

CHAPTER 10

THE JOINT NUCLEAR WEAPON LIFE-CYCLE PROCESS

A. GENERAL

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.

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 10-1.)

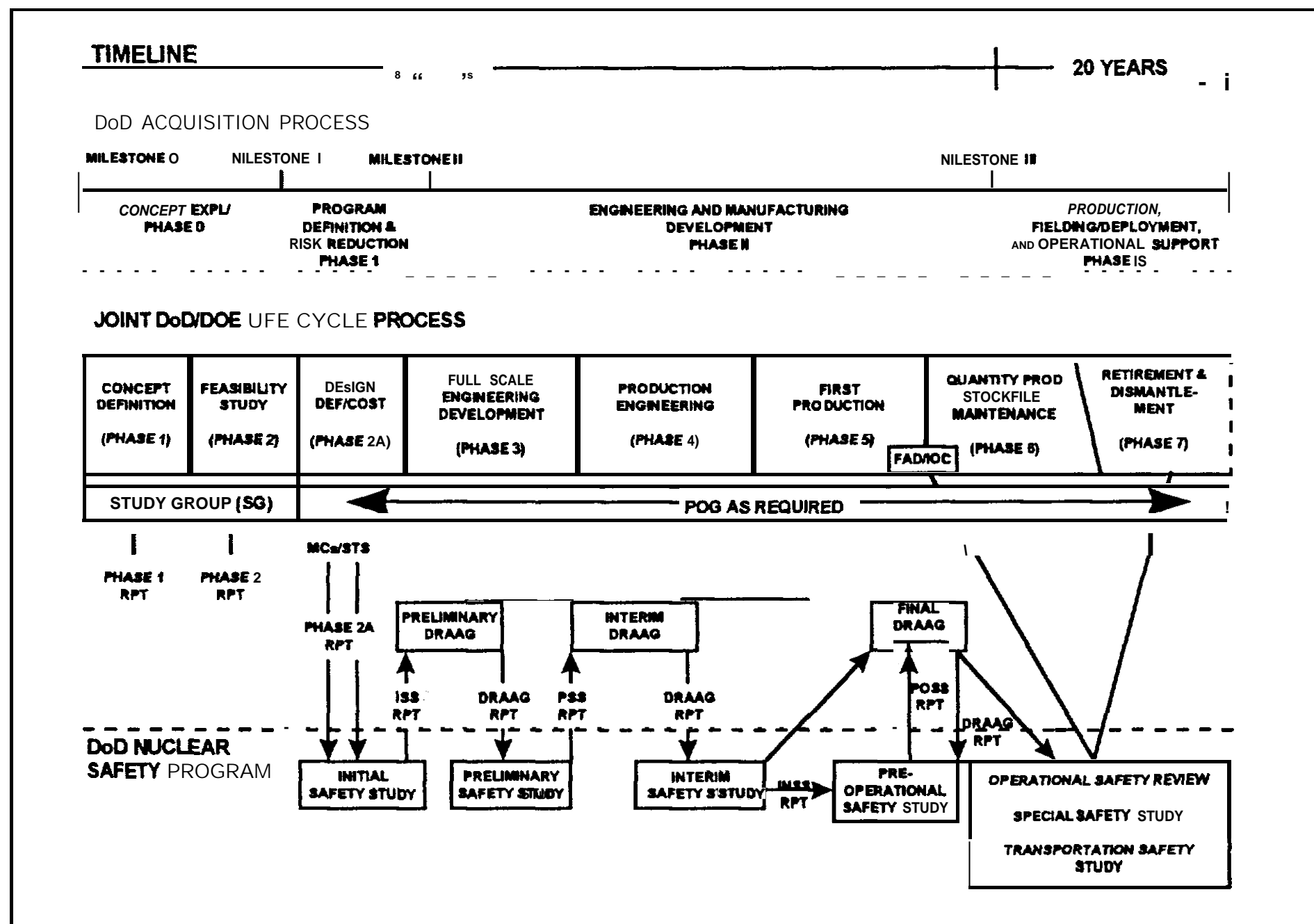


Figure 10-1. Interrelationship of DoD Safety Program, the Joint DoD/DOE Life-Cycle Process and the DoD Acquisition Process

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 Nu-

clear 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.

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)).

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 10-1, above.

## **B. JOINT LIFE-CYCLE ACTIVITIES**

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

a. 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.

b. 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.

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.

a. Early in the life-cycle process, a joint-DoD and 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.

(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.

(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.

b. 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.

### **C. 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:

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

a. Consider weapon system life-cycle safety in the development of outline MCS and draft STS documents.

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

(1) Safety technologies that have application to the nuclear weapon system under consideration.

(2) How the new weapon will meet the nuclear weapon system's general safety theme.

(3) How the new weapon design tentatively will meet the DoD nuclear weapon system safety standards.

(4) How the likelihood of fissile material release or dispersal will be minimized.

2. The Military Department shall provide a copy of the Phase 1 report to the NWSSG conducting the 1SS, as applicable.

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

### **D. 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:

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

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

- b. Identify safety technologies that could be applied to the weapon system.
- c. Address weapon safety in preliminary draft documents, including outline MCS and draft STS.
- d. Specifically address safety in the Phase 2 report, including the following:
  - (1) Safety technologies examined during the study.
  - (2) Safety themes proposed by the DoE design Agencies.
  - (3) How the new weapon system will meet DoD nuclear weapon system safety standards.
  - (4) How the likelihood of plutonium release or dispersal will be minimized.

2. The Military Department shall provide a copy of the Phase 2 report to the NWSSG conducting the 1SS.

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.

#### **E. 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:

- 1. The LPO directs the POG to do the following:
  - a. Form a nuclear weapon system safety subgroup; that subgroup shall exist for the lifetime of the POG.
  - b. Examine the weapon safety design in conjunction with the DoD nuclear weapon system safety standards.
  - c. 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.
  - d. Specifically address safety in its Phase 2A report, including the following:
    - (1) Safety issues addressed during the study.
    - (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 1SS.
- 2. The Military Department shall provide a copy of the Phase 2A report to the NWSSG conducting the 1SS.

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.

#### **F. 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:

1. The LPO directs the POG to do the following:

- a. Examine weapon concepts with the DoD nuclear weapon system safety standards.
- b. Examine the approved MCS and STS and the ISS NWSSR for safety considerations.
- c. Specifically address safety in a report that includes the following:

(1) Safety issues addressed during Phase 3.

(2) A level of detail that permits the Military Department to validate the safety design aspects of the nuclear weapon system.

2. The Military Department shall direct the preliminary DRAAG to consider the 1SS 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.

3. The Military Department shall do the following:

- s. Conduct the PSS following publication of the preliminary DRAAG report.
- b. Forward the nuclear weapon system Phase 3 POG report(s), preliminary DRAAG report, and Military Department PSS NWSSR to the ATSD(NCB).

#### **G. 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:

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.

2. The Military Department shall do the following:

- a. Conduct the INSS, if necessary, following the publication of the interim DRAAG report

(see Appendix B).

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

#### **H. 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:

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

a. A successful POSS must have been conducted.

b. Nuclear weapon safety rules must be approved and in place.

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

d. Procedures, personnel, equipment, facilities, and organizations must be certified.

e. Nuclear weapons technical inspections must have been completed.

2. The DRAAG shall consider the ISS and the POSS NWSSRS, if available, in the preparation of the final DRAAG report.

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.

#### **1. PHASE 6- QUANTITY PRODUCTION AND STOCKPILE MAINTENANCE AND EVALUATION**

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.

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

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

## **J. PHASE 7- RETIREMENT**

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.

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.