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Safety

**NUCLEAR WEAPON SYSTEM SAFETY
STUDIES, OPERATIONAL SAFETY REVIEWS,
AND SAFETY RULES**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFR 91-1, *Nuclear Weapons and Systems Surety*. It defines the procedures for conducting safety studies and operational safety reviews; outlines the development and approval process for nuclear weapon system safety rules; describes the functions of the US Air Force Nuclear Weapon System Safety Group (NWSSG); and the responsibilities of affected organizations. It applies to all personnel with nuclear weapon system safety and security responsibilities. It does not apply to US Air Force Reserve and Air National Guard units and members. Send major command (MAJCOM) supplements to this instruction to HQ AFSA/SEN, 9700 Avenue G, Kirtland AFB NM 87117-5670 for coordination and to HQ USAF/SE, 1400 Air Force Pentagon, Washington DC 20330-1400 for approval before publication.

SUMMARY OF REVISIONS

This is the first publication of AFI 91-102, substantially revising AFR 122-2. It gives the new composition of the NWSSG voting members (paragraph 5.1.) and identifies organizations that provide NWSSG permanent technical advisors (paragraph 5.2.). This revision also clarifies the requirements for an independent Technical Nuclear Safety Analysis, describes an abbreviated analysis (paragraph 14.), and updates agency responsibilities (paragraphs 18. through 20). It includes an example of a nuclear weapon system safety standards matrix as an attachment.

Section A—General Information

1. Terms and Definitions. The terms used in this instruction are defined in AFI 91-101, *Air Force Nuclear Weapons Surety Program* (formerly AFR 122-1).

2. Department of Defense (DoD) Safety Standards. DoD Directive 3150.2, *Safety Studies and Reviews of Nuclear Weapon Systems*, February 8, 1984, establishes the DoD Nuclear Weapon System Safety Standards.

3. Air Force Goals and Requirements:

3.1. This instruction provides guidelines to ensure nuclear weapons are designed, maintained, transported, stored, and operated in a safe and secure manner. The Air Force supports these goals by:

- Convening the NWSSG to evaluate nuclear weapon systems.
- Proposing nuclear weapon system safety rules for Secretary of Defense (SECDEF) approval.

3.2. Operational units must not perform any nuclear operations without SECDEF-approved safety rules.

3.2.1. Use equipment, software, and procedures certified according to AFI 90-103, *Air Force Nuclear Safety Certification Program* (formerly AFRs 122-3 and 122- 9).

3.2.2. Conduct Initial Nuclear Surety inspections according to AFI 90-201, *Inspector General Activities* (formerly AFR 123-1, chapter 2).

3.2.3. Conduct approved actual nuclear weapon operations according to approved plans based on governing directives, technical orders, and the safety rules.

Section B—NWSSG Functions and Composition

4. NWSSG Functions. The NWSSG:

4.1. Reviews nuclear weapon system designs and operations to determine if they meet the DoD Nuclear Weapon System Safety Standards.

4.2. Proposes safety rules and recommends changes to improve nuclear weapon system surety.

4.3. Doesn't certify nuclear weapon system hardware, software, or procedures.

5. NWSSG Composition. Agencies appoint permanent members to serve in the NWSSG.

5.1. Permanent Voting Membership:

- Chair from HQ AFSA/SEN (votes only to break a tie).
- One member each from the Air Force Materiel Command, Air Force Security Police Agency, Defense Nuclear Agency (DNA), and Department of Energy (DOE).

5.2. Additional Voting Membership:

- One member each from the Air Combat Command, Air Force Space Command, Air Mobility Command, US Strategic Command, US European Command, and United States Air Forces in Europe when the group addresses topics in these organizations area of responsibility.
- A member from another Air Force agency or military Service that uses the weapon system being evaluated. The Chair must approve each additional voting member.

5.3. Nonvoting Technical Advisors. Engineers, technical experts, and contractors may attend the NWSSG evaluations when requested by the Chair, the Executive Officer, or a voting member. The Chair decides how many technical advisors go on field trips.

5.4. Nonvoting Support Staff. The support staff includes the NWSSG Executive Officer, project officers, and the nuclear surety assistant.

6. Qualifications and Duties of Members:

- 6.1. Air Force members must meet these qualifications to serve as a voting member in the NWSSG:
- Field grade rank or civilian equivalent.
 - Recent nuclear weapons experience.
 - Full understanding of their agency's responsibilities for the nuclear weapon system being evaluated.
 - No direct responsibility for designing, developing, or producing the nuclear weapon system being evaluated.

NOTE:

The DNA and DOE must appoint members who meet these qualifications as closely as possible.

- 6.2. Voting Member Duties. Voting members must:

- Exchange information with the NWSSG.
- Help the NWSSG schedule field trips.
- Ensure that their agencies provide documents and briefings needed during an NWSSG evaluation.
- Request any essential technical support from their agency.
- Review background material to prepare for NWSSG evaluations.
- Send a list of their technical advisors' security clearances to HQ AFSA/SENS at least 5 work-days before the NWSSG evaluation.
- Send their personal security clearance to HQ AFSA/SENS every year or as required.
- Vote during NWSSG meetings and sign the NWSSG report.

7. Visitor Participation. Visitors approved by the Chair or the Executive Officer may attend NWSSG meetings.

- 7.1. Send requests to HQ AFSA/SENS at least 5 work-days before the meeting. Include this information:

- Full name, rank or civilian grade, Social Security number, and civilian employee or military identification card number.
- Organization, address, and telephone number (Defense Switched Network [DSN] number, if available).
- Security clearance and any special access, such as North Atlantic Treaty Organization and critical nuclear weapon design information.
- Visit dates and specific NWSSG activities you want to attend.
- Justification for visit.
- Telephone number (DSN, if available) of the office that can verify the security clearance and special access.

Section C—Processing Reports and Evaluations

8. Types of Evaluations. DoD Directive 3150.2 describes the types of evaluations the Air Force must conduct at a minimum.

9. Report and Safety Rules Processing. DoD Directive 3150.2 requires prompt report processing.

9.1. HQ AFSA/SEN prepares the NWSSG report and, within 3 weeks of completing the study, sends it to HQ USAF/SEC for the Air Staff's approval. The report may include proposed safety rules.

9.2. The Air Staff reviews the report within 3 weeks of its arrival at HQ USAF/SEC.

9.3. HQ AFSA/SEN publishes the final NWSSG report within 2 weeks of the Air Staff's approval.

9.4. HQ USAF/SEC sends any Air Staff-approved rules package to DNA for coordination.

9.5. After DNA action, HQ USAF/SEC sends the rules package to the Joint Staff (JS) for approval.

9.6. The JS requests approval from the SECDEF.

9.7. The SECDEF's staff reviews the proposed rules and requests DOE coordination.

9.8. The JS receives notification of the SECDEF's decision and advises the Air Staff.

9.9. HQ USAF/SEC notifies the appropriate agencies of the SECDEF's approval. *Note: To avoid incomplete or erroneous transmission, don't send a complete set of approved safety rules electronically.*

9.10. The Air Force publishes the approved safety rules in an Air Force instruction within 6 weeks of the SECDEF's approval.

Section D—Supporting Documents and Briefings

10. NWSSG Report. An NWSSG report is an executive summary of NWSSG proceedings. It is not a technical or engineering source document. DoD Directive 3150.2 contains the basic report format.

11. Technical Nuclear Safety Analysis (TNSA). The TNSA is an independent technical analysis of the nuclear weapon system.

11.1. Personnel who prepare the TNSA may not represent organizations directly responsible for designing, developing, producing, maintaining, operating, or providing logistics for the weapon system under evaluation.

11.2. The TNSA:

- Describes the weapon system in depth.
- Has a safety and security compliance matrix that shows how weapon system features meet the DoD Nuclear Weapon System Safety Standards (see **Attachment 1**).
- Contains a comprehensive engineering analysis of the weapon system design.
- States how the weapon system does or does not meet the DoD Nuclear Weapon System Safety Standards in both normal and credible abnormal environments.

- Identifies deficiencies and recommended corrective actions for the weapon system to comply with AFI 91-107, *Design, Evaluation, Trouble-shooting, and Maintenance Criteria for Nuclear Weapon Systems* (formerly AFR 122-10), or DoD Directive 5210.41, *Security Policy for Protecting Nuclear Weapons*, September 23, 1988.
- Assesses physical security features planned for the weapon system. If appropriate, include an examination of security measures for nonfixed site operations, identify security deficiencies, and propose necessary corrective actions.
- Includes a qualitative risk assessment of the weapon's likelihood of violating any of the DoD Nuclear Weapon System Safety Standards or causing plutonium scatter.

11.3. Prepare a preliminary TNSA for phase I of an initial safety study. Prepare a final TNSA for phase II of an initial safety study and a preoperational safety study. **Note: An abbreviated TNSA may be used for a special safety study.** It is limited in scope and only covers the specific study topic.

11.4. Provide a draft TNSA to NWSSG members, technical advisors, and HQ USAF/SEC at least 6 weeks before the NWSSG study. Provide a preliminary or final TNSA no later than 2 weeks before the first NWSSG meeting.

12. Operational Plan Data Document (OPDD). The OPDD is a source document for the TNSA or abbreviated TNSA that tells the NWSSG how the command will operate and maintain the nuclear weapon system.

12.1. The operational command prepares the OPDD. If the OPDD is new or requires change to support an NWSSG study or review, prepare the OPDD in sufficient time to ensure approval and distribution (see paragraph 12.6.) 6 months before the study is scheduled to begin.

12.2. The OPDD describes:

- The nuclear weapon system's concept of operations.
- General operations commonly performed regardless of geographical location.
- Significant variations of the general operations.
- Normal operations in the stockpile-to-target sequence during peacetime, wartime, and periods of increased hostilities.
- Operations conducted under contingency plans.

12.3. Because the OPDD is a planning document, don't prepare it with the same level of detail as an operational plan. Summarize each operation and refer to appropriate documents (if available) for greater detail. Include all desired operational capabilities. Include all desired system capabilities in the OPDD. The weapon system safety rules proposed by the NWSSG may not allow all desired capabilities, but they will not even be considered unless included in the OPDD. Commands can't add operational capabilities after the SECDEF approves the safety rules without an NWSSG study.

12.4. Send HQ AFSA/SENS any current documents or plans referred to in the OPDD.

12.5. The operational command:

- Sends the OPDD to HQ USAF/XOFS for approval, with information copies to HQ USAF/SEC and HQ AFSA/SENS. (HQ AFSA/SENS reviews the OPDD to ensure that the proposed operations will not violate weapon system safety rules.)

- After the OPDD is approved, distributes copies of the document to SA-ALC/NWI, HQ USAF/SEC, HQ AFSA/SENS, and other agencies as deemed appropriate.

12.6. HQ USAF/XOFS:

- Approves or disapproves the OPDD.
- Returns a disapproved OPDD to the operational command for correction and resubmittal, directing the operational command to reaccomplish the review process if necessary or sends an approval memorandum to the operational command.

13. Support Briefings:

13.1. The operational command, development agency, TNSA authors, and contractors brief the NWSSG.

13.2. HQ AFSA/SENS tells the agencies what topics they must cover in the briefing.

Section E—Actions Required on NWSSG Recommendations Approved by the Air Staff

14. Implementing Air Staff-Approved Recommendations:

14.1. The designated action agencies must implement all safety recommendations approved by the Air Staff.

14.2. Each action agency:

- Notifies HQ AFSA/SENS of the agency's office of primary responsibility, telephone number (DSN, if available), and point of contact.
- Sets up a schedule to implement the recommendations.
- Sends HQ AFSA/SENS a status report of NWSSG Studies and Reviews, Recommendations, and Proposed Safety Rules (RCS: HAF-SE[M]9241) by the 15th of January, April, July, and October. Begin reporting after receiving the final NWSSG report and include a schedule for completing each action identified in each recommendation. *Note: This reporting requirement is essential during emergency conditions (continue reporting under precedence C-2, Normal).*
- Asks HQ AFSA/SENS to close the recommendation after implementing the required actions. A recommendation is not closed until HQ AFSA/SENS notifies the action agency in writing.

14.3. HQ AFSA/SENS monitors agency actions and publishes a semiannual status of recommendations.

Section F—Responsibilities

15. Air Force Chief of Safety (HQ USAF/SE). Oversees the Air Force Nuclear Weapons Surety Program.

16. Air Force Chief of Security Police (HQ USAF/SP). Oversees the Air Force Security Program.

17. Office of the Chief of Safety, Ground Safety and Nuclear Surety Division (HQ USAF/SEC):

- Is the Air Force point of contact on nuclear surety matters. (*Note: HQ USAF/XOXJ is the formal point of contact for all JS issues.* SEC forwards requests for action or information from JS, including requests for approval of proposed safety rules, through XOXJ.)
- Monitors all nuclear surety activities and takes part in actions as directed by HQ USAF/SE.
- Coordinates nuclear surety activities within the Air Staff and with other government agencies.
- Staffs NWSSG reports sent for Air Staff approval.
- Obtains DNA coordination on nuclear weapon system safety rules.
- Gives HQ AFSA/SENS the status of proposed safety rules.
- Makes initial notification of approved safety rules.
- Staffs the proposed rules need date for new weapon systems, modified weapon systems, or new or modified operational concepts and informs HQ AFSA/SENS of approved dates. SEC notifies HQ AFSA/SENS of changes to the rules need date.

18. Director of Operations, Directorate of Forces, Space and Nuclear Forces Division (HQ USAF/XOFS):

- Approves or disapproves the OPDD after consulting with appropriate Air Staff offices.
- Sends the approved OPDD to the operational MAJCOM, SA-ALC/NWI, HQ USAF/SEC, and HQ AFSA/SENS. *Note: The approved OPDD or OPDD change is needed at least 6 months before the NWSSG study.*

19. Commander, Air Force Safety Agency (AFSA/CC):

- Manages the safety evaluation process.
- Directs HQ AFSA/SEN to appoint the NWSSG Chair, Executive Officer, project officers, nuclear surety assistant; and selected technical advisors and to provide administrative support.

20. Commander, Air Force Security Police Agency. Designates a full-time NWSSG member to represent HQ USAF/SP interests.

21. The NWSSG Support Staff:

- 21.1. Ensures that the NWSSG conducts the scheduled studies and reviews.
- 21.2. Schedules NWSSG evaluations and coordinates support with appropriate agencies, and publishes a quarterly NWSSG schedule. The NWSSG Chair convenes the evaluations according to the schedule.
- 21.3. Prepares the draft report for NWSSG evaluations.
- 21.4. Sends NWSSG recommendations and proposed nuclear weapon system safety rules to the Air Staff for coordination.
- 21.5. Maintains the status of proposed nuclear weapon system safety rules.
- 21.6. Reviews weapon system modifications, changes in operational procedures, or proposed tests to determine if nuclear surety is affected. The support staff requests an OPDD or OPDD change and schedules an NWSSG study when nuclear surety is affected.

21.7. Budgets all NWSSG field trips. *Note: Each command must budget for temporary duty expenses in support of NWSSG activities other than field trips.* The Chair determines funding requirements if an NWSSG study calls for additional expertise.

21.8. Serves as the Air Force focal point for DOE field reviews of nuclear weapon system safety rules.

21.9. Publishes a semiannual report containing the status of NWSSG recommendations.

21.10. Assigns an Air Force member to nuclear safety studies or operational safety reviews conducted by other military Services if the Air Force also uses the weapon system under evaluation.

22. MAJCOM:

22.1. Ensures that MAJCOM-developed procedures comply with approved nuclear weapon system safety rules and agree with Air Force-approved operational and technical procedures.

22.2. Evaluates proposed modifications, procedural changes, tests, or other activities involving nuclear weapons and then takes one of the following actions:

22.2.1. Proceeds with the modification, procedural change, or test after coordinating with the appropriate engineering organizations to verify that nuclear surety isn't affected.

22.2.2. Sends evaluations to SA-ALC/NWI (with an information copy to HQ AFSA/SEN) for further analysis when unable to determine the nuclear surety status.

22.2.3. Proceeds with the modification, procedural change, or test when SA-ALC/NWI doesn't recommend a special safety study.

22.2.4. Revises the OPDD and requests a special safety study when recommended by SA-ALC/NWI or when the MAJCOM determines a special safety study is appropriate.

22.2.5. Requests an NWSSG evaluation for reasons other than those listed here. Fully explain the request to HQ AFSA/SENS. SENS determines the need, scope, and priority of the proposed evaluation.

22.2.6. Proposes a rules need date, including a justification, to HQ USAF/SEC.

22.2.7. Designates an individual to serve as an NWSSG member consistent with paragraph **5.1**.

22.2.8. Provides SA-ALC/NWI or OL-EL/ELO the technical support and data needed to prepare the TNSA or abbreviated TNSA.

22.2.9. Provides required support to HQ AFSA/SEN and the MAJCOM's NWSSG voting member.

22.2.10. Hosts and arranges NWSSG field trips to MAJCOM facilities and supports HQ AFSA/SEN on DOE field reviews.

22.2.11. Implements Air Staff-approved NWSSG recommendations.

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Chief of Safety

Attachment 1

SAMPLE FORMAT FOR DOD NUCLEAR WEAPON SYSTEM SAFETY STANDARDS MATRIX

We are submitting the F-15E/B61 Safety Compliance Matrix according with AFI 91-102, *Nuclear Weapon System Safety Studies, Operational Safety Reviews, and Safety Rules*. The matrix indicates features of the weapon system that meet the intent of particular DoD Nuclear Weapon System Safety Standards (**Figure A1.1**). We cover physical security (4th standard) in a separate supplement to the Technical Nuclear Safety Analysis.

The matrix analyzes eleven types of positive nuclear safety features or measures:

1. Power Isolation.
2. Signal Characteristic.
3. Electrical Isolation.
4. Mechanical Restraint.
5. Reversibility.
6. Two-Person Concept Control.
7. Monitor.
8. Code Entry.
9. Data Control.
10. Environmental Parameter.
11. Personnel Reliability Program Control.

The matrix shows how to apply types 1 through 11 in 5 phases of system operations on the ground and in flight, as affected by aircraft power, logic power, aircraft monitoring and control (AMAC) power, AMAC state, and release state. A number in bold, italicized type indicates primary means of control. A dash indicates "not applicable."

Figure A1.1. Safety Compliance Matrix.

DoD Standard Concern	Loading	A Ground-Power OFF	B Ground-Logic OFF	C Ground-Safe AMAC ON	D Flight-Safe/ LOCKED	E Flight-Arm/ UNLOCKED
Accidental Yield (1st Standard)	<i>1 2 3 --</i> ---- 10 -	<i>1 2 3 --</i> ---- 10 -	- <i>2 3 --</i> ---- 10	- <i>2 3 --</i> <i>6 - 8 - 10</i> -	- <i>2 3 --</i> ---- 10 -	---- <i>5</i> ---- 10 -

DoD Stan- dard Concern	Loading	A Ground-Power OFF	B Ground-Logic OFF	C Ground-Safe AMAC ON	D Flight-Safe/ LOCKED	E Flight-Arm/ UNLOCKED
Unauthorized Prearm (2d Standard)	<i>1 - - - - 6 - - - - 11</i>	<i>1 - - - - 6 - - - - 11</i>	<i>- - 3 - - 6 - - - - 11</i>	<i>- - - - - 6 7 8 - - 11</i>	<i>- - - - - 6 7 8 - - -</i>	<i>- - - - - - - - - - -</i>
Unauthorized Release (2d Standard)	<i>1 - - - - 6 - - - - 11</i>	<i>1 - - 4 - 6 - - - - 11</i>	<i>- - 3 4 - 6 - - - - 11</i>	<i>- - - 4 5 6 7 - - - 11</i>	<i>- - - 4 5 6 7 - - - 11</i>	<i>- - - - - - - - 9 - 11</i>
Inadvertent Prearm (3d Standard)	<i>1 2 3 - - - - - - - -</i>	<i>1 - - - - - - - - - -</i>	<i>- - 3 - - - - - - - -</i>	<i>- 2 3 - 5 6 7 8 9 10 -</i>	<i>- 2 3 - 5 6 7 8 9 - -</i>	<i>- - - - - - - - - - -</i>
Inadvertent Release (3d Standard)	<i>1 - 3 4 - 6 - - - - -</i>	<i>1 - - 4 - - - - - - -</i>	<i>- - 3 4 - - - - - - -</i>	<i>- - 3 4 5 6 7 - 9 - -</i>	<i>- - 3 4 5 6 7 - 9 - -</i>	<i>- - - - - - - - 9 - -</i>
NOTE: This example is adapted from as actual matrix for illustrative purposes only.						