





AL F 5635.8  
(04/82)

USDOE ALO

DOCUMENT(S) ATTACHED HERETO CONTAIN **SECRET** INFORMATION

**ACCOUNTABILITY RECORD**  
( SECRET DOCUMENTS )

**UNCLASSIFIED**

FROM: (PERSON &/OR ORGANIZATION)  SNLA	DOCUMENT DATE  920115	REGISTRY #  175 IT 4	DOCUMENT NO.  19 2-3219	PAGE 1
--	-----------------------------	----------------------------	-------------------------------	--------

DESCRIPTION: (SUBJECT OR TITLE, TYPE, CLASSIFICATION, DOCUMENTATION)

1/1A, 1/1B, 4OPGS EA., SECRET HD, RS2140/92/00001,  
FINAL DEVELOPMENT RPT FOR THE B61-7 BOMB (U)

CHARGED TO: (ORGANIZATION)	COPY #	DATE SENT:	
OIE	1/1A	5 920811	FOIA 91-349-J
OIE	1/1B	5 920811	





~~SECRET~~

RS 3140/92/00001

UNCLASSIFIED

COPY

COPY

TABLE I

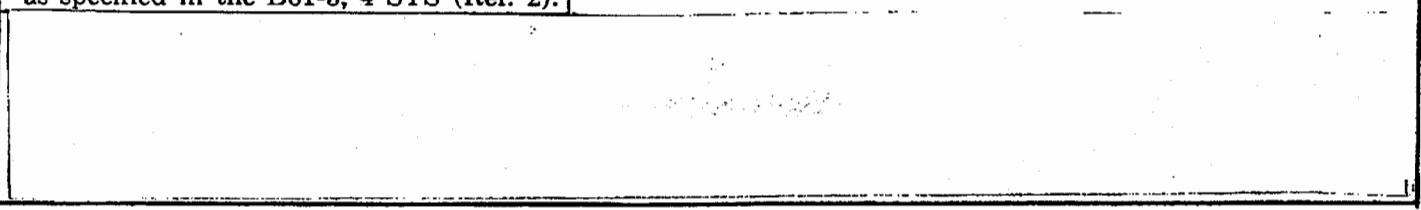
<u>System</u>	<u>Ø 3</u>	<u>Ø 6</u>	<u>Normal Env.</u>	<u>Abnormal Env.</u>
W25 (GENIE)	11/54	1/57		
W28 (HOUND DOG)	8/54	8/58		
B28 EX & RE	8/54	8/58		
B28 FI	9/60	7/62		
B43	10/56	2/60		
B53	12/58	8/62		
B57	1/60	1/63		
B61-0, 1, 2	1/63	1/68		
W69 (SRAM)	1/67	2/72		
W72 (WALLEYE)	5/69	9/70		

DoD  
(b)(3)

- Note 1: Fire only abnormal environment specified.
- Note 2: In the absence of input signals except normal monitor and control.
- Note 3: Fire and shock only abnormal environments specified.
- Note 4: Fire, shock, F-4 aircraft crash, fragmentation, nuclear radiation, lightning, and flooding specified as abnormal environments.

The W25 and W69 warhead each contain a single environmental sensing safety feature, an integrating accelerometer. The W28 warhead contains no environmental sensing safety feature. It does contain a 28 volt DC motor-driven high-voltage safing switch, controlled by aircraft power. The W72 warhead contains a single environmental sensing safety feature, a velocity-sensing differential pressure switch.

Each of the bombs contains one active environmental sensing safety feature for each option; integrating accelerometers, velocity-sensing differential pressure switches, or hydrostats (B57, ASW). In addition, they each contain one or two 28 volt DC motor-driven safing switches, controlled by aircraft power. None of these safety switches (Ready/Safe and Environmental Sensing), with the exception of the W69 ESD, have any hardening features which would help to assure safety during exposure to abnormal environments. All of the 28 volt DC safing switches will arm if supplied with typical aircraft stray voltages and currents through fault circuits in the aircraft as specified in the B61-3, 4 STS (Ref. 2).



In summary, all of the current stockpile of aircraft delivered weapons (and the B61-2 entering stockpile this fiscal year) have serious shortcomings when evaluated against current abnormal environment nuclear safety standards. These shortcomings stem from the inability of existing safing devices to assure the maintenance of a predictably safe state through exposure to abnormal environments, the possibility of these safing devices being electrically bypassed through charred organic plastics or melted solder and finally the susceptibility of the safing devices themselves to premature operation from stray voltages and currents which may be present in the abnormal environments.

COPY

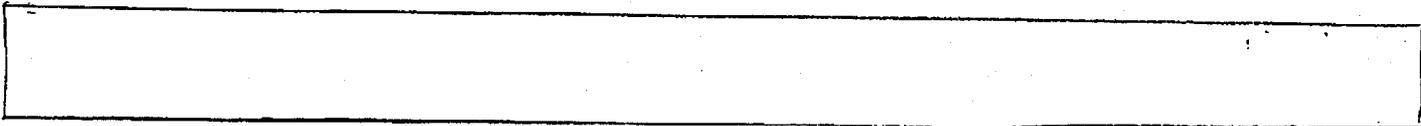
COPY

~~SECRET~~ UNCLASSIFIED

5  
02

~~SECRET~~ UNCLASSIFIED

(S)



It appears that the safety of the aircraft delivered stockpile could be greatly improved over the next decade in the following manner:

1. Retire the following weapons or retrofit them with two independent safety devices utilizing the strong link/weak link concept:
  - W25 (GENIE)
  - W28 (HOUND DOG)
  - B57 (ASW)
  - B53
  - B61-0, 1, 2
  - W69 (SRAM)
  - W72 (WALLEYE)
2. Replace the following weapons as indicated:
  - B28 EX/RE - Replace with B61-3,4,5 and B77
  - B28 FI - Replace with B77
  - B43 - Replace with B61-3,4,5 and B77
  - B57 (TAC) - Replace with new FUFO MRR and/or NATO bomb

(S)



As you pointed out in our conversation earlier this month, a plan to modernize or replace the aircraft-delivered weapons to improve safety is a subset of a broader stockpile modernization and retirement plan. Perhaps the urgency associated with the safety question will serve to stimulate the effort associated with the overall plan. We will be glad to help in any way we can either with the abnormal environment safety plan or with the broader question.

/s/Glenn A. Fowler

CCB:1511:ps

RS 1000/4465, Series A, SRD, 6 pages, 12 copies

Distribution:

- 1 - M1382 Maj. Gen. Graves, DMA
- 2 - M0828 R. E. Batzel, LLL
- 3 - M0828 H. L. Reynolds, LLL
- 4 - M0801 T. B. Cook, Jr., 8000
- 5 - M0737 H. M. Agnew, LASL
- 6 - M0737 E. H. Eyster, LASL
- 7 - M0659 H. C. Donnelly, ALO
- 8 - M0659 W. R. Cooper, ALO, Office of Plans & Budgets
- 9 - M0659 J. F. Burke, ALO
- 10 - M0659 T. C. Jones, ALO
- 11 - 1 Morgan Sparks
- 12 - 1000 G. A. Fowler

COPY

COPY

6  
100

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

RS1000/4465, Series B, SRD, 6 pages, 7 copies, November 15, 1974

Series B Distribution:

Series 7230-C - THIS IS AN EXACT COPY:2/12/85:

1 - 5100 R. N. Brodie

1 - M0801 L. Gutierrez, 8100

2 - 1500 R. L. Peurifoy, Jr.

3 - 1520 G. J. Hildebrandt

4 - 1600 H. E. Lenander

5 - 1650 W. L. Stevens

6 - 2000 K. D. Bowers

7 - 9500 L. J. Heilman

COPY

UNCLASSIFIED  
~~SECRET~~

COPY

7  
10

~~SECRET~~ UNCLASSIFIED

COPY

ATTACHMENT I

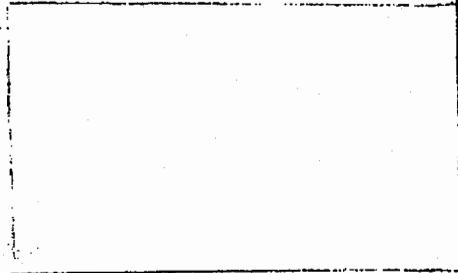
COPY

AMAC/BOMB FAULTS

Summary (1961-1974)

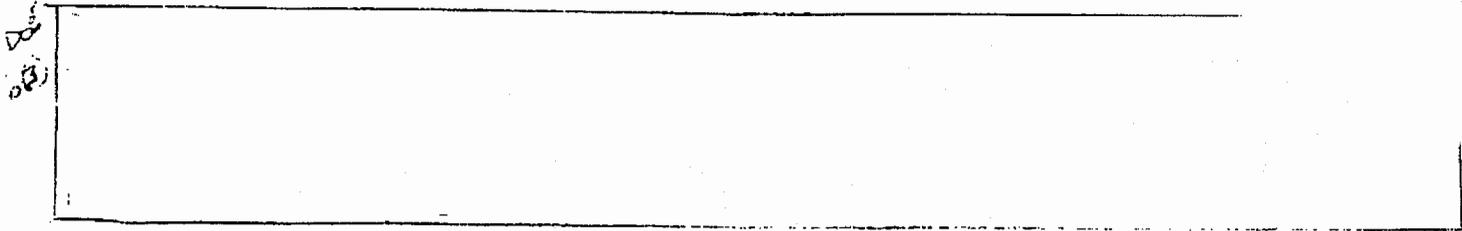
Number of Occurrences  
 Number of Bombs Involved  
 Operation of R/S Switch  
   Ready  
   Intermediate  
 Other Than R/S Switch Operation  
 Weapons Not Affected

DOE  
b(3)



W25 (AIR-2A) INCIDENTS

1963-64



COPY

COPY

8  
102

~~SECRET~~ UNCLASSIFIED







~~SECRET~~ UNCLASSIFIED

COPY

COPY

Distribution

Distribution:

- M1382 - DMA, Maj. Gen. J. K. Bratton, w/enc., copy 2
- M1382 - DMA, Ralph E. Caudle, w/enc., copy 3
- M1382 - DMA, Wayne L. Beech, w/enc., copy 4
- M0759 - ATSD/AE, D. R. Cotter, w/encs., copies 5 & 6
- M0659 - ALO, H. E. Roser, w/enc., copy 7
- M0659 - ALO, V. Berniklau, w/enc., copy 8
- M0659 - ALO, V. Vespe, w/enc., copy 9
- M0659 - ALO, T. C. Jones, w/enc., copy 10
- M0737 - LASL, H. C. Hoyt, w/encs., copies 11 & 12
- M0828 - LLL, H. L. Reynolds, w/encs., copies 13 & 14
- M0801 - SLL, T. B. Cook, 8000, Attn: A. N. Blackwell, w/enc., copy 15
- M0801 - SLL, L. Gutierrez, 8100, w/enc., copy 16
- M0801 - SLL, B. F. Murphey, 8300, w/enc., copy 17
- 2 - W. J. Howard, Attn: C. Winter, w/enc., copy 18
- 1300 - D. B. Shuster, w/enc., copy 19
- 4320 - G. J. Hildebrandt, w/enc., copy 20
- 4360 - J. A. Hood, w/enc., copy 21
- 4370 - B. E. Arthur, Jr., w/enc., copy 22
- 4371 - R. N. Brodie, w/encs., copies 23 thru 27
- 4300 - R. L. Peurifoy, Jr., w/enc., copy 1

COPY

COPY

112  
102

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

November 30, 1977

(Excerpted from)

**AN EXAMINATION OF THE  
U. S. NUCLEAR WEAPON INVENTORY**

**R. N. BRODIE**

COORDINATION DRAFT  
WORK IN PROGRESS

**ATOMIC WEAPON DATA  
PRODUCTION AND STOCKPILE INFORMATION**

COPY

COPY

~~SECRET~~

13  
102

~~SECRET~~ UNCLASSIFIED

COPY

COPY

FY 79: P&PD Plan [Redacted] ← DOE (b)(3)

Weapon	Action	Quantity	Priority	Type
B28FI	Interim - Enhanced Electrical Safety Mod [Redacted] ← DOE (b)(3) Replaced by B77 FY82-85	[Redacted]	1	Field Retrofit
W25 (Genie)	Change Safety Rules to Prevent Peacetime Loading Use Retired Denuclearized Warheads for Training		1	Factory (Pantex)
B53	Remove from Normal Peacetime Alert		1	Administrative
B61-2	Upgrade to B61-5 Configuration All [Redacted]		2	Field Retrofit
W53 (Titan II)	Enhanced Electrical Safety Mod [Redacted] ← DOE (b)(3)		2	Field Retrofit
W70 (Lance)	[Redacted] Mod 0, -1's to -2 Configuration with Enhanced Electrical Safety Mod		2	Factory Rebuild

FY 80: P&PD Plan [Redacted] ← DOE (b)(3) ← DOE/DoI (b)(3)

Weapon	Action	Quantity	Priority	Type
B28FI	Complete Enhanced Electrical Safety Mod	[Redacted]	1	Field Retrofit
W31 (Nike Herc)	[Redacted] Enhanced Electrical Safety, MCCS, & Non-Violent Command Disable		1	Field Retrofit
B61-1	[Redacted] Include Enhanced Electrical Safety, IHE, MCCS, and Non-Violent Command Disable (B61-X, High Yield) ← DOE (b)(3)		2	Factory Rebuild
B61-0	[Redacted] to B61-X		2	Factory Rebuild
B61-2	Complete Upgrade to B61-5		2	Field Retrofit
W53 (Titan II)	Complete Enhanced Electrical Safety Mod		2	Field Retrofit
W70 (Lance)	Complete Upgrade to W70-2 Configuration With Enhanced Electrical Safety		2	Factory Rebuild

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

Department of Energy  
Albuquerque Operations Office  
P. O. Box 5400  
Albuquerque, New Mexico 87115

Major General Joseph K. Bratton, USA /  
Director of Military Application, HQ

### EXECUTIVE SUMMARY, "STOCKPILE MODERNIZATION STUDY"

The subject report documents a DOE study which examines the U. S. nuclear weapon inventory and recommends specific weapon modernization programs. The study was undertaken in the broad context of maintaining a viable and credible nuclear deterrent force capable of supporting a wide range of options. Although the nuclear weapon stockpile has been relatively stable over the last 15 years with theater weapons being essentially fixed, the technology associated with threat scenarios and our understanding of the threats, have made substantial advancements. Therefore, the thrust of the study and the resulting recommendations recognize a growing conviction on the part of DOE that unless greater attention is paid to adjusting the stockpile to meet more rigorous demands of safety, security, and command control, concerns about the present adequacy of these features could bring about constraints on our nuclear posture and reduce its deterrent value.

The study used as a planning base the joint DOD/DOE stockpile projection provided to ALO via P&PD 78-0. It was presumed that unlimited resources would not be available for complete stockpile modernization and, therefore, a methodology was required for setting priorities and proposed corrective actions. Goals, objectives and priorities were defined in terms of DOE's understanding of national policy and consequences. The presently projected nuclear stockpile was evaluated on a weapon-by-weapon basis to establish a priority of concern according to:

- Military use-related deficiency(ies),
- Consideration of the exposure to potential safety, security, command control problems and the susceptibility of the weapon to those problems, and
- The degree that national policy would likely be affected.

For example, a nuclear weapon could be susceptible to electrical fault signals when mated to a missile. Concern for this susceptibility could be moderated if the weapon was not mated to a carrier missile in peacetime, or increased if it was mated to a missile on continuous alert. The deployment conditions and location of the alert missile could also moderate or increase the likely degree of national implications, e.g., a missile deployed underground in an isolated CONUS area versus deployed above ground near a politically sensitive NATO population center. The physical susceptibility of individual weapons to various environments used in the study were those determined by DOD/DOE technical working groups chartered during the joint stockpile safety study and the JCS stockpile improvement study.

In formulating the proposed modernizing action program, full account was made of the new nuclear weapon production currently planned. For example, the enhanced electrical safety retrofit of the B28FI strategic bomb recommended in the plan falls short of an adequate long-term solution for the concerns associated with air-carried strategic alert weapons. Instead, the B28FI retrofit is intended as an interim improvement until a modern strategic high yield bomb which meets all strategic alert requirements is available. Also, not all existing B28FI's may need to be retrofitted since only the weapons on actual alert create the combined susceptibility/high exposure environment.

This quantity may vary depending on the future alert requirement mix of B28's and Modern Strategic Bombs.

Inherent in trying to limit the proposed modernization actions to a prudent minimum is an assumption that not all units of a weapon system or a class of weapons have to be modified to provide a substantial improvement in posture.

~~SECRET~~  
UNCLASSIFIED

15  
102

~~SECRET~~ UNCLASSIFIED

In any case, only a portion of the B57 stockpile should be modernized; the remainder should be withdrawn to main operating bases for storage under optimized security conditions.

The proposed modernization program for the existing nuclear weapons extends over the next eleven years—a period of high anticipated production and, as a result, limited capacity. Because of this potential limitation, many of the highest priority concerns can be addressed through field retrofit kits which minimize capacity impact. Modifications to upgrade existing B61 bombs have been defined in detail and make maximum use of existing hardware now in production. While many of the other modernization proposals could utilize existing hardware, the production complex constraints require an execution time scale that could allow a more studied approach to the selection of candidate replacements similar to the normal Phase 2 and 3 development process.

Resource constraints seem to dictate a natural division of the proposed modernization program into two parts. The first consists of those actions which we are able to define in detail at this time and the second, those remaining actions that cannot be accommodated under current planning and assumptions in the production complex until the mid-80's. It should be noted that operating requirements to support the recommended modernization have not been requested or included in the budget requirements submitted to MA.

The initial program (listed by priority established in the report) which can be approved and implemented immediately consists of:

- 1. [redacted] B28FI strategic bombs for enhanced abnormal environment nuclear safety.
- 2. [redacted] W25 Genie warheads for training and mass loading usage in lieu of using War Re-
- 3. [redacted] W31 Honest John [redacted] Nike Hercules (if required) missiles for enhanced abnormal environment nuclear safety and a multicode command control system (an integral command disable retrofit is likely not feasible).
- 4. Preparation for factory retrofit of B61-0 and 1's to B61 Mod X version [redacted] with IHE, enhanced electrical safety, modern PAL and command disable. This preparation can consist of producing "preproduction kits" in anticipation of released capacity at Pantex because of WR program slips or workload leveling schedule manipulations. If released capacity at Pantex does not materialize, these kits will be incorporated when the capacity is generated by the study's recommendation on capital funding.
- 5. Preparation for factory retrofit of B61-2 and 5's to B61 Mod Y version [redacted] with IHE, enhanced electrical safety, modern PAL and command disable. This recommendation also would require "preproduction kits."

Doc (b)(3)

Doc/Dod (b)(3)

A tabular summary of the total modernization program is presented in Enclosure 1.

While it is recommended that the initial modernization program begin with the actions defined above, the remaining program should be approved or endorsed in principle in order to program for the necessary R&D design definition and capacity related production requirements.

Herman E. Roser  
Manager

WPW:NSD

Enclosures:

- 1. Table, "Modernization Program," SRD
- 2. Report, "Stockpile Modernization Program," SRD

COPY

COPY

16

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

Maj. Gen. Bratton

Distribution:

- 1A - Maj. Gen. Joseph K. Bratton, USA, Director of Military Application, HQ, w/cy. 1/15A encls. 1 & 2
- 2A - R. E. Caudle, MA, HQ, w/cys. 2, 3, 4, 5/15A encls. 1 & 2
- 3A - R. E. Batzel, Director, LLL, Attn: H. L. Reynolds, w/cy. 6/15A encls. 1 & 2
- 4A - H. M. Agnew, Director, LASL, Attn: H. C. Hoyt, w/cy. 7/15A encls. 1 & 2
- 5A - T. B. Cook, Jr., Vice President, SLL, Attn: R. D. Cozine, Org. 8160, w/cy. 8/15A encls. 1 & 2
- 6A - Morgan Sparks, President, SLA, Attn: R. L. Peurifoy, Jr., Org. 4300, w/cy. 9/15A encls. 1 & 2
- 7A - Herman E. Roser, Manager, Albuquerque Operations Office, w/cy. 10/15A encls. 1 & 2
- 8A - V. V. Berniklau, Director, Resources Management Division, ALO, w/cy. 11/15A encls. 1 & 2
- 9A - H. A. Weber, Acting Director, Weapons Development Division, ALO, w/cy. 12/15A encls. 1 & 2
- 10A - J. R. Roeder, Director, Operational Safety Division, ALO, w/cy. 13/15A encls. 1 & 2
- 11A - G. A. Haugitz, Director, Quality Assurance Division, ALO, w/cy. 14/15A encls. 1 & 2

Series B - THIS IS AN EXACT COPY:4300:ew:8/30/78 (permission granted by N. S. Dienes, WPD/ALO)

Distribution:

- 1 - 1200 L. D. Smith
- 2 - 2000 E. D. Reed
- 3 - 3200 C. R. Barncord
- 4 - 4300 R. L. Peurifoy, Jr.
- 5 - 9500 L. J. Heilman

COPY

COPY

~~SECRET~~  
UNCLASSIFIED

17

~~SECRET~~ UNCLASSIFIED

COPY

COPY

DEPARTMENT OF DEFENSE  
MILITARY LIAISON COMMITTEE  
TO THE  
DEPARTMENT OF ENERGY  
WASHINGTON, D. C. 20301

20 March 1979

Major General Joseph K. Bratton  
Director of Military Application  
Department of Energy  
Washington, D. C. 20545

Dear General Bratton:

(U) In response to your September 22, 1978, letter concerning the stockpile modernization program, we strongly support the goal of improving the overall safety and security of nuclear weapon systems and the incorporation of enhanced safety and security features where appropriate.

(U) Modernization should emphasize:

- The incorporation of modern safety and security features in new weapons as a first priority; and
- The modification of current systems on a non-interference basis with new weapon production and under a system of priorities which considers the operational/basing modes of the systems and their projected service life.

(C) Based on these criteria, specific modifications for those systems recommended for improvement were made considering previous safety evaluations, recommendations by each Service, ongoing long term theater nuclear force and strategic weapon system modernization studies, and short term deployment goals. For consistency, the Goals, Definitions, and Priority Level Descriptions provided in your study have been used as a framework for the recommended safety and security improvements.

(S) In reference to the recommended DoE/DoD guidelines concerning DoD weapon system modifications, there are ongoing efforts to incorporate Unique Signal Generator (USG) aircraft monitor and control (AMAC) units in aircraft to be compatible with those weapons with USG strong links.

(S) (U)

[Redacted]

Although we realize that the safety goal ( $1 \times 10^{-6}$  probability of a detonation in an abnormal environment) cannot be guaranteed during operational circumstances, the USG feature will be used during the majority of the stockpile-to-target sequence thereby obtaining the safety goal during a major portion of the credible abnormal environment scenarios.

(U) Specific weapons recommended for modernization are at Appendix A. Included are the scope of the modernization, the number of weapons suggested for modification, and relative priorities.

(C) I concur in the proposed modifications for the B28FI and B61 bombs. The recommended number of weapons to be modified has been changed to coincide with current requirements for both systems.

(C) Modifications are also recommended for the W31 (for both the HONEST JOHN and NIKE HERCULES) and the B54. However, these modifications differ from those recommended in your study. Resolution of these differences is necessary before actual modifications are programmed and funded. In particular, we need to assure adequate security protection.

18

~~SECRET~~ UNCLASSIFIED

UNCLASSIFIED

~~SECRET~~

RS 3140/92/00001

COPY

COPY

(SFRD) The Navy and the Air Force have extended the requirement for a limited number of B43Y1 bombs through at least the late 1980s. Modifications similar to that proposed for the B28FI should be considered.

(CFRD) Denuclearizing of W25 warheads is not required; a modification to improve the electrical safety of retained W25s is recommended.

(CFRD) Due to the ongoing Navy/DoE Phase 1 nuclear ASW weapon system study and the Air Force/DoE Phase 2 feasibility study for the ASALM, proposed modifications for the B57 depth bomb, W44 (ASROC), W55 (SUBROC), and the W69 (SRAM) should be held in abeyance pending completion of these studies. Proposed modifications to the W70 LANCE should not be considered at this time pending an Army/DoE feasibility study to address the alternative of modernizing the LANCE or replacing it with a follow-on system. The Army is currently drafting a Mission Element Need Statement for a Corps Support Missile System. Modifications to the tactical B57 are not recommended at this time. The potential risk to the B57 will be reduced as tactical alert requirements are satisfied with B61 bombs. However, safety and security improvements to the B57 will be considered if continued deployment, particularly in an overseas environment beyond the 1980s, is necessary. A summary and rationale for those systems which are not recommended for modernization at this time are in Appendix B.

(SFRD) Current DoD policy pertaining to emergency destruct and emergency disablement is being reviewed. Meanwhile, we are continuing to evaluate emergency disable capabilities. It is requested that you continue in your effort to determine the cost and feasibility of providing disablement capabilities for theater weapon systems to include remote arming and activation. It is also requested that the DoE, jointly with DoD, determine the potential to integrate such a capability with the planned physical security equipment command, control, and communications network.

(S) To insure that this program is being pursued in an effective manner, the status of the modification effort should be jointly reviewed at least yearly, preferably prior to the annual budget submissions. This will provide the opportunity to make appropriate changes to requirements or to consider the impact on production or costs. Accordingly, the DoD recommends and supports the modernization program outlined in Appendix A subject to resolution of the differences in the W31 and B54 modifications and, when developed, a review of the costs and feasibility assessment associated with DoD changes to your modernization proposal for the W25, B43, and B53. Based on the DoD recommendations, your modification capability (rate/timing) is requested.

(U) I suggest our staffs recommended and arrange for the appropriate program reviews. My action officer for these matters is Major Jerry Davis, 695-1097.

Sincerely,

/s/James P. Wade, Jr.

James P. Wade, Jr.  
Chairman

Enclosures 2

1. Appendix A - Modernization Program (SRD)
2. Appendix B - Summary of Systems Not Recommended for Modernization (SFRD)

COPY

COPY

~~SECRET~~

317  
12

~~SECRET~~ UNCLASSIFIED

COPY

COPY

APPENDIX A

Modernization Program

Recommended Systems (Priority Ordered)	Modifications Desired	Modifications Required	Schedule	Comments
B28F1 (Strategic Bomb)	Field retrofit for enhanced electrical safety. Replace HVTB and high voltage arm/safe switch with low voltage transverter power supply and unique signal strong link switch. [Redacted]	[Redacted]	FY81 <i>DoE (b)(3)</i>	
W25 <sup>1</sup> (GENIE)	Field retrofit for enhanced electrical safety. Replace HVTB with low voltage transverter, redesign arm/safe switch, improve ESD and lightning/EMR immunity features.	[Redacted]	FY81	Feasibility and cost of modifications required. Number and schedule dependent on feasibility and future requirements for new air defense system.
W31 <sup>1</sup> (HONEST JOHN and NIKE HERCULES)	Field retrofit for enhanced electrical safety and improved command and control. Isolate HVTB inputs.	[Redacted]	FY81	Resolution of recommended electrical safety improvements required. Planned Army modifications to NH and MCCS should be considered.
B61-0, 2, 5 (Theater Nuclear Bomb)	Factory rebuild to include IHE, EES, CD, CAT D PAL, and unique signal strong link [Redacted]	[Redacted]	FY83	Schedule dependent on DoE factory capability.
B61-1 (Strategic Bomb)	Factory rebuild to include IHE, EES, CD, CAT D PAL, and unique signal strong link [Redacted]	[Redacted]	FY83 <i>DoE/DoD (b)(3) →</i>	Schedule dependent on DoE capability. Retrofit should not exceed [Redacted]
B54 <sup>2</sup>	Field retrofit to provide a unique signal switch to interrupt ferro-electric transducer output.	[Redacted]	FY83	Resolution of recommended electrical safety improvements required. Alternate methods of providing enhanced command and control features should be investigated.
B43Y1 <sup>1</sup>	Field retrofit for enhanced electrical safety to include unique signal strong link switch [Redacted]	[Redacted]	FY83	feasibility and cost of modifications required.
B53 <sup>1</sup>	Field retrofit for enhanced electrical safety with transverter firing system and unique signal strong link switch [Redacted]	[Redacted]	FY83	Feasibility and cost of modifications required.
W53 <sup>3</sup>	Field retrofit for enhanced electrical safety to include new ESD/power supply/trigger circuit package.	[Redacted]	FY81	Final decision to modify W53 is dependent upon Air Force to determine impact associated with incorporating unique signal capability.

<sup>1</sup>Modification and schedule dependent upon cost and feasibility review.

<sup>2</sup>Resolution of recommended safety improvements required.

<sup>3</sup>Modification and schedule dependent upon Air Force review of incorporating unique signal capability.

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
**UNCLASSIFIED**

RS 3140/92/00001

COPY

COPY

B28FI

PROGRAMMED QUANTITY  
END OF

MODERNIZATION QUANTITY

← DoE/DoD (b)(3) →

MODERNIZATION

Field retrofit as recommended by DoE,

REMARKS

projections the advisability of incorporating MCCS should be considered.

Based on current planning

COPY

COPY

~~SECRET~~





~~SECRET~~ UNCLASSIFIED

COPY

COPY

B61-0, B61-2, B61-5

PROGRAMMED QUANTITY  
END OF

MODERNIZATION QUANTITY

B61-0  
B61-2  
B61-5

[Redacted box for programmed quantity]

[Redacted box for modernization quantity]

← DoE/DoD  
16/37 →  
↓

MODERNIZATION

Factory retrofit to B61-MOD X and B61-MOD Y weapons, as recommended by DoE, [Redacted]

REMARKS

Priority II is appropriate. The order of retrofit, by type, should be B61-2, B61-5, and B61-0. To insure a high degree of theater nuclear force readiness, this retrofit should be accomplished [Redacted] month throughout the duration of the modernization.

Modification should commence in FY83.

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

B61-1

PROGRAMMED QUANTITY  
END OF

[Redacted]

MODERNIZATION QUANTITY

[Redacted]

DoE/DoD  
b(3)  
← →  
↓

MODERNIZATION

Factory retrofit to B61-MOD X weapons as recommended by DoE, but with the addition of hardware to make the modified warheads compatible with non-USG aircraft.

REMARKS

The entire stockpile should be modified and the modification should begin in FY83 (as DoE recommended) but at [Redacted] This is necessary so that the retrofit coincides with B-52D/G/H and FB-111 modifications planned to satisfy SAC Required Operational Capability (ROC) 6-76. An annual review of the status of the aircraft and bomb modifications must be conducted to insure proper phasing of the programs. Continuation of the bomb modification program must be contingent upon continued funding support for the aircraft modification program.

[Redacted]

Modification should commence in FY83.

COPY

COPY

~~SECRET~~  
UNCLASSIFIED

25  
10

~~SECRET~~ UNCLASSIFIED

COPY

COPY

B54 (SADM)

PROGRAMMED QUANTITY  
END OF

[Redacted box]

MODERNIZATION QUANTITY

[Redacted box]

← DoE/1000 →  
5j(3)

MODERNIZATION

[Redacted box]

Incorporate a unique signal switch to interrupt ferro-electric transducer output.

Investigate feasibility of incorporating a remote command disable capability and improved command and control system.

REMARKS

As a result of DoD safety perception and intended deployments, upgraded electrical safety is desired. Evaluation of an internal emergency disablement system should continue within the EDS program.

The DoE proposal to use an MCCS to control access into a steel container containing the B54 would increase the weight and complexity of the system thereby reducing its military utility. Resolution of the recommended safety improvements and continued evaluation to improved command and control features are required.

Modification should commence not later than FY83.

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

B43Y1

PROGRAMMED QUANTITY  
END OF

[Redacted]

Doi/DoD  
(b)(3)

MODERNIZATION QUANTITY

[Redacted]

MODERNIZATION

Field retrofit for enhanced electrical system including unique signal prearming

[Redacted]

Doi/DoD  
(b)(3)

REMARKS

Navy storage of the B43Y1 will be limited to igloos in U. S. and/or to shipboard below-deck magazines. Use of modernized strategic bombs in the tactical role as a replacement may prove feasible.

Doi/DoD  
(b)(3)

[Redacted]

In consideration of the small quantity of weapons and their limited storage, cost and feasibility of the proposed modification is required.

COPY

COPY

~~SECRET~~

**(SECRET UNCLASSIFIED)**

COPY

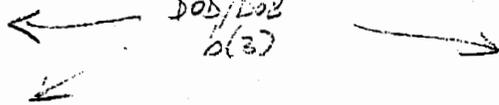
COPY

B53

PROGRAMMED QUANTITY  
END OF

[Empty rectangular box]

*DoD/DoS  
2(3)*



MODERNIZATION QUANTITY

[Empty rectangular box]

MODERNIZATION

Field retrofit to include changing chopper converter to a transverter firing system and strong link intent switch

REMARKS

Modifications dependent on cost and feasibility study. The advisability of incorporating MCCS should be considered.

COPY

COPY

**(SECRET UNCLASSIFIED)**

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

W53

PROGRAMMED QUANTITY  
END OF


MODERNIZATION QUANTITY

--

← DoE/DoD  
b(3) →

MODERNIZATION

Field retrofit to include a unique signal (trajectory) ESD and associated strong link switch transverter power supply and firing trigger circuits as recommended by DoE.

REMARKS

Final determination on the modification and schedule dependent upon Air Force review of incorporating unique signal capability in the launch control facility.

COPY

COPY

~~SECRET~~

29  
12

~~SECRET~~ UNCLASSIFIED

COPY

COPY

## APPENDIX B

Summary of Systems not Recommended  
for Modernization\*

System	Reason
W70 MODs 1, 2, 3	Army feasibility study to consider the alternatives of modernizing the LANCE or replacing it with a follow-on system. Army MENS for a Corps Support Missile System is being drafted.
B57 TAC	Tactical alert requirement to be satisfied by B61s. System should continue to be reviewed.
B57 DB	Navy/DoE ASW Phase 1 Study.
W44 ASPOC	Navy/DoE ASW Phase 1 Study.
W55 SUBROC	Navy/DoE ASW Phase 1 Study.
W69 (SRAM)	Air Force Safety Feasibility Review and Air Force/DoE ASALM Phase 2 Study.
W33	Replacement.
W45 (MADM)	Retirement.
W45 TERRIER	Replacement, modification or retirement should continue to be reviewed.
W48	Replacement.
W50	Replacement.
W56, W58, W62, W68, W76, W78	Safety and security such that replacement, modification or retirement should continue to be reviewed.

\*Modernization to enhance safety and security for these systems is not recommended at this time due to production/retirement projections and exposure levels. These systems should be reconsidered in conjunction with the periodic review of the ongoing program.

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

G. C. Dacy  
President

Sandia National Laboratories  
Albuquerque, New Mexico 87185

Maj. Gen. William W. Hoover  
U.S. Department of Energy  
Office of Military Application  
Washington, D.C. 20545 (M1382)

Subject: Stockpile Improvement Program (U)

In August 1978, reference 1 recommended nuclear-detonation safety and radioactive-material-scatter safety upgrades for selected stockpiled weapons with high exposure to possible abnormal environments and with potentially troublesome responses to those environments. In April, 1979, with DOD concurrence (Ref. 2), we initiated development activity on the B28FI aimed at providing field retrofit kits to enhance the nuclear-detonation safety of that weapon. Although delayed one year because of production funding problems, the design is now complete. In addition to enhanced nuclear-detonation safety, the refurbished B28FI will incorporate a Category D PAL, improved EMR/EMP resistance, and a "hot drop" feature which requires aircraft power at release. More recently, because of capacitor reliability concerns we and BKC have added a provision to screen returned firing sets at BKC. I understand that BKC expects first kit shipment to the Air Force in April 1983 on schedule.

Development start-up on the W31 was delayed at DOD's request pending the resolution of differences between the DOE proposal and the Army's recommendations (Ref. 2). A joint Army/DOE study was chartered to resolve these differences, and this group provided recommendations to the Army Staff in September 1979. The Army staff responded in October 1980. This apparent lack of interest by the Army coupled with other demands placed on our weapon development activities during the intervening 21 months prior to the receipt of reference 3 have caused us to commit fully our weapon development resources through FY 1982. Following receipt of reference 5, we initiated action to examine ways of reprogramming FY 1982 resources so that W31 development could begin early next fiscal year (FY 1982). This reallocation process has not been completed; consequently, we are unable, at this time, to commit the improved W31 design to a specific date. We expect to complete this reallocation activity within a few months and will provide our schedule assessment at that time.

The B61 improvement which was also agreed to by the DOD (Ref. 2) was started concurrent with the B28FI in April 1979.

Reference 6 provided BKC's assessment of their ability to support the production schedules. It concluded that B61 improvement schedules could be supported provided that needed engineering releases occurred in the approximate time frames identified in the production planning assessment. This assessment called for early engineering releases commencing in April 1981 and continuing through September 1981 for component parts such as semiconductors, castings, connectors, and forgings. Further, releases for subassemblies were required in August 1981 to continue through December 1981. Because of the added features noted above, design maturity and development status did not and do not support the issuance of all releases needed at this time. This factor coupled with heavy demands on Sandia weapon development resources for FY 1982 suggest that a prudent approach would be to slip the B61 Phase 6 FPU by approximately 9 months. We believe this action is necessary to allow for a more orderly and less risky B61 development and production program if the design is to retain the additional features.

~~SECRET~~

31 29  
126

~~SECRET~~ UNCLASSIFIED

COPY

COPY

Although we endorse the inclusion of these additional features and believe this design should be pursued on modified timescales, another option still exists which we believe can support the existing schedule.

5/3/84

If support of the existing schedule is considered more important than provisions for these additional features, a decision must be made now while a design alternative still exists that supports the FY84 Phase 6. If we decide to accept a delay in B61-7 Phase 6, I suggest that you consider using that released production capacity to accelerate the build of the additional B61-4's now authorized.

We support and will continue to pursue the present baseline definition with all the features previously mentioned unless you notify us that current schedules must be protected.

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

Copy to:  
MO659 - ALO, R. G. Romatowski  
MO737 - LANL, D. M. Kerr

**References**

1. SFRD letter with SRD enclosure from Herman E. Roser to Maj. Gen. Joseph K. Bratton, dated 8/15/78; Subject: Stockpile Modernization Study. (This study was transmitted to James P. Wade By General Bratton on 9/22/78 - copy not available at Sandia.)
2. SFRD letter from James P. Wade to Maj. Gen. Bratton, dated 3/20/79
3. SFRD letter from James P. Wade to Maj. Gen. Hoover, dated 6/2/81
4. SFRD letter from Maj. Gen. Hoover to James P. Wade, dated 7/24/81
5. SFRD letter from Maj. Gen. Hoover to Messrs. Clark, Sparks, Cook, Kerr and Batzel, dated 7/30/81, subject: Stockpile Improvement Program for the W31 Warhead (U)
6. Uncl. memo, J. A. Morrison, BKC, to J. R. Nicks, DOE-KCAO, dated 8/4/81, Subject: Preliminary Assessment of Capability for B61 Stockpile Improvement Schedule Support

COPY

COPY

~~SECRET~~  
UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

COPY

COPY

Maj. Gen. W. W. Hoover, MA

Subsequent Distribution:

- M0737 - LANL, C. P. Robinson
- M0737 - LANL, J. J. Wechsler
- M0737 - LANL, A. L. Conner
- M0659 - ALO, J. F. Burke
- M0659 - ALO, W. R. Cooper
- 2 - W. J. Howard
- 1200 - L. D. Smith
- 1220 - J. M. Wiesen
- 1230 - W. L. Stevens
- 1400 - L. J. Heilman
- 2100 - B. L. Gregory
- 2300 - J. C. King
- 2500 - J. C. Crawford
- 3200 - C. R. Barncord
- 4000 - A. Narath
- 4300 - R. L. Peurifoy, Jr.
- 4310 - C. C. Burks
- 4370 - B. E. Arthur, Jr.

COPY

COPY

4  
12

~~SECRET~~  
UNCLASSIFIED



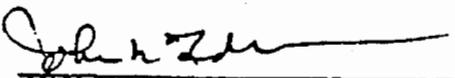
~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

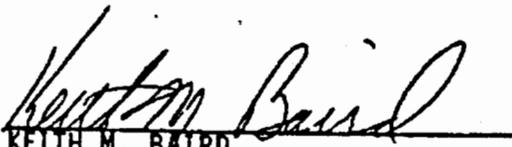
COPY

COPY

MINUTES OF FINAL  
DESIGN REVIEW AND ACCEPTANCE GROUP (DRAAG)  
MEETING ON THE  
B61 MOD 7 BOMB DESIGN  
17 JULY 1985

  
\_\_\_\_\_  
JOHN M. LEDERER  
AIR FORCE WEAPONS LABORATORY  
CHAIRMAN B61 MOD 7 DRAAG

  
\_\_\_\_\_  
JAMES M. MESNARD  
AIR FORCE WEAPONS LABORATORY  
AIR FORCE MEMBER

  
\_\_\_\_\_  
KEITH M. BAIRD  
PROJECT MANAGER FOR NUCLEAR MUNITIONS  
ALBUQUERQUE FIELD OFFICE  
ARMY MEMBER

  
\_\_\_\_\_  
ROBERT T. BRANDT  
SENIOR WEAPON SYSTEMS ENGINEER  
NAVAL WEAPONS EVALUATION FACILITY  
NAVY MEMBER

COPY

COPY

36 22  
12

~~SECRET~~ UNCLASSIFIED



~~SECRET~~ UNCLASSIFIED

COPY

COPY

MINUTES OF FINAL  
DESIGN REVIEW AND ACCEPTANCE GROUP (DRAAG)  
MEETING ON THE  
B61 MOD 7 BOMB  
HELD AT SANDIA NATIONAL LABORATORIES ALBUQUERQUE  
17 JULY 1985

1. (U) Pursuant to the provisions of DOD Instruction 5030.55, "Joint AEC-DOD Nuclear Weapons Development Procedures," 21 January 1974, and AF Regulation 80-9, "Nuclear Weapons Development Procedures," 17 May 1976, a final DRAAG meeting to review the design of the B61 Mod 7 Bomb was held at Sandia National Laboratories, Albuquerque, NM on 17 July 1985.

2. (U) Participants in the review were representatives of the Air Force Weapons Laboratory (representing the Air Force); Naval Weapons Evaluation Facility (representing the Navy); and the Project Manager for Nuclear Munitions, Albuquerque Field Office (representing the Army). Presentations at the meeting were made by Sandia National Laboratories, Albuquerque and Los Alamos National Laboratory. An attendance list and agenda are attached.

3. (U) The design review addressed the B61 Mod 7 design as presented in the Draft Final Development Report (FDR) for the B61 Mod 7 Bomb and the Use Control Addendum for the B61 Mod 7 Bomb, both dated Jun 1985, and compliance by the DOE with the design specifications contained in Ammendment 29, Section II of the B61 Military Characteristics (MCs), 19 November 1984, and the B61 Stockpile-to-Target Sequence (STS), Revision 6 15 April 1984. Fifteen comments from the services and corresponding responses from the DOE laboratories relative to the design were discussed.

A. (U) Items specific to the B61 Mod 7.

(U) The following aspects of the B61 Mod 7 deviate from specifications in the B61 Mod 7 MCs and STS

42  
(3)

[Redacted]

(2) (U) Safety: The probability of a premature nuclear detonation in the normal environments described in the STS shall not exceed: (MC para 2.5.1.3) "After release and prior to fuzing:  $1 \times 10$  per occurrence." (Where "fuzing" is defined as receipt of a fire signal from the radar, timer, or contact crystal, as appropriate) The DOE assesses the probability as  $1 \times 10$  during the period after release and prior to expiration of the safe separation time. The probability of premature nuclear detonation is estimated to be  $2 \times 10$  during the period from safe separation time to fuzing.

42  
(3)

(3) (U) STS Environments: The nuclear environments specified in Table 3.14 of the STS for Stage 6 (Release and Free flight) are not adequately defined for testing purposes. The sensitivity of the MC 3637 Programmer and MC 3638 ICU to gamma dose and dose rate has been explored in laboratory tests.

[Redacted]

COPY

COPY

~~SECRET~~ UNCLASSIFIED

~~SECRET~~  
UNCLASSIFIED

RS 3140/92/00001

COPY

COPY

B. (U) B61 Mod 7 Conclusions:

(U) The B61 Mod 7 design deviations noted in para A above are considered minor and should result in no important impact on SACs planned operational use of the B61 Mod 7.

C. (U) General Items:

(U) In response to the Service Comments on the Draft FDR for the B61 Mod 7, the DOE agreed to include the following items in the Final Development Report.

(1) (U) The operating characteristics of the MC 3640 Trajectory Sensing Signal Generator will be shown, including the no-operate and operate limits.

(2) (U) DOE will expand the description of the MC 3554 Neutron Generator to explain its noise immunity.

(3) (U) The discussion of the Lightning Arrestor Connector will be expanded to show how the MC 2969/2935 Strong Link Switches add to lightning protection. A SNLA report on (LAC/SLS) reliability will be referenced.

(4) (U) An expanded discussion and analyses of credible combined abnormal environments will be included.

(5) (U) The discussion of the T 1563 APC and T 1572 PDM will be combined and expanded.

(6) (U) The FDR will reference specific sections and/or pages relative to compliance with the MCs.

(8) (U) Functional Block Diagrams of the B61 Mod 7 Bomb will be included in the FDR.

4. (U) Recommendations:

A. (U) B61 Mod 7 DRAAG Specific Recommendations:

(1) (U) Exceptions from the design requirements mentioned above be accepted for the B61 Mod 7 Bomb.

(2) (U) Changes to the Draft FDR and FDR Addendum agreed at the DRAAG meeting and listed in C above be published in the final reports.

(3) (U) The B61 Mod 7 be accepted as a standard stockpile item.

B. (U) DRAAG General Recommendations:

(U) The DRAAG did not have approved Military Characteristics at hand, but only verbal assurances of what had been approved by the MLC. The DRAAG cannot function effectively without official written approved MC's and changes. It is recommended no DRAAGs be convened on specific nuclear weapons until approved MC's on those weapons have been made available to the DRAAG members. We also recommend the DRAAG chairman receive information copies of DRAAG related documents (MCs, DRAAG Minutes, Policy guidance, etc) which are forwarded to ATSD(AE) anQ DOE/MA by Service Staffs and ATSD(AE) respectively.

COPY

COPY

~~SECRET~~

39  
12

