Safety rules will be applied to nuclear weapon transport operations through all approved modes.

C11.4.4.1. General safety rules, as outlined in Appendix 1, shall apply when nuclear weapons are transported.

C11.4.4.2. Specific safety rules will be developed for each aircraft used for transportation of nuclear weapons.

C11.4.4.3. Specific safety rules for other than air transport carriers (e.g., barge and flat bed truck) will be incorporated in nuclear weapon system specific safety rules, as determined by the Military Department.

C11.4.5. Procedures, personnel, equipment, facilities, and organizations involved in the transport of nuclear weapons shall be certified before conducting operations.

C11.5. ACCIDENT AND/OR INCIDENT RESPONSE

C11.5.1. The Department of Defense is responsible for safely storing, securing, maintaining, transporting, and handling nuclear weapons in its custody. The

requirement to protect personnel and property from health or safety hazards in the event of an accident or significant incident involving a nuclear weapon is inherent in those responsibilities.

C11.5.2. To minimize the possibility of a nuclear weapon accident (or significant incident), the Department of Defense and the DoE direct that safety should be an integral part of a nuclear weapon system's life cycle. Safety policy and responsibilities identified in DoD Directive 3150.2 (reference (c)) and this Manual are aimed at preventing or limiting the hazardous effects of a nuclear weapon system accident or significant incident.

C11.5.3. DoD Directive 5100.52 and DoD 5100.52-M (references (g) and (h)) guide DoD functions, responsibilities, and procedures for accidents and significant incidents. Those documents provide policies and procedures to help limit the effects of an accident or significant incident and to protect personnel responding to the accident or significant incident.

C11.5.4. In the event of an accident or significant incident, every effort must be made to determine the cause(s) and to identify actions that can be taken to prevent a future occurrence. A post-accident SSS will be conducted, if appropriate (not in conjunction with the official accident investigation), to address nuclear weapon system safety concerns. The NWSSG will provide applicable findings, recommendations and safety rules, in accordance with the procedures described in Chapter 5.

C12. CHAPTER 12

DoD NWTI SYSTEM

C12.1. GENERAL

This Chapter issues baseline policy and responsibilities for the DoD NWTI system. NWTIs examine nuclear weapons technical assembly, maintenance, storage functions, logistic movement, handling, and safety and security directly associated with those functions. Commanders use NWTIs as the basis for certifying facilities and organizations for operations with nuclear weapons and weapon systems. Additional guidance and detailed procedures for conducting inspections will be jointly developed by the Services and the DSWA and prescribed in JNWPS TP 25-1 (reference (i)). The guidance and procedures will be coordinated with the ATSD(NCB) and the Chairman of the Joint Chiefs of Staff.

C12.2. INSPECTION POLICY AND RESPONSIBILITIES

C12.2.1. The Services and DSWA shall conduct all NWTIs to ensure compliance with pertinent DoD, Joint, and applicable Service requirements.

C12.2.2. Inspections shall be conducted on all units that store, assemble, maintain, or transport nuclear weapons. Services shall provide a list of units meeting those requirements to the DSWA at the beginning of each fiscal year and as changes occur.

C12.2.2.1. The Services will inspect at intervals of their choosing, but not to exceed 18 months between inspections. The Services may conduct limited notice inspections, as necessary.

C12.2.2.2. DSWA will inspect designated nuclear units at intervals specified by the Chairman of the Joint Chiefs of Staff. Currently, 20 to 25 percent, as required to ease efficient scheduling, of the units will be inspected each year. Services may designate additional units.

C12.2.3. Inspections will evaluate the unit's management and administration; technical operations; tools, test, tiedown, and handling equipment; storage and maintenance facilities and condition of the stockpile; security; safety; supply support; nuclear weapon PRP; logistics transport; and special subjects. The Services may amplify the scope of inspections to meet additional requirements.

C12.2.4. All DoD Components shall periodically review the NWTI system for adequacy and to identify necessary improvements.

C12.2.5. The Chairman of the Joint Chiefs of Staff shall sponsor symposia, as required to resolve issues associated with the NWTI system.

C12.2.6. The DSWA may be tasked by the Chairman of the Joint Chiefs of Staff to evaluate special interest topics that may or may not be consistent with the scope of NWTIs. The DSWA and other DoD Components may also propose special interest topics. Those topics will be coordinated with the Chairman of the Joint Chiefs of Staff before submitting to the DSWA. DSWA will notify the Services of special interest items to be evaluated before inspection.

C12.2.7. Nuclear bombs and warheads may be used for the technical operations portion of the NWTI when not specifically prohibited, but only if they are due for inspection, test, maintenance, or modification or retrofit at a time approximately coincident with the NWTI. Technical operations on war reserve bombs and warheads other than those due at the time of the inspection are prohibited.

C12.2.8. Training weapons shall be used for the following:

C12.2.8.1. All certification and recertification inspections, except as noted in subsection C12.2.7., above.

C12.2.8.2. All operations that are forbidden for war reserve weapons by safety rules, the Department of Defense, the Chairman of the Joint Chiefs of Staff, Service, or major command publications.

C12.2.9. Issues that may arise involving interpretation or clarification of national level policy (the Department of Defense or the Chairman of the Joint Chiefs of Staff) may be submitted by the Service or the DSWA to the Joint Staff, ATTN: J-38, for clarification.

AP1. APPENDIX 1

DoD GENERAL NUCLEAR WEAPON SYSTEM SAFETY RULES

AP1.1. INTRODUCTION

Safety rules are categorized as "general" and "specific," as follows:

AP1.1.1. General Safety Rules. General safety rules apply to all nuclear weapons and nuclear weapon systems. General safety rules primarily apply safety policy and shall be included as part of the Military Department's safety rules package.

AP1.1.2. Specific Safety Rules. Specific safety rules are procedural and administrative safeguards unique to each individual nuclear weapon system (and logistics carriers as required) that are identified during safety studies and OSRs.

AP1.2. DoD GENERAL NUCLEAR WEAPON SYSTEM SAFETY RULES

AP1.2.1. Nuclear weapons shall not be intentionally exposed to abnormal environments except in an emergency.

AP1.2.2. Nuclear weapons shall not be used for training or for troubleshooting (i.e., to confirm the existence of a fault, aid in fault isolation, or verify that a fault has been corrected except as explicitly allowed by a specific safety rule).

AP1.2.3. Nuclear weapons may be used for exercises except when explicitly prohibited by specific safety rules.

AP1.2.4. Only certified procedures, personnel, equipment, facilities, and organizations, authorized by the appropriate level of authority, shall be employed to conduct nuclear weapon system operations.

AP1.2.5. The total number of personnel performing nuclear weapon system operations shall be held to the minimum consistent with the operations performed.

AP1.2.6. At least two authorized persons must be present during any operation with a nuclear weapon, except when authorized by a specific safety rule; i.e., alert fly. They must be able to detect incorrect or unauthorized procedures in the task being performed. They must also have knowledge of and understand applicable safety and security requirements.

AP1.2.7. Personnel that have physical access to nuclear weapons must be qualified under the PRP, in accordance with DoD Directive 5210.42 (reference (d)).

AP1.2.8. Physical security will be maintained, in accordance with DoD Directive 5210.41 (reference (b)).

AP1.2.9. Nuclear weapons will be transported as determined by the Combatant Commander or the Military Department, in accordance with DoD Directive 4540.5 (reference (a)). Additionally, the following safety guidance applies:

AP1.2.9.1. Movement(s) will be kept to a minimum consistent with operational requirements.

AP1.2.9.2. Custody and accountability transfers during logistic movements shall be by courier receipt system to ensure positive control.

AP1.2.10. PAL operations shall be, in accordance with plans and procedures prescribed by the applicable Combatant Command and TPs.

AP1.2.11. Verification that a nuclear warhead is not present in a test assembly must be made utilizing nonnuclear assurance procedures at the last practical opportunity agreed on by the Department of Defense and/or DoE before the conduct of an operational test.

AP1.2.12. Deviations from safety rules are permitted in an emergency, except as follows:

AP1.2.12.1. U.S. custody must be maintained until receipt of a valid nuclear control order that permits transferring U.S. nuclear weapons to non-U.S. delivery forces.

AP1.2.12.2. Nuclear weapons shall not be expended unless a valid, properly authenticated nuclear control order conveying release or expenditure authority is received.

AP1.2.12.3. Jettisoning of nuclear weapons is permitted in the event of an emergency, and is to be accomplished according to plans and procedures

AP2. APPENDIX 2

TYPES OF STUDY AND REVIEW

AP2.1. GENERAL

Safety studies and reviews are used to examine nuclear weapon system design features and technical and operational procedures to determine if the system is able to meet the DoD nuclear weapon system safety policy and standards. Those studies and reviews are conducted by NWSSGs, in accordance with the procedures detailed in section C5.4. of Chapter 5 and this Appendix. This Appendix addresses the different types of studies and reviews and provides the purpose, timing, and specific scope of each study or review, relating them to the joint DoD/DOE life-cycle process. Report formats are addressed in Appendix 3.

AP2.2. INITIAL SAFETY STUDY (ISS)

AP2.2.1. Purpose. The ISS shall examine design features and aspects of the proposed concept of operations (if available) that will affect the safety of the nuclear weapon system. The ISS shall address the safety themes and identify safety-related concerns so that changes, if necessary, can be made to the nuclear weapon system design in a timely and cost-efficient manner.

AP2.2.2. Timing. The ISS will be conducted following completion of the joint-DoD/DoE Design, Definition and Cost Study (Phase 2A) and the DoD Demonstration and Validation Phase (Phase I). The ISS is conducted before the start of the joint-DoD/DoE Full Scale Engineering Development Phase (Phase 3) and the DoD Engineering and Manufacturing Development Phase (Phase II). (See figure C10.F1.)

AP2.2.3. Scope. The NWSSG shall review the Phase 2 and 2A reports, draft MCs, draft STS, safety design theme, and the system concept of operations.

AP2.2.4. The Military Department NWSSR on the ISS will be made available to the preliminary DRAAG, when applicable, and to the nuclear weapon system LPO (or manager, as applicable) for information.

AP2.3. PRELIMINARY SAFETY STUDY (PSS)

AP2.3.1. Purpose. The PSS shall examine design features, hardware, procedures, and aspects of the concept of operations that affect the safety of the nuclear weapon system. The PSS will identify safety-related concerns and deficiencies in the nuclear weapon and nuclear weapon system so that corrections may be made in the joint DoD/DoE Full Scale Engineering Development Phase (Phase 3) of the development process in a timely and cost-efficient manner.

AP2.3.2. Timing. The need for and timing of this study will be determined by the using Service, normally following the completion of the preliminary DRAAG. (See figure C10.F1.)

AP2.3.3. Scope. The NWSSG shall do the following:

AP2.3.3.1. Review the preliminary DRAAG report and the ISS NWSSR.

AP2.3.3.2. Identify any nuclear weapon system safety design criteria that are not met or that have been waived.

AP2.3.3.3. Examine proposed storage, maintenance, and transportation concepts for relevant elements of the nuclear weapon system.

AP2.3.3.4. The Military Department NWSSR on the PSS will be made available to the Interim DRAAG, and the nuclear weapon system LPO (or managers, as applicable) for information.

AP2.4. INTERIM SAFETY STUDY (INSS)

AP2.4.1. Purpose. The need for and timing of this study will be determined by the using Service. The INSS normally shall examine changes to system design features, hardware, procedures, and aspects of the concept of operations that affect the safety of the nuclear weapon system to determine if the DoD nuclear weapon system safety standards are able to be met.

AP2.4.2. Timing. The INSS may be conducted at the option of the Military Department following completion of the interim DRAAG, if significant changes have occurred in the nuclear weapon system's proposed design and operations. (See figure C10.F1.)

AP2.4.3. Scope. The NWSSG shall do the following:

AP2.4.3.1. Review the Interim DRAAG Report and the PSS NWSSR.

AP2.4.3.2. Identify any nuclear weapon system safety design criteria that are not met or that have been waived.

AP2.4.3.3. Examine proposed storage, maintenance, and transportation concepts for relevant elements of the nuclear weapon system.

AP2.4.4. The Military Department NWSSR on the INSS, if conducted, will be made available to the final DRAAG, and to the nuclear weapon system LPO (or manager, as applicable) for information.

AP2.5. PRE-OPERATIONAL SAFETY STUDY (POSS)

AP2.5.1. Purpose. The POSS shall examine safety procedures for new or modified systems, and aspects of the concept of operations that will affect the safety of the nuclear weapon system to determine if the DoD nuclear weapon system safety standards are met. It will recommend draft nuclear weapon system safety rules to the Military Department.

AP2.5.2. Timing. The POSS shall be conducted in such time that specific system safety rules can be coordinated, approved, promulgated, and implemented 60 days before Initial Operational Capability (IOC) or First Assets Delivered (FAD). (See figure C10.F1.)

AP2.5.3. Scope. The NWSSG shall do the following:

AP2.5.3.1. Review the final DRAAG report, if available, and the previous NWSSR.

AP2.5.3.2. Examine the system concept of operations.

AP2.5.3.2. Review unauthorized and inadvertent launch analyses, if applicable.

AP2.5.3.3. Examine proposed storage, maintenance, and transport operations.

AP2.5.3.4. Identify any nuclear weapon safety design criteria that are not met or that have been waived.

AP2.5.3.5. Develop draft safety rules.

AP2.5.4. The Military Department NWSSR on the POSS shall be made available to the final DRAAG (if applicable to the nuclear weapon system LPO (or managers, as applicable) for action.

AP2.6. OPERATIONAL SAFETY REVIEW (OSR)

AP2.6.1. Purpose. An OSR shall examine all operational aspects of a nuclear weapon or nuclear weapon system for safety to determine if the DoD nuclear weapon system safety standards are met.

AP2.6.2. Timing. An OSR shall be conducted during the second year after initial approval of safety rules for the nuclear weapon system. Additionally, an OSR shall be repeated, as required, based on weapon system design, procedural or operational concept changes, and experience with the weapon system and the system's safety rules. Each nuclear weapon system shall receive an OSR at least every 5 years from the start of each preceding OSR. (See figure C10.F1.)

AP2.6.3. Scope. The NWSSG shall do the following:

AP2.6.3.1. Review the previous Military Department NWSSRs.

AP2.6.3.2. Examine the operational history of the weapon system.

AP2.6.3.3. Identify any nuclear weapon safety design criteria that are not met or that have been waived.

AP2.6.3.4. Observe operations with the delivery system using training or inert weapons when possible and applicable support equipment, and in a representative sample of operational environments (and in unique operational locations). Where applicable and possible, observe weapons on alert.

AP2.6.3.5. Examine storage, maintenance, and transport operations.

AP2.6.3.6. Review unauthorized and inadvertent launch analyses, if applicable.

AP2.6.3.7. Recommend changes or additions to safety rules, as applicable.

AP2.6.3.8. The Military Department NWSSR on the OSR shall be made available to the nuclear weapon system lead project officer.

AP2.7. SPECIAL SAFETY STUDIES (SSS)

AP2.7.1. Purpose. A SSS investigates unsafe conditions revealed by operational experience; accidents and/or incidents; modifications, tests, or retrofits involving nuclear safety; significant changes in the concept of operations or STS; additional new equipment and/or weapons; proposed changes to nuclear weapon system safety rules; or inactive storage of nuclear weapons.

AP2.7.2. Timing. A SSS will be conducted for a nuclear weapon system when deemed necessary by the Military Department concerned or when requested by the ATSD(NCB). (See figure C10.F1.) The DoE and the DSWA may request, through the ATSD(NCB), that a SSS be conducted. A SSS may be conducted with an OSR or a TSS, if desired.

AP2.7.3. Scope. When applicable, the NWSSG shall:

AP2.7.3.1. Examine modifications, alterations, retrofits, and special tests.

AP2.7.3.2. Assess potentially unsafe conditions revealed by operational experience, studies, or analyses.

AP2.7.3.3. Review significant changes in the system concept of operations, operational conditions, STS, or performance of the safety features incorporated into the weapon system.

AP2.7.3.4. Review unauthorized and inadvertent launch analyses, if applicable.

AP2.7.3.5. Recommend changes or additions to safety rules, as applicable.

AP2.7.4. Military Department SSS NWSSRs shall be made available to the nuclear weapon system LPO.

AP2.8. TRANSPORTATION SAFETY STUDY (TSS)

AP2.8.1. Purpose. The TSS shall examine transport operations with the nuclear weapon system. The Military Department(s) transporting the nuclear weapon or nuclear weapon system are responsible for conducting the study. The TSS will also be conducted in coordination with the Military Department that is responsible for performing transport operations in the weapon's STS.

AP2.8.2. Timing. A TSS shall be conducted for all nuclear weapons by the Military Department(s) in 2 years of receipt of this Manual, and shall be conducted at least every 3 years thereafter for those transportation operations not covered by a weapon system safety study or review. A TSS may be conducted with a POSS, an OSR, or a SSS.

AP2.8.3. Scope. The NWSSG shall do the following:

AP2.8.3.1. Examine the Military Department's transport operations that support nuclear weapon systems (e.g., PNAF movements). The responsible Military Department will coordinate with other Military Departments, the Unified Combatant Commands, and the DoE, as applicable.

AP2.8.3.2. Observe weapon transport or representative transport operations using training or inert weapons and applicable support and transport equipment in a sample of transportation environments. NWSSGs may observe, if previously scheduled, actual logistic movements of nuclear weapons.

AP2.8.3.3. Identify potential hazards during transport operations that could lead to accidental nuclear detonation of the weapon, accidental detonation of the HE in the nuclear weapon or nuclear weapon system, or other credible events that might result in the release or dispersal of plutonium.

AP2.8.3.4. Review pertinent accident and incident data for transport modes used for nuclear weapon movements.

AP2.8.3.5. Assess potentially unsafe conditions revealed by operational experience, studies, or analyses.

AP2.8.3.6. Assess changes in the system concept of operations, operational conditions, STS, or performance of the safety features incorporated into the nuclear weapon or nuclear weapon system as they affect the transport of nuclear weapons or nuclear weapon systems.

AP2.8.3.7. Recommend changes or additions to safety rules governing transport operations, as appropriate.

AP2.8.4. Military Department TSS reports shall be made available to the nuclear weapon system lead project officer.

AP3. APPENDIX 3

SAFETY DOCUMENTS FORMATS

AP3.1. NWSSG REPORT

NWSSG reports shall be written with the following sections: "Executive Summary," "Study Overview," "Findings and Recommendations," "Draft Safety Rules," and "Addendum of Minority Opinions." The NWSSG report title shall be descriptive and shall include the name of the weapon system under study.

AP3.1.1. "Executive Summary." The "Executive Summary" shall summarize the study results. It will include an appraisal statement that assesses whether or not the weapon system, when operated, in accordance with prescribed technical and operational procedures, in the system concept of operations, and with proposed or existing safety rules and other positive measures, meets DoD nuclear weapon system safety policy and standards. The "Executive Summary" will also include a synopsis of the findings and recommendations and minority opinions (if any), and will comment on limitations that affected the conduct of that study.

AP3.1.2. Study Overview

AP3.1.2.1. That subsection shall summarize the study's scope, background, and purpose; describe the assessments conducted by the NWSSG; list any assumptions that were necessary to complete the study; and include the system's concept of operations, current safety rules (if any), a system functional description including the safety technologies incorporated in the system; and the safety feature description provided in the Military Department data package. Those documents may be attached as appendices. That subsection is not intended to be a technical or engineering source document.

AP3.1.2.2. In the "Study Overview," the members shall provide comments on the impact of safety on the system concept of operations and the different implications for safety inherent in unique operational locations; reiterate recommendations from previous studies or reviews that remain open pending completion of corrective action, and provide the status of each; and note any limitations that affected the study or review (e.g., scope, implementation, and instructions).

AP3.1.3. "Findings and Recommendations." That section contains NWSSG findings and recommendations.

AP3.1.3.1. Findings. Findings are statements of fact or conclusions of the NWSSG on the nuclear safety of the weapon system.

AP3.1.3.1.1. The first finding will include an appraisal statement that assesses whether the weapon system, when operated in accordance with prescribed technical and operational procedures, in the system concept of operations, and with proposed or existing safety rules and other positive measures, meets DoD nuclear weapon system safety policy and standards.

AP3.1.3.1.1.1. If the system meets the standards, recommend actions; e.g., propose safety rules and other positive measures, if applicable, that will enhance safety consistent with operational requirements.

AP3.1.3.1.1.2. If the system is not verified to meet the standards by the NWSSG, identify system limitations and constraints that preclude the system from meeting the standards.

AP3.1.3.1.1.3. If the system does not meet the standards, identify system limitations and constraints that do not allow safe operation of the system, or any other factors that preclude conformance with the standards.

AP3.1.3.1.2. Remaining findings will address system-specific enhancements or deficiencies related to hardware, firmware, software, and procedures.

AP3.1.3.2. Recommendations. Each finding shall be followed by a recommendation. If a finding is a positive statement of nuclear weapon safety, the recommendation may be "none." Recommendations shall be, as follows:

AP3.1.3.2.1. For weapon systems that meet the four DoD Nuclear Weapon System safety Standards, if applicable, recommend actions; e.g., new safety rules or changes to current safety rules or other positive measures, to further ensure maximum safety consistent with operational requirements.

AP3.1.3.2.2. For weapon systems that are not verified to meet the four DoD Nuclear Weapon System Safety Standards, recommend positive measures and safety rules in consideration of the requirements identified in subparagraph C5.4.2.2.2. of Chapter 5, including those that may permit continued operations while maximizing safety consistent with operational requirements.

AP3.1.3.2.3. For weapon systems that do not meet the four DoD Nuclear

Weapon System Safety Standards, recommend positive measures and safety rules permitting continued operations or recommending cessation of operations.

AP3.1.3.2.4. Recommend positive measures that address system-specific enhancements or deficiencies regarding hardware, firmware, software, and procedures.

AP3.1.3. Reiterate applicable recommendations for the weapon system made during previous studies or reviews for which corrective actions have not been completed.

AP3.1.4. "Draft Safety Rules." That section provides a separate listing of the draft safety rules or recommended changes to current safety rules as identified in the "Findings and Recommendations." That section provides the basis for Part C of the Military Department safety rules package. Members may recommend processing changes as an administrative change, if applicable.

AP3.1.5. "Addendum of Minority Opinions." An addendum of minority opinions will be included if agreement is not reached by the NWSSG through discussion and deliberation. Minority opinions shall be presented in the same format as the other findings and recommendations of the basic report, and shall be signed by each member supporting the minority opinion.

AP3.2. MILITARY DEPARTMENT NWSSR

AP3.2.1. Military Department NWSSR shall include an "Executive Summary," "Assessment," "Findings," "Recommendations and Corrective Actions," and, as an enclosure, the NWSSG report.

AP3.2.1.1. Executive Summary. The "Executive Summary" shall summarize the Military Department position on the study results. It will include an appraisal statement that assesses whether or not the weapon system, when operated in accordance with prescribed technical and operational procedures, in the system concept of operations, and with proposed or existing safety rules and other positive measures, meets DoD nuclear weapon system safety policy and standards. If the NWSSR assessment of compliance with the DoD safety standards differs from that of the NWSSG (majority or minority), that difference shall be noted in the Executive Summary, along with the rationale for the disagreement. The "Executive Summary" will also include a synopsis of the most significant NWSSG report recommendations and the corresponding Military Department action. The "Executive Summary" shall also comment on limitations that affected the conduct of the study.

AP3.2.1.2. Assessments. The assessment section shall include evaluations and analyses to support the Military Department appraisal statement in the "Executive Summary."

AP3.2.1.3. "Findings," "Recommendations," and "Corrective Actions." Each finding and recommendation of the NWSSG report shall be associated with a corrective action. That section shall do the following:

AP3.2.1.3.1. List NWSSG findings and recommendations and minority opinions, and indicate "approval" or "disapproval" of each recommendation (with rationale).

AP3.2.1.3.2. List corrective actions that the Military Department will implement for approved recommendations.

AP3.2.1.3.3. Provide recommendations on the retention, modification, or retirement of the system, as applicable.

AP3.2.1.3.4. The NWSSG report shall be included as an enclosure to the Military Department NWSSR.

AP3.3. SAFETY RULES PACKAGE

The safety rules package shall consist of an "Executive Summary," "Technical Description and Concept of Operations" (Part A), "Safety Features" (Part B), and "Proposed Safety Rules" (Part C). Each part is factual and will stand alone, without subjective or qualifying data.

AP3.3.1. "Executive Summary." The "Executive Summary" shall summarize the Military Department position on the results of the study or review. It will include an appraisal statement that assesses whether or not the weapon system, when operated in accordance with prescribed technical and operational procedures, in the system concept of operations, and with proposed or existing safety rules and other positive measures, meets DoD nuclear weapon system safety policy and standards. If the NWSSR assessment of compliance with the DoD safety standards differs from that of the NWSSG (majority or minority), that difference shall be noted in the "Executive Summary," along with the rationale for the disagreement. The "Executive Summary" shall include a synopsis of the proposed safety rules or changes to current rules. It shall also provide a descriptive title and study date.

AP3.3.2. "Technical Description and Concept of Operations." Part A shall contain a brief functional description and the concept of operations for the nuclear weapon system. That information shall be consistent with that provided in the Military Department data package.

AP3.3.3. "Safety Features." Part B shall describe the safety features incorporated in the nuclear weapon system. That information shall be consistent with that provided the Military Department data package. That part shall include a summary description of specific positive measures that support DoD nuclear weapon system safety policy and standards.

AP3.3.4. "Proposed Safety Rules." Part C shall list all general and specific system safety rules that apply to the nuclear weapon system. The proposed safety rules or changes to current rules shall be clearly identified.

AP3.4. "ANNUAL SAFETY STATUS REPORT "

The "Safety Status Report" shall describe the status of corrective actions for each of the approved NWSSG findings and recommendations from completed studies and reviews until closed.