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# RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP KICKOFF MEETING (U)

A-05-197(R)

11 May 2005

Derived from OPNAVINST S5513.5B, Encl (27),  
Change 4, dated 12 January 2004.

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2nd REVIEW-DATE:	1-22-07
AUTHORITY:	DD
NAME:	Eric Hogen
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## RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP KICKOFF MEETING (U)

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MINUTES OF THE RELIABLE REPLACEMENT WARHEAD  
PROJECT OFFICERS GROUP KICKOFF MEETING (U)  
ITT AES, Arlington, VA  
11 May 05

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MINUTES OF THE RELIABLE REPLACEMENT WARHEAD  
PROJECT OFFICERS GROUP KICKOFF MEETING (U)  
ITT AES, Arlington, VA  
11 May 05

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(This List of Appendices is UNCLASSIFIED)

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  - B ATTENDEES LIST
  - C RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP ORGANIZATION CHARTS
  - D RRW BACKGROUND, TERMS OF REFERENCE, GOALS & OBJECTIVES, POG MEMBERSHIP AND SCHEDULE
  - E POG AUTHORITY, STRUCTURE, CHARTERS, AND GROUNDRULES
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  - L LANL DESIGN OPTIONS
  - M SNL DESIGN OPTIONS
  - N ACTION ITEMS
  - O RRW POG MASTER MEETING SCHEDULE

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MINUTES OF THE RELIABLE REPLACEMENT WARHEAD  
PROJECT OFFICERS GROUP KICKOFF MEETING (U)  
ITT AES, Arlington, VA  
11 May 05

1.0 (U) GENERAL BUSINESS

1.1 (U) ADMINISTRATIVE REMARKS

(U) [ ] provided administrative remarks regarding the facility as well as security.

(b)(6)

Privacy Act 1974

1.2 (U) OPENING REMARKS

(U) [ ] welcomed everyone to the kick-off meeting for the Reliable Replacement Warhead (RRW) Project Officers Group (POG) and acknowledged

(b)(6)

[ ] for his efforts in getting the Terms of Reference (TOR) established.  
[ ] also recognized

(b)(6)

(U) [ ] presented the agenda which is included as Appendix A. The List of Attendees is attached as Appendix B. An organization chart is attached as Appendix C.

1.3 (U) BACKGROUND, TERMS OF REFERENCE, GOALS & OBJECTIVES, POG  
MEMBERSHIP & SCHEDULE

Privacy Act 1974

(b)(6)

(U) [ ] presented an overview which included RRW background, Terms of Reference (TOR), goals and objectives of the study, POG membership, and schedule. A copy of his briefing is included as Appendix D. [ ] discussed the competition for the RRW design. The POG agreed that this will be a true competition between Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL) and will result in getting the best individual engineering effort from each laboratory team. The laboratories' designs will be developed independently and reviewed separately to ensure that data is protected as required for proprietary information. The selected design will then be subject to peer review.

Privacy Act  
1974

(b)(6)

(U) [ ] stated that the starting point for the Navy is the MK5 aeroshell with a MK4A Arming, Fuzing & Firing (AF&F) system. He mentioned that there is a significant inventory of MK5 aeroshells. He made it very clear that there will be no changes to the MK5/D5 missile interface and that the MK4A AF&F will be used as is. [ ] also commented that he believes that the W78 is the only other existing Nuclear Explosive Package (NEP) that will fit in the MK5 shell. This sparked discussion on what makes up a "new" design. There is significant political resistance to anything perceived as "new". [ ] took an action, in conjunction with [ ] to provide clarification on what constitutes a new design at the next POG. Regardless, [ ] added that we should not be too quick to dismiss a design simply because it may be perceived as new. He believes that Congress wants to look at all the options and select the "right" approach despite some appearance of being new.

~~(b)(6)~~  
Privacy Act  
1974

~~(b)(6)~~ (b)(6) Privacy Act 1974

[ ] expressed that he is very encouraged about the RRW POG due to the potential benefits to the stockpile and the related infrastructure. He explained that the National Nuclear Security Administration (NNSA), USSTRATCOM and the Services are part of the design down-select process because of the impact to the overall force structure. [ ] challenged the group to look for opportunities to speed up the process. The POG was given 18 months to complete the study but perhaps it could be done faster. A First Production Unit (FPU) for RRW has been set for 2012 – perhaps it could be sooner. [ ] said that USSTRATCOM should be involved as much as possible and should play a significant role in defining requirements. [ ]

1.4 (a)  
(e)(g)

[ ] Finally, [ ] remarked that verification and inventory process improvements should be considered if possible.

~~(b)(6)~~  
Privacy Act 1974

~~(b)(6)~~ Privacy Act 1974

(U) [ ] also provided general comments at this point. He believes that the Department of Defense (DOD) and NNSA are very well aligned on the objectives. He stated that the POG was created because the Nuclear Weapons Council (NWC) recognizes that it is vital to address the sustainment of the NNSA infrastructure. [ ] committed to applying the resources needed for this task. However, finding the funding will be a difficult challenge. The support of USSTRATCOM and the Services will be helpful in obtaining Congressional

(b) (6) Privacy Act 1974

(U) support.

[redacted] also commented on the increasing importance of security for nuclear weapons. Preventing loss and recovery at all costs has been done very well but precluding loss at all costs will be even harder and more important. [redacted] emphasized that it will be important to focus on security and surety where it is needed most and will do the most good.

## 1.4 (U) POG AUTHORITY, STRUCTURE, CHARTERS, &amp; GROUNDRULES

(b) (6) x  
Privacy Act  
(1974)

[redacted] presented a briefing that reviewed the POG authority, responsibilities, structure, subcommittee draft charters, and ground rules. His briefing is included as Appendix E. An action was assigned to the POG Principals to provide names of members for each subcommittee and working group by 20 May 2005. Another action was assigned each subcommittee and working group to review the draft charters and present revised charters for review and approval at the next POG. ITT was given an action to distribute the USN and USAF MCs and STS by 20 May 2005. Two actions were also assigned to the Requirements Subcommittee: (1) brief the POG on the consolidated requirements at the next POG meeting; and (2) distribute draft RRW MCs/STS that reflect the consolidated requirements within 6-8 weeks. The status should be provided at the next POG.

## 2.0 (U) NAVY TECHNICAL GROUNDRULES

## 2.1 (U) MK4A FUZE / AF&amp;F REQUIREMENTS

(S) (1D)

[redacted] presented the MK4A AF&F Requirements for RRW. His briefing is attached as Appendix F. [redacted] provided some guidance to SNL to say that they are tasked to identify how to use the MK4A AF&F.

1.4(a)  
(e)(g)

[redacted] Another action was assigned to USAF/XOS to identify the Air Force fuze baseline for the RRW study by the next POG meeting.

## 2.2 (U) NAVY MASS PROPERTIES / INTERFACE REQUIREMENTS

6(b)(6) Privacy Act 1974

(U) [redacted] presented the mass properties and interface requirements for the Navy. A copy of his briefing is included as Appendix G. [redacted] stated that RRW will operate within the MK5 mass properties constraints.

6(b)(6) Privacy Act 1974

## 3.0 (U) AIR FORCE TECHNICAL GROUNDRULES

## 3.1 (U) MK12A ARMING &amp; FUZING AND MASS PROPERTIES / INTERFACE REQUIREMENTS

6(b)(6) Privacy Act 1974

(U) [redacted] gave a combined presentation covering the MK12A Arming & Fuzing Subsystem as well as the mass properties and interface requirements. [redacted] commented that the MK21 fuze is still an option and that the Air Force would very likely use the MK21 interface as their baseline.

## 4.0 (U) REQUIREMENTS

## 4.1 (U) INFRASTRUCTURE

6(b)(6) Privacy Act 1974

~~(SFRG)~~ (U) [redacted] provided a briefing on the infrastructure requirements. A copy of his presentation is included as Appendix I. Dr. Allen discussed the NNSA Enterprise Models they use to analyze the infrastructure. [redacted] expressed some concerns that NNSA is building unreasonable expectations in Congress that RRW will result in large, near-term budget savings for stockpile management and support. He explained that the RRW life-cycle costs must be considered in the total systems context. That is, the costs for the current systems are not going away.

Se  
c  
F

## 4.2 (U) FORCE STRUCTURE

(c)(4)(b)  
(U)  
6(b)(6) Privacy Act 1974

[redacted] presented the Force Structure Requirements. His briefing is included as Appendix J. One of the important USSTRATCOM requirements is that the current [redacted]

[redacted] His briefing included notional numbers for deployed forces in 2012 as well as a desired yield for RRW.

## 5.0 (U) LABORATORY DESIGN OPTIONS

## 5.1 (U) LLNL DESIGN OPTIONS

## 5.2 (U) LANL DESIGN OPTIONS

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Privacy Act  
(1974)

(U) [redacted] presented the design options for LANL. His briefing is included as Appendix L. [redacted] recommended forming an Enterprise Modeling subgroup. However, the POG did not agree at this time, contending that the subject can be handled by the current subcommittee structure. [redacted] again expressed concerns about the need for controlling cost savings expectations. [redacted] wants to address this at the first NWCSSC Review Meeting by saying that there will be large, long-term savings, but not large, short-term cost savings.

(U) [redacted] had to leave at this point in the meeting. He expressed satisfaction with the progress made during this meeting.

(U) An action item was assigned to the POG Principals to provide a list of names for SIGMA 15 access by 20 May 2005. An action assigned to the POG Principals is to provide a distribution list for general POG materials, also due 20 May 2005.

5.3 (U) SNL DESIGN OPTIONS

*(b)(6) Privacy Act (4074)*

(U) [redacted] presented the SNL design options. A copy of his briefing is included as Appendix M.

6.0 (U) OTHER ACTIVITIES

6.1 (U) DISCUSSION

(U) There were no additional discussion items at this point of the meeting.

6.2 (U) ACTION ITEM REVIEW

(U) The new action items assigned during this meeting were reviewed and a copy is included as Appendix N. (Note: Status of the action items as of 1 June is indicated)

6.3 (U) RRW POG MASTER MEETING SCHEDULE

(U) The master meeting schedule is attached as Appendix O.

6.4 (U) NEXT MEETING

(U) The next meeting was changed to 9 June 2005, Thursday afternoon, to coincide with the Annual Stockpile Assessment Conference at SNL/NM in Albuquerque, NM.

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**APPENDIX A**

**AGENDA**

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## **AGENDA**

**RELIABLE REPLACEMENT WARHEAD KICKOFF MEETING**  
ITT Industries, AES Division, Arlington, VA  
11 May 2005

### **GENERAL BUSINESS**

ADMINISTRATIVE REMARKS .....	ITT
OPENING REMARKS .....	SSP
BACKGROUND, TERMS OF REFERENCE, GOALS & OBJECTIVES, POG MEMBERSHIP	
& SCHEDULE.....	SSP
POG AUTHORITY, STRUCTURE, CHARTERS, AND GROUNDRULES .....	ITT

### **NAVY TECHNICAL GROUNDRULES**

MK4A FUZE/AF&F REQUIREMENTS .....	SNL
NAVY MASS PROPERTIES/INTERFACE REQUIREMENTS .....	LMSSC

### **AIR FORCE TECHNICAL GROUNDRULES**

MK12A FUZE/AF&F AND MASS PROPERTIES/INTERFACE REQUIREMENTS.....	AF/NWCA
---	---------

### **REQUIREMENTS**

INFRASTRUCTURE .....	NNSA
FORCE STRUCTURE .....	USSTRATCOM

### **LABORATORY DESIGN OPTIONS**

LLNL DESIGN OPTIONS .....	LLNL
LANL DESIGN OPTIONS.....	LANL
SNL DESIGN OPTIONS.....	SNL

### **OTHER ACTIVITIES**

DISCUSSION .....	ALL
ACTION ITEM REVIEW .....	SSP/ITT
RRW POG MASTER MEETING SCHEDULE.....	ITT
NEXT MEETING	

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**APPENDIX B**

**LIST OF ATTENDEES**

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KICKOFF MEETING OF THE RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP  
ITT, AES DIVISION, ARLINGTON, VA

11 MAY 05

ATTENDEES LIST

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KICKOFF MEETING OF THE RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP  
ITT, AES DIVISION, ARLINGTON, VA

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ATTENDEES LIST (Continued)

KICKOFF MEETING OF THE RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP  
ITT, AES DIVISION, ARLINGTON, VA

11 MAY 05

ATTENDEES LIST (Continued)

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**APPENDIX C**

**RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP  
ORGANIZATION CHARTS**

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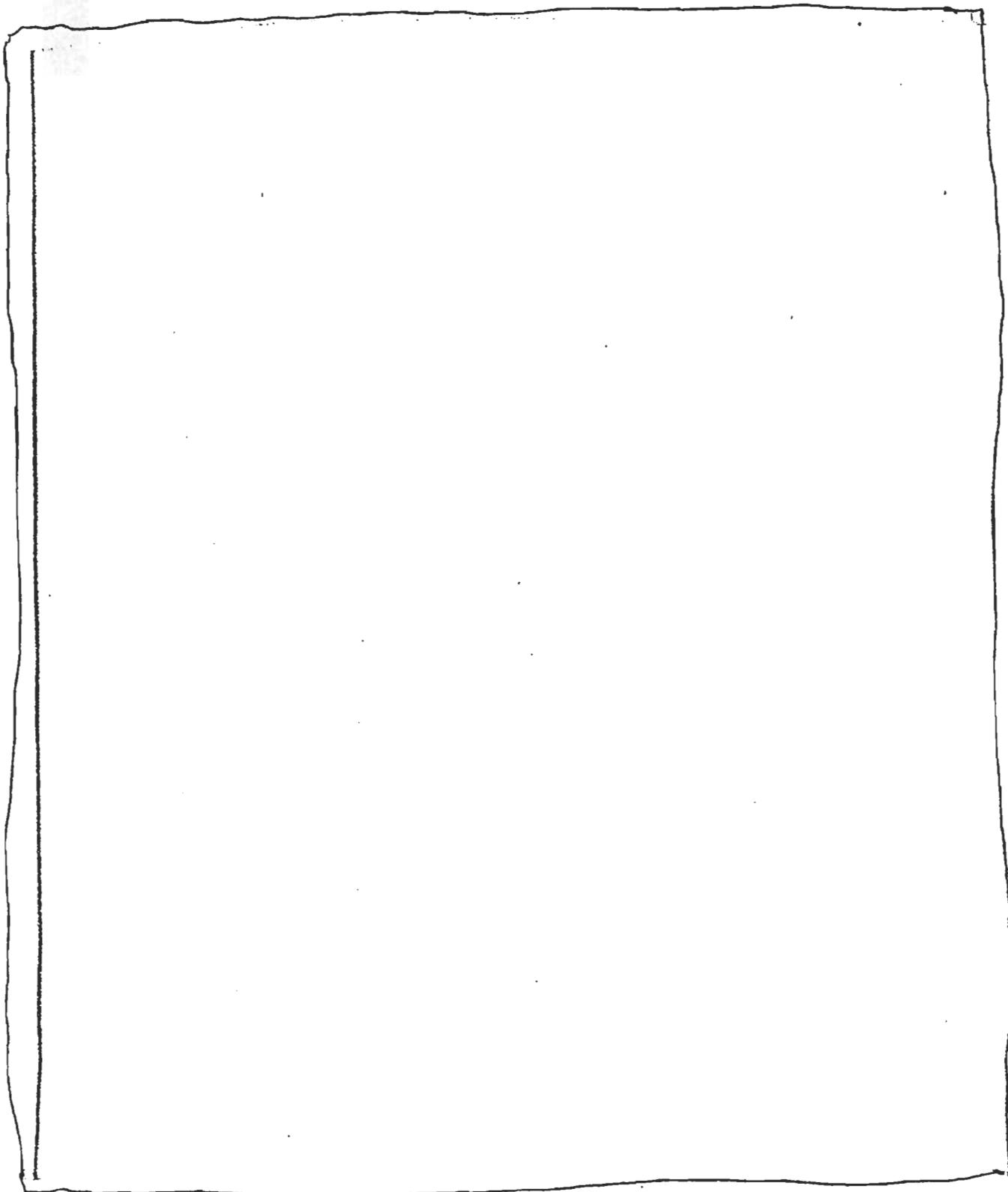
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**APPENDIX D**

RRW BACKGROUND, TERMS OF REFERENCE, GOALS & OBJECTIVES,  
POG MEMBERSHIP AND SCHEDULE

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Strategic Systems Programs

May 11, 2005

# Background



## ● Transformation study recommendations

- Approve a Joint Project Officer Group to oversee a laboratory design competition for an RRW for the first deployments on SLBMs
- Direct a design concept competition for a minimum cost W76 risk reduction solution
- Reduce the planned W76-1 refurbishment

## ● NWC approved creation of a Joint Reliable Replacement Warhead Project Officers Group (RRW POG) on 23 March 2005

## ● NWC memorandum dated 11 April 2005 establishes a RRW POG

- Oversee a laboratory design competition for an RRW
- First deployment on SLBM
- 18 month study
- Assess technical feasibility, design definition and cost
- At the conclusion of the study, the RRW POG will present the preferred RRW design options and recommendations to the NWCSSC for approval

## RRW Study Goals



- Sustain long term confidence in a safe, secure and reliable stockpile
- Enable transformation to a responsive nuclear weapon infrastructure
- Adaptability to other intercontinental ballistic missile platforms

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# Terms of Reference (TOR)



- Details membership, organization and conduct of the POG and the RRW study

- Transformation Coordinating Committee (TCC)

- Ad hoc group led by DATSD (NM) and NNSA NA-13
- Members include representatives from OUSD(P)/(FP), The Joint Staff (J-5), USSSTRATCOM, Navy (SSP), Air Force (XOS), NNSA NA-11, NNSA NA-12 and DTRA
- RRW POG to work in cooperation with and receive advice from the TCC
- Issues and conflicts within the POG and between the TCC and POG shall be transmitted to the Chairman, NWCSSC for resolution
- **NWC will make the final design selection based on**
  - POG developed options and recommendations
  - NNSA recommendations
  - User Service recommendations

# Key Players



## MEMBERS

- Navy SSP (Chair)
- Air Force XOS (Co-chair)
- USSTRATCOM
- DATSD (NM)
- NNSA NA-11
- NNSA NA-12
- LANL
- LLNL
- SNL/NM
- SNL/CA
- ITT
- PMOSSP (SPF)
- Air Force NWCA

## OFFICIAL OBSERVERS

- Pantex
- Y12
- KCP
- DTRA
- OPNAV

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## NWC Reviews

- Detailed study plan to the NWCSSC in July 2005

- Study goals
- Strategy
- Major milestones
- NWCSSC updates quarterly
- NWC updates semi-annually
- Study expected to be complete within 18 months

# Study Scope



## Reliable Replacement Warhead (RRW)

### ● Feasibility/design definition and cost study

- Laboratory design competition
- First deployment on SLBMs

### ● Considerations:

- FPU ~ 2012
- Compatibility with ICBMs and potential to cancel/replace W78 LEP
- Enable transformation to a responsive infrastructure
- "Lifecycle" review of infrastructure requirements
- Effect on the SLBM force structure and NNSA infrastructure resulting from reduction of the planned W76-1 refurbishment numbers through deployment of RRW

## W76 Risk Reduction Warhead

### ● Design Concept study

- Minimum cost W76 replacement as a backup for the RRW (risk reduction measure)
- Laboratory design competition
- FPU ~ 2010

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# Items to be Addressed by W76 Risk Reduction Study



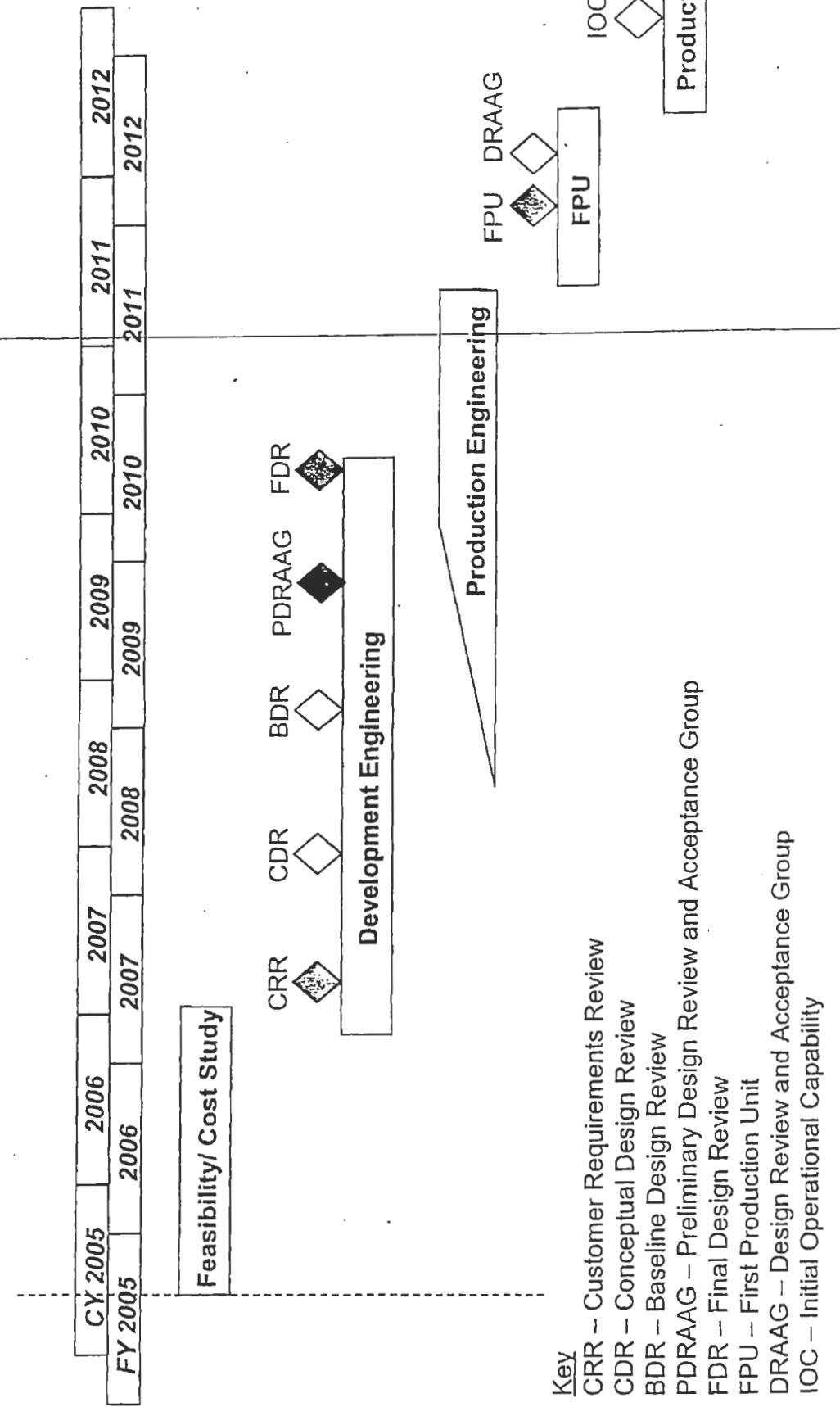
- Maximum lifetime of each design and the cost tradeoffs
- Total lifecycle costs of each design
- Earliest possible FPU date
  - consistent with DOE production schedules
- Adaptability for use on ICBM platform (MMIII, LBSD)
- Use of existing RB/RV aeroshell (Mk4, Mk5, Mk12/12A, Mk21)

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# National RRW Schedule



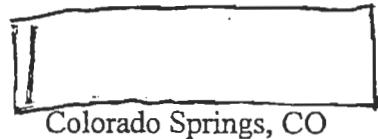
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APPENDIX E

POG AUTHORITY, STRUCTURE, CHARTERS, & GROUNDRULES



Colorado Springs, CO

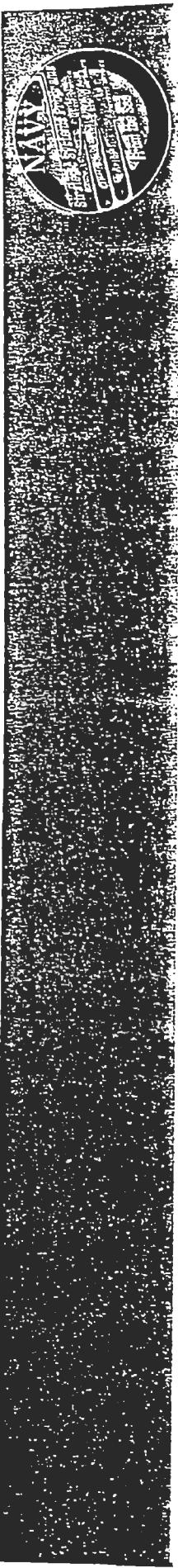
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Advanced Engineering Sciences Division  
May 11, 2005

# POG Authority



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- DOD and AEC (now NNSA) - Atomic Energy Act, 1953
- Memorandum of Understanding between ERDA (now NNSA) and the DOD on Nuclear Weapons Development Programs, 1975
- DOD Directive 3150.1 – Joint Nuclear Weapons Development Studies and Engineering Projects
- DOD Instruction 5030.55 – Joint AEC-DOD Nuclear Weapons Development Procedures

NWC approved creation of a RRW POG on 23 March 2005

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# POG Responsibilities



- Joint DOD/NNSA organization for implementation of responsibilities for all weapon development phases, from Weapon Conception through Weapon Retirement
- Coordinates all aspects of
  - Research, development, test and evaluation of weapons development projects
  - Weapon certification, operational support, deployment, retirement and disposal
  - STS and MC development and minor changes
- Maintain visibility into all issues affecting safety, cost, reliability and performance
- Coordinates
  - Interfaces between NNSA and DOD
  - Investigations concerning weapons/WH design trade-offs affecting capability, reliability, safety, maintainability, testability, vulnerability, cost
  - Joint test programs
  - Insure timely exchange of information between DOD and NNSA

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# RRW POG Study

E-6

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# Deliverables



## Common

- Draft Military Characteristics (MC) and Stockpile-to-Target Sequence (STS) documents
- Final Report of RRW Study

- How each design fosters and promotes infrastructure transformation
- Recommendation for the optimal balance of W76-1, W88 and RRW warheads in SLBM fleet
- Joint DoD/DOE acquisition strategy that fits within the JCIDS process

## Option Specific (RRW and Risk Reduction Option)

- Design data package for each
- Cost Report detailing the resources required to produce and maintain throughout lifecycle
- Development, production and certification plans
  - Joint Integrated Program Plan (JIPP)
  - Joint System Qualification Plan (JSQP)
  - Joint Logistics and Production Plan (JLPP)
  - Integrated Master Schedule

## Other

- Draft MOU/IAA
- DOE Major Impact Report (MIR)
- DOE Weapon Development Cost Report (WDCR)
- Coordinated Project Summary

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# Ground Rules



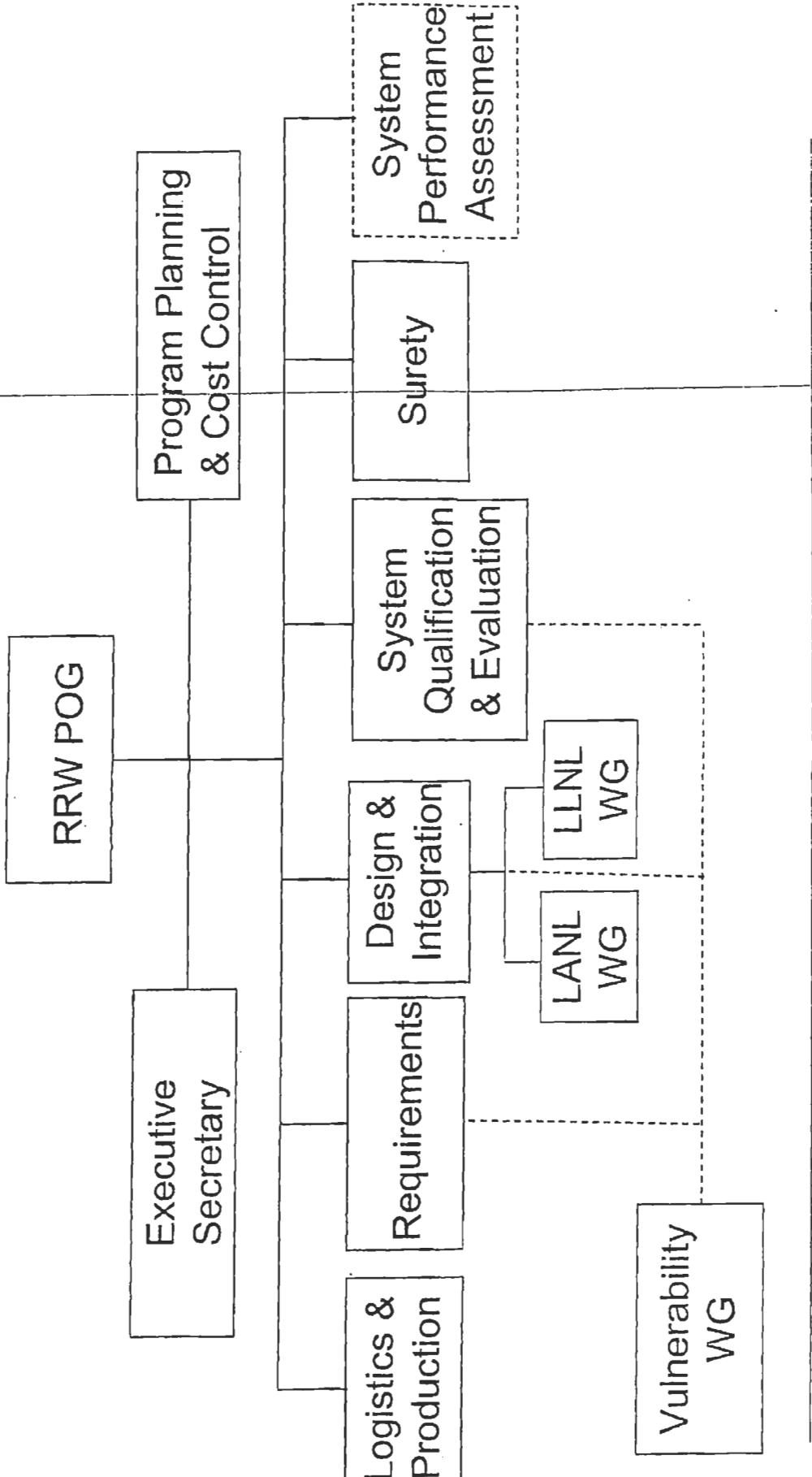
RRW

- MK5 aeroshell (SLBM) / MK12A aeroshell (ICBM)
- D5 missile interfaces (SLBM) / MMIII missile interfaces (ICBM)
- MK4A fuze (SLBM) / \_\_\_\_\_ (ICBM)
- Yield - TBD
- Surety
  - In insensitive high explosive
  - Fire resistant pit
  - Surety options (2 versions – shipping container / RBA)
    - Command disable
    - Permissive action link
- W76 Risk Reduction**
  - Must use existing NEP

# National RRW Organizational Chart



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# Program Planning and Cost Control Subcommittee

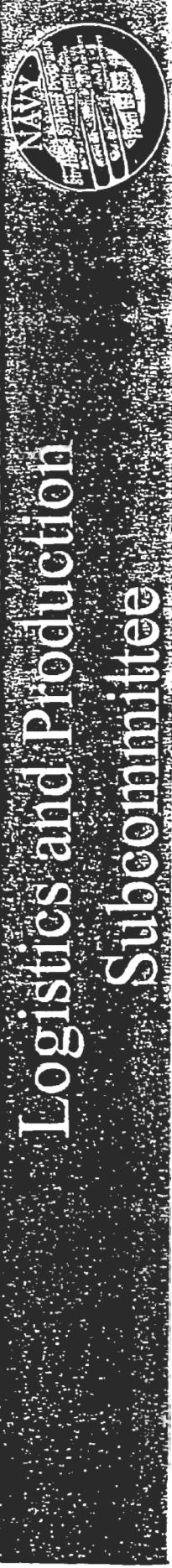


- Cost report, detailing the resources required to produce and maintain each preferred design through the design's lifecycle
- An acquisition strategy for RRW that fits within the JCIDS process
- A recommendation for the optimal balance of W76-1, W88 and RRW warheads in the SLBM fleet
- Prepare, update and maintain a Joint Integrated Project Plan (JIPP)
- Coordinate, develop, and maintain the Integrated Master Schedule (IMS)
- Prepare, update and maintain the Coordinated Project Summary
- Coordinate the development of Memorandums of Understanding, Memorandum of Agreements, and Inter-Agency Agreements to support development, production, and deployment of RRW

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# Logistics and Production

## Subcommittee



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- “Lifecycle” review of DOD and DOE/NNSA infrastructure requirements to support the RRW from conceptual design to operational capability; through service life, retirement and dismantlement
- Describe how each design fosters and promotes infrastructure transformation
- Evaluate the production, deployment, and logistics support for RRW
- Develop facility requirements
- Develop Joint Logistics and Production Plans

# Requirements Subcommittee



- Develop and maintain the draft RRW Military Characteristics (MC)
- Develop and maintain draft RRW Stockpile-to-Target Sequence (STS)
- Develop and maintain MC/STS requirements tradeoff matrix
- Identify and coordinate MC/STS requirements tradeoff studies
- Resolve issues on interpretation of MC/STS requirements
- Provide technical and programmatic impact assessment of proposed changes to the MC/STS

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# Design and Integration Subcommittee



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- Coordinate the development of RRW Interface Control Documents (ICDs)
- Coordinate the development of RRW design data packages for WR, JTA, IH, and Trainers
- Coordinate the development of W76 risk reduction option design data packages
- Conduct Design Integration Tradeoff Studies

# System Qualification and Evaluation

## Subcommittee



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- Coordinate the planning, scheduling, and implementation of the verification, validation, qualification, certification, and acceptance of the RRW
- Prepare, update and maintain the System Qualification/Certification Plan
  - Integrated Test Plan
  - Joint Modeling & Simulation Plan
- Coordinate the planning, scheduling, implementation & evaluation of joint DOD/DOE tests
  - Joint Ground Tests
  - Joint Flight Tests
- Coordinate the use of Modeling & Simulation
  - Monitor development of M&S to be used as basis for qualification
  - Monitor Verification, Validation & Accreditation of Models
  - Monitor Verification, Validation & Certification of Data

# Surety Subcommittee



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- Review RRW / W76 Risk Reduction options to ensure surety (safety, security, reliability, control) attributes meet the requirements of the MC/STS
- Produce a prioritized list of nuclear/HE safety concerns for each warhead candidate
- Compare warhead candidates from a INRAD perspective
- Identify areas where special efforts and/or testing may be warranted to satisfy existing safety criteria
- Recommend tests to the System Qualification & Evaluation SC to evaluate surety attributes
- Coordinate the planning, scheduling and implementation of Nuclear weapon safety assessments
- Coordinate the planning, scheduling and implementation of Operational Safety Reviews

# Vulnerability Working Group



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- Assist the Requirements Subcommittee develop Hostile and Fratricide environment requirements
- Assist the Design & Integration Subcommittee assess the design options for vulnerability to hostile and fratricide environments
- Assist the System Qualification and Evaluation Subcommittee define test and evaluation requirements for hostile and fratricide requirements

# System Performance Assessment Subcommittee



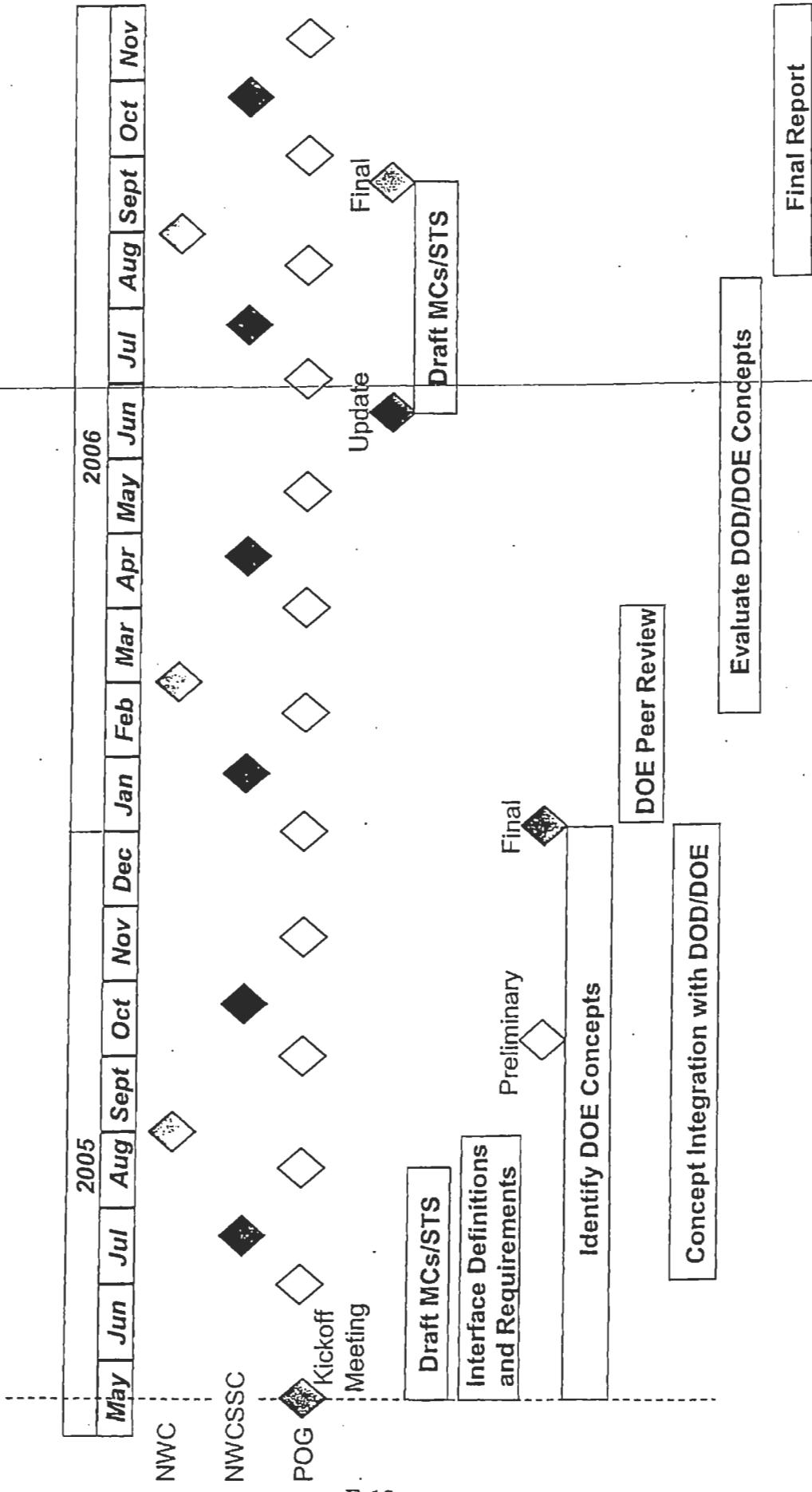
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- Establish requirements for development, qualification, production, and surveillance to achieve desired stockpile evaluation objectives
- Prepare, update, and maintain a flexible and achievable integrated system performance assessment plan
- Establish and maintain the Nuclear Weapon Subsystem Test Plan (NWSSTP)
- Develop, maintain, and update system performance assessment models
- Support the Annual Assessment and CLINICAL processes

# RRW Plan of Action and Milestones



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## APPENDIX F

### MK4A FUZE AND AF&F REQUIREMENTS



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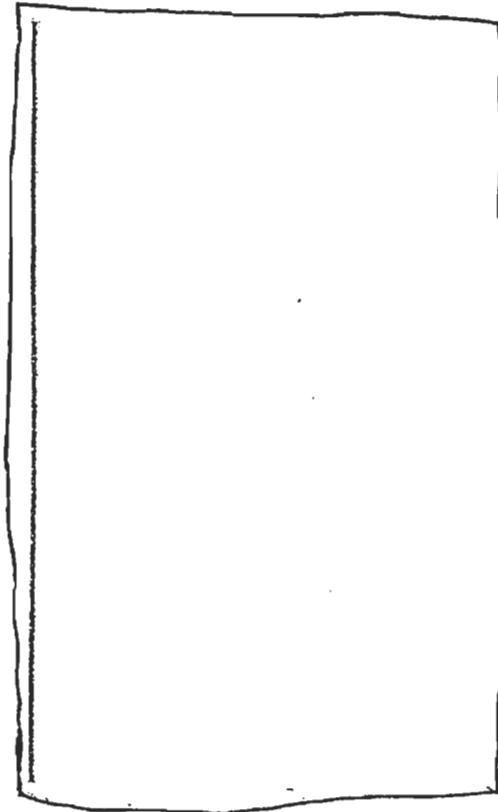
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# Mk4A Fuze/AF&F Requirements



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Privacy Act  
1974



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~~May be exempt from public release under the Freedom of Information Act (5 U.S.C. 552), exemption number and category 2, Circumvention, State Department of Energy Review required before public release~~  
~~Name/Org: Brad Godfrey/B741 Date: May 5, 2005~~  
~~Guidance (if applicable) N/A~~



Mk4A Fuze/AF&F Requirements -20050510 - Page 1

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~~Official Use Only~~

# Approach



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- Look at possibility of using Mk4A AF&F in Mk5 RB
  - Discern compatibility issues
    - What can be re-used
    - What may require changes



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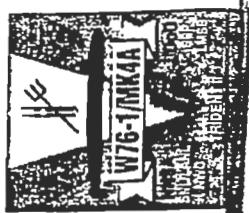


(b) (5)

Arming, Fuzing & Safety

# Arming, Fuzing & Firing System

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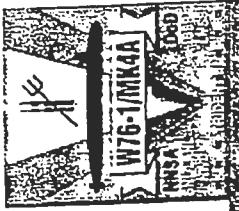
F-6

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# Mechanical Considerations



- Mounts (locations)
  - AF&F
    - Mk4A AF&F fits in Mk5 AF&F envelope
    - Shock transmissibility
  - Neutron generator
  - Gas bottle
- Cables & connectors
  - New preset cable (length)
  - New NG cabling
  - Re-route cable runs
  - May be able to re-use LAC



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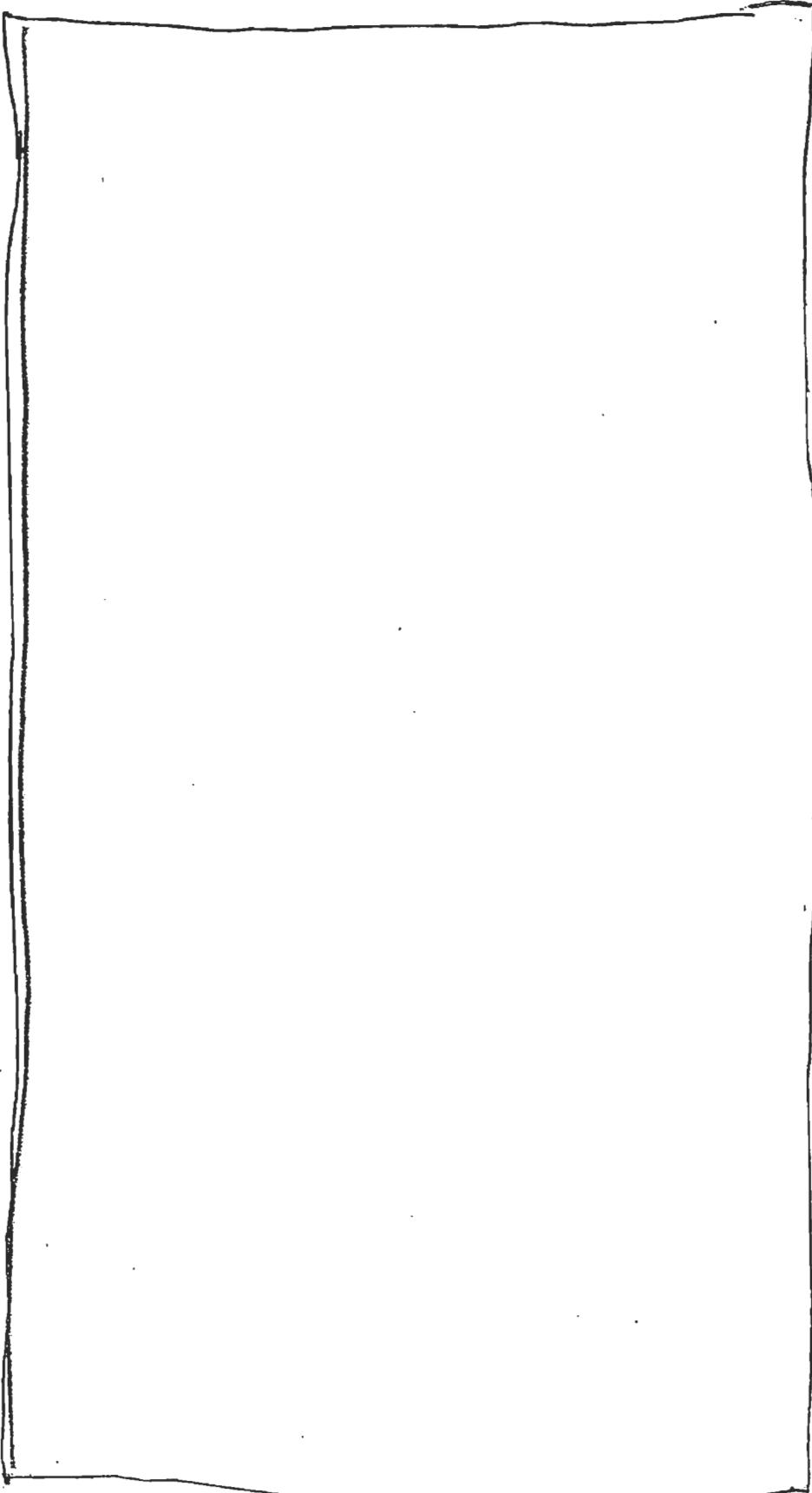


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# Electrical Considerations

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# Other Warhead Considerations



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- Fireset
  - Implements safety theme
  - Possible detonator compatibility issues
  - Enhanced surety tradeoffs
- Hostile protection
  - Current implementation appears OK
  - Fireset changes may require re-qualification
- NG timing issues (re-qualification)
  - New JTA likely



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# Operational Considerations

- Bus deployment
  - Most Mk4/Mk4A deployments are null miss

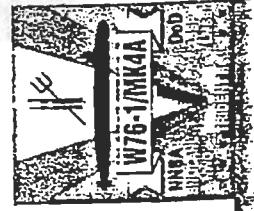
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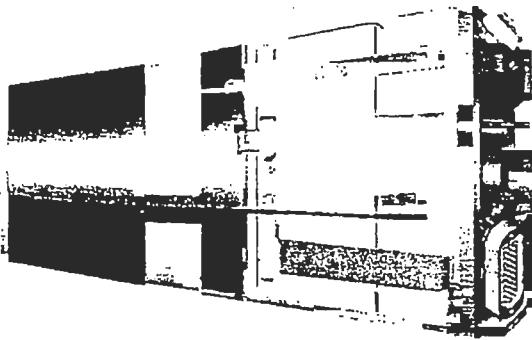
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FRD

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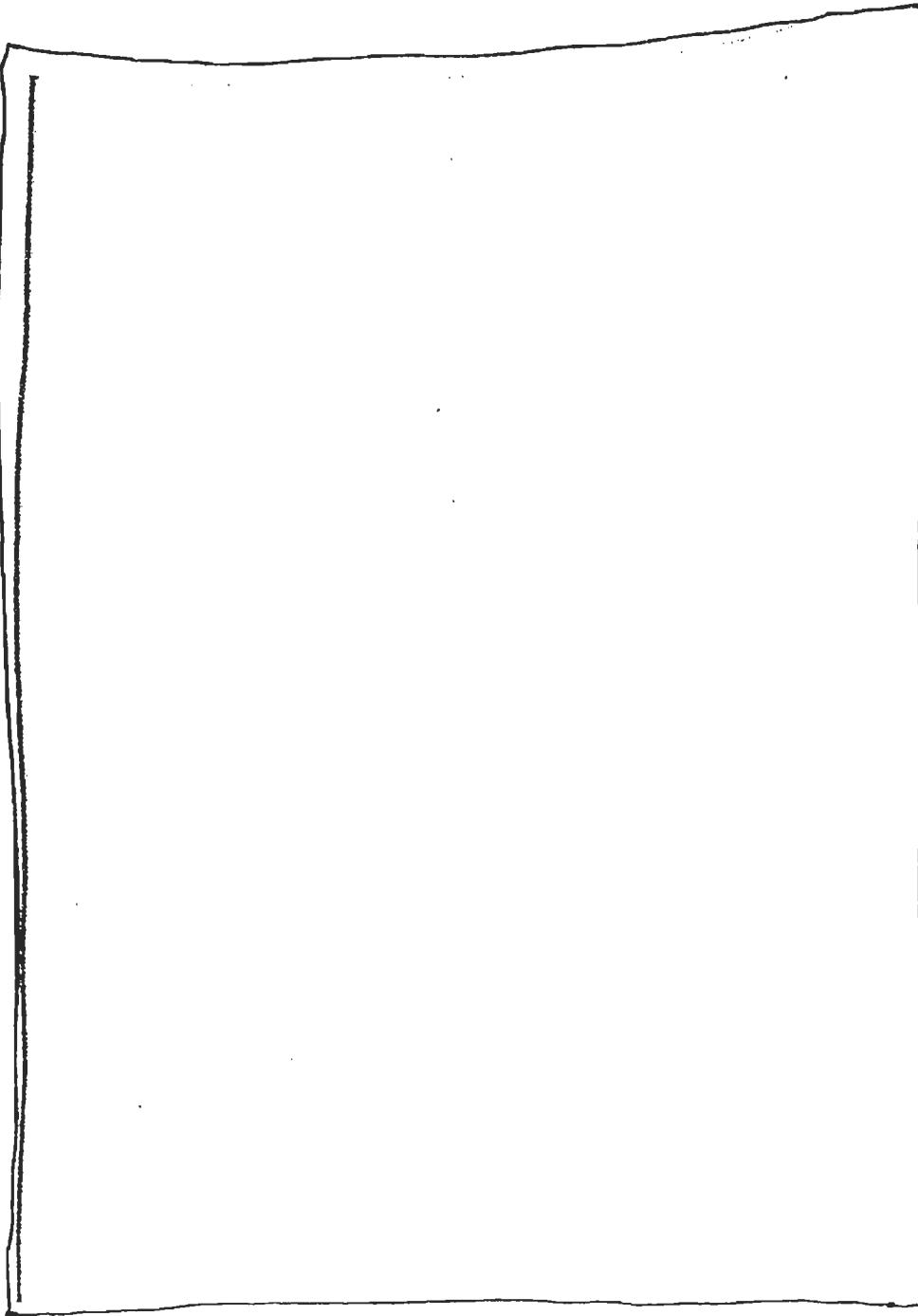
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# Observations

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**APPENDIX G**

**NAVY MASS PROPERTIES AND INTERFACE REQUIREMENTS**



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(b)(6)

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1974

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# Reliable Replacement Warhead (RRW) Kickoff Meeting

## Navy Mass Properties / Interface Requirements

[redacted] Privacy Act Exemption  
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Nebraska Avenue Complex  
3801 Nebraska Avenue, NW  
Washington, DC 20393-5230

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Reentry Systems Engineering

# Topics

G-4

- Navy Mk5/D5 Interface Requirements
- Navy Mk5/D5 Mass Property Constraints
- Mk5/D5 Reentry Body and Release Assembly Structure

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Reentry Systems Engineering

# Mk5/D5 Interface Requirements

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- RRW will require Interface Control Drawings (ICDs) similar to Mk5/W88 & Mk5B/PRP (SWPP)
  - Identifies interface requirements within Reentry Body (RB) between DoD & NNSA
- RRW will require Physical & Functional ICDs for the following RB types:
  - War Reserve (WR)
  - Production Flight Test configurations
  - Trainer Reentry Bodies will either comply with WR or Flight Test configuration ICDs

# RB INTERFACE DOCUMENTS - D5

## INTERFACE CONFIGURATION CONTROL DRAWINGS (ICDs)

- \* DEFINES CROSSES-CONTRACT CRITICAL INTERFACES FOR RD SYSTEM
- \* CONTRACTUAL DOCUMENT
- \* APPROVED BY LRIS, AND NAVY
- \* AUTHENTICATED BY NAVY
- \* ALSO KNOWN AS INTERFACE DEFINITION DOCUMENT (IDDs)

## TEST INTERFACE CONTROL DRAWINGS (TICDs)

- \* DEFINES RD TO RD INTERFACES
- \* DEFINES RD TO NASA (OCE) FOR TEST RD
- \* REGULATES ACTIVE UNIT SUPPORTED BY PROBE (FOR TICD ON COMPLETION OF TESTING)
- \* APPROVED BY ICDs
- \* NOT AUTHENTICATED BY NAVY

## INTERFACE CONTROL DRAWINGS (ICDs)

- \* DEFINES RD TO RD INTERFACES
- \* CONTRACTUAL DOCUMENT
- \* APPROVED BY LRIS, AND NAVY
- \* AUTHENTICATED BY NAVY
- \* NOT AUTHENTICATED BY NAVY

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REVISED: 20 APRIL 2005  
4th Interact. Test, V1

## MK5

## S-RIMU

5669590	5670091
Wk 4 RD TO MK5-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 5 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD

5671041	5671042
Wk 4 RD TO MK5-1 PHYSICAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5669591	5671043
Wk 4 RD TO MK5-1 PHYSICAL & FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5671040	5671044
Wk 4 RD TO MK5-1 PHYSICAL & FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

(\*) IN PROCESS OF AUTHENTICATION

## MK4A

5669595	5671041
Wk 4 RD TO MK4A-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4A-1 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5671119	5671157
Wk 4 RD TO MK4A-D FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD N	Wk 4 RD TO MK4A-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD

5668857	5669316
Wk 4 RD TO MK4A-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4A-1 PHYSICAL ICD TRK: NO(+) U ICD YES SFRD

5669317	5671040
Wk 4 RD TO MK4A-1 PHYSICAL & FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4A-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

(\*) IN PROCESS OF AUTHENTICATION

## MK4

3031117	5669590
Wk 4 RD TO MK4-0 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4-1 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5671157	5671040
Wk 4 RD TO MK4-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5669317	5671040
Wk 4 RD TO MK4-1 PHYSICAL & FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5671040	5671044
Wk 4 RD TO MK4-1 PHYSICAL & FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK4-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

(\*) IN PROCESS OF AUTHENTICATION

## CDs

## CDs

NOTE:  
REQUIRED DOCUMENTS REGARDLESS OF  
MISSILE/REB/RBA CONTRACTS:  
ICDs, TICDs

REQUIRED DOCUMENTS BECAUSE MISSILE/  
REB/RBA CONTRACTS ARE DIFFERENT:  
ICDs, TICDs

KFY:

## cDs

5662590	5662576
Wk 4 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 5 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5662591	5662592
Wk 4 RD TO MK5-1 FUNCTIONAL ICD TRK: NO(+) U ICD YES SFRD	Wk 4 RD TO MK5-0 FUNCTIONAL ICD TRK: NO(+) U ICD NO(+) U

5662593	5662594
Wk 4 RD TO MK5-1 PHYSICAL ICD TRK: NO(+) U ICD YES SFRD	Wk 5 RD TO MK5-0 PHYSICAL ICD TRK: NO(+) U ICD NO(+) U

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# E<sup>B</sup>M

Reentry Systems Engineering

## Mk5/D5 Mass Property Constraints

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- Mass property parametric studies of Mk5 Aeroshell & D5 Missile with heavier warheads were performed
  - Alternate Warhead Phase 2 Feasibility Study 1992-94
- Following chart shows Reentry Body (RB) weight & longitudinal CG constraints for Mk5/D5 configuration
- Release Assembly (RA) has lower structural margins for Test Missile configuration

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Reentry Systems Engineering

# Mk5/D5 Mass Property Boundaries

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## (5 Body Configuration - Worst Case)

■ = Test Missile stayout region

■ = Ballast plate stayout region

□ = Test Missile acceptable region

Tactical RA

SWPP Position 8  
Test Missile RA

Weight

Heatshield Limit

Ballast plates (nozzle erosion)

Aftward stability

W88/Mk5

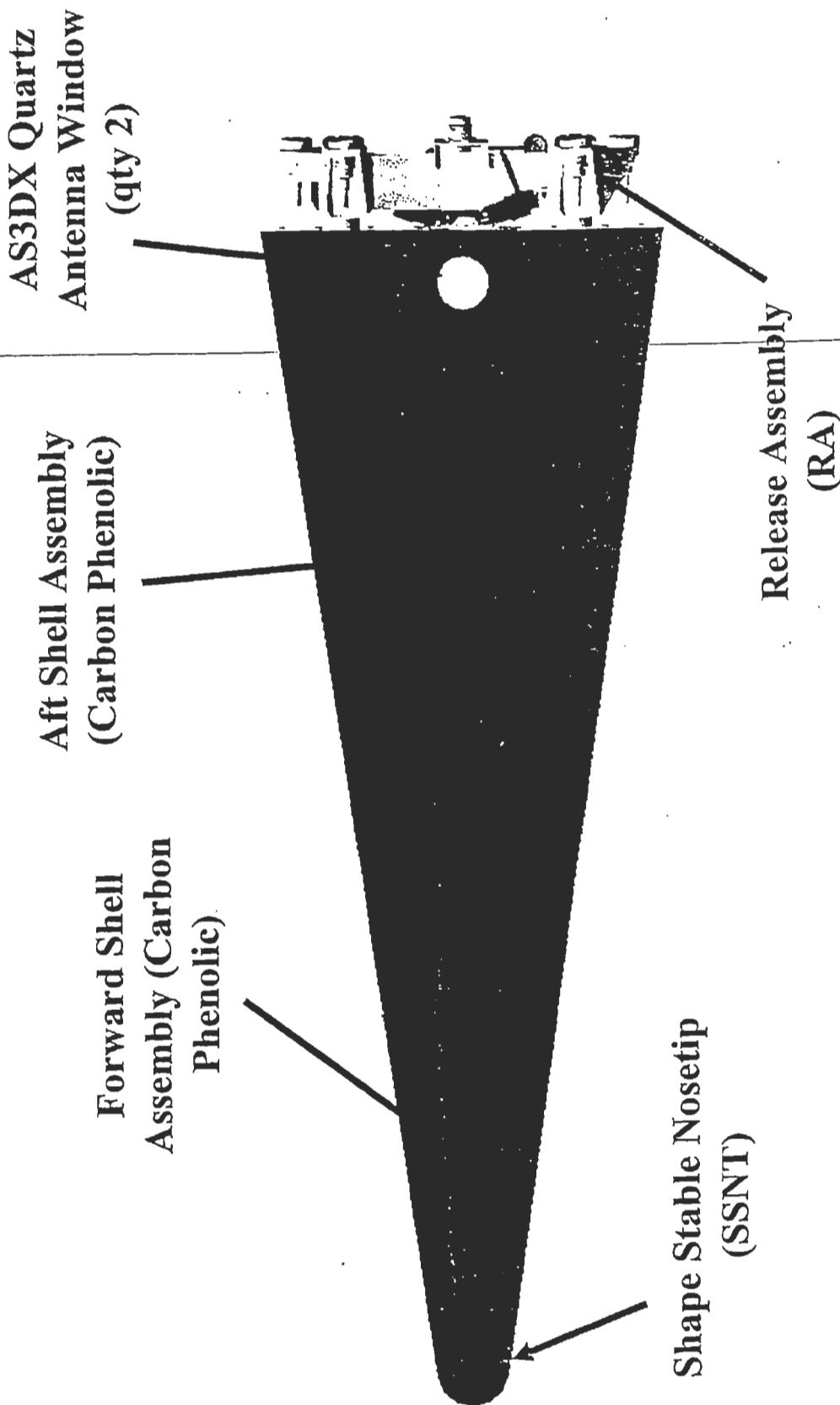
Mk5 ICD Limits

CG from nose

**F**BM

Reentry Systems Engineering

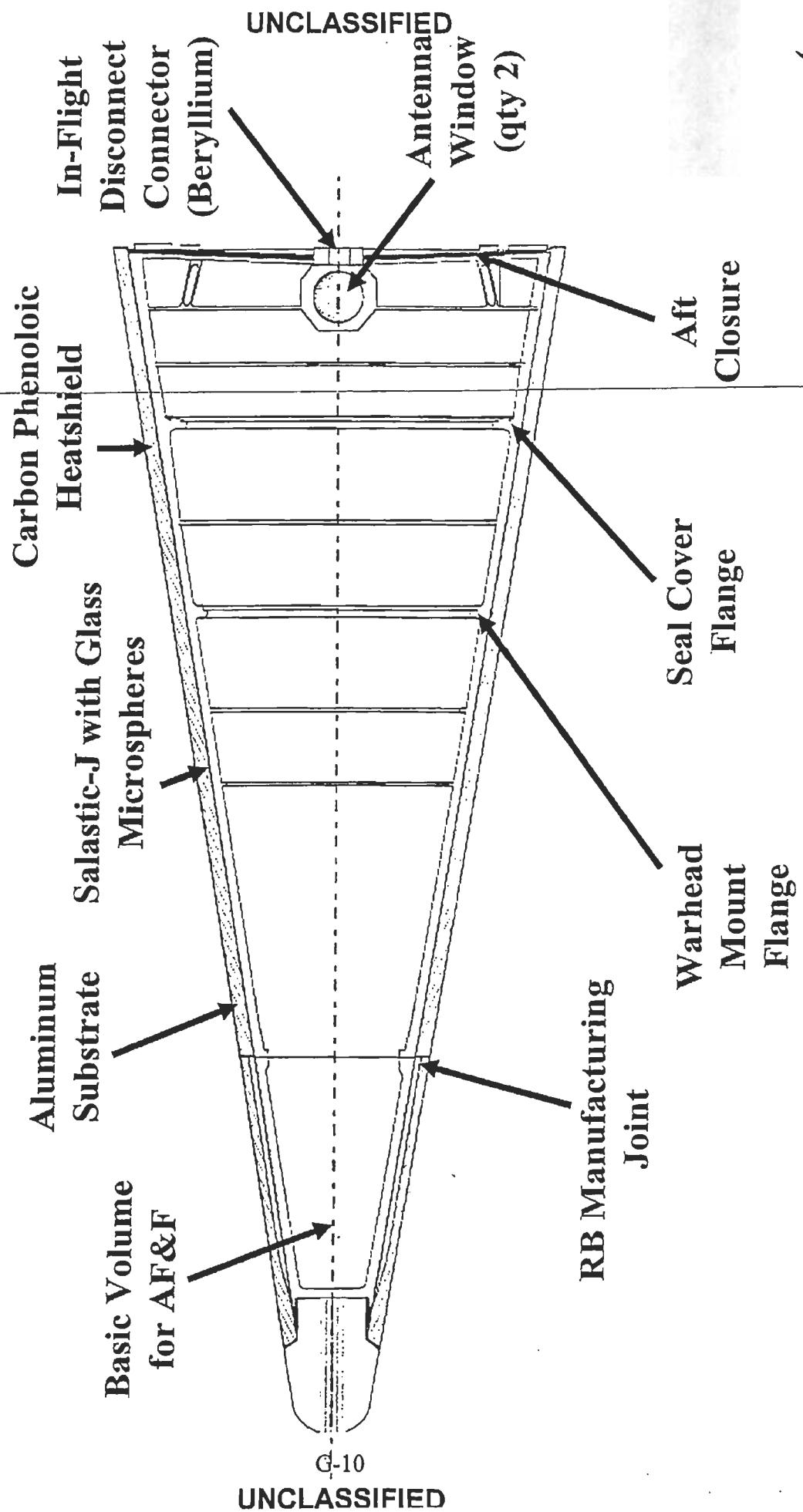
# Mk5 Reentry Body Assembly (RBA)



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Reentry Systems Engineering

# Mk5 RBA - - Internal Structure

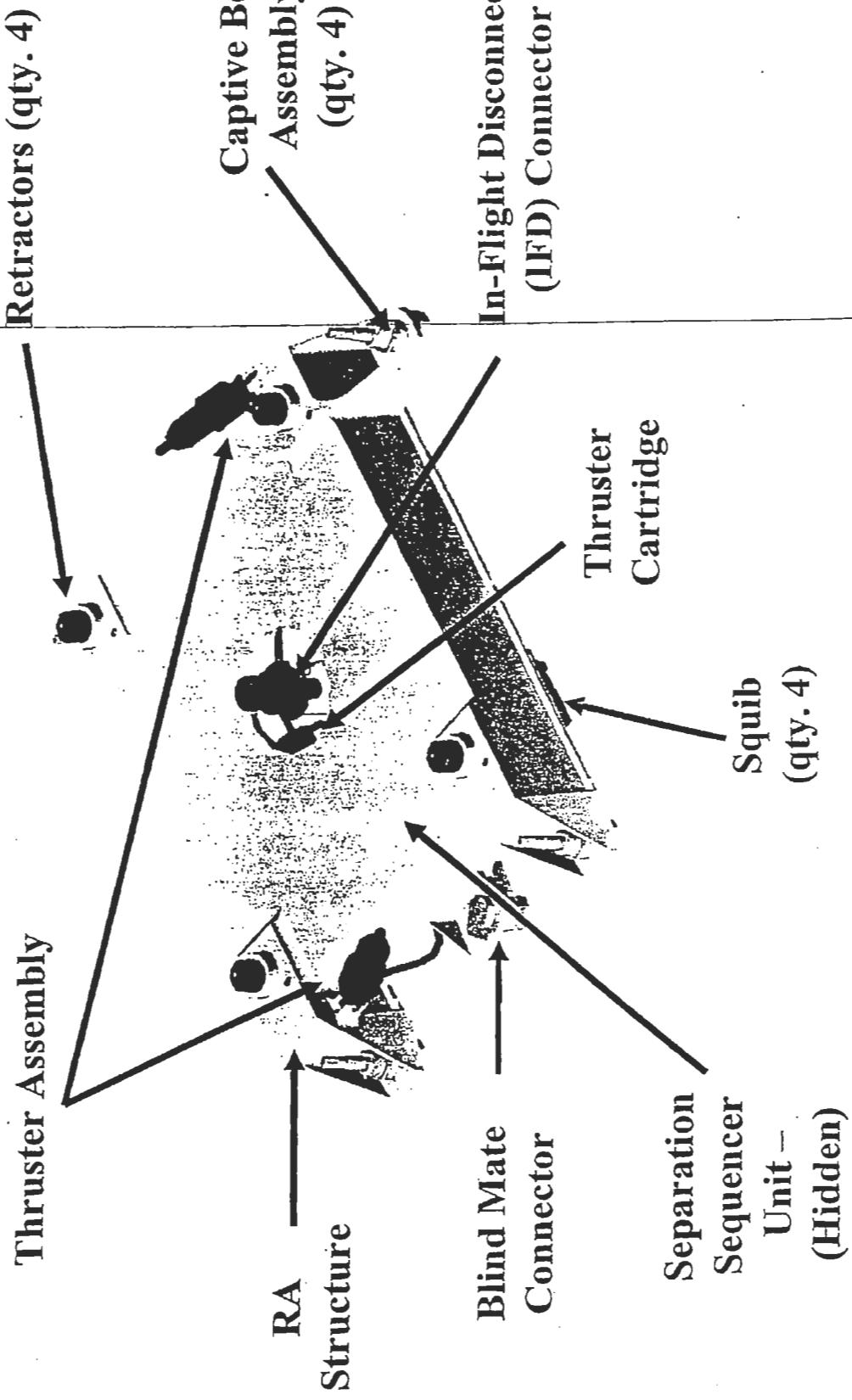


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# Mk5 Release Assembly

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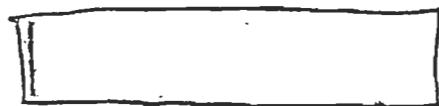
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G-12  
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APPENDIX H

MK12A FUZE / AF&F AND MASS PROPERTIES / INTERFACE REQUIREMENTS (U)



Albuquerque, NM

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(b)(6)  
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# ~~SECRET RESTRICTED DATA / CNWDL~~ Headquarters U.S. Air Force

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## MK12A/W78 Arming & Fuze Assembly Mass Properties and Interfaces



11 May 2005

*Exemption 6(b)(6)*

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<del>Critical Nuclear Weapons Design</del>
<del>Information-DOD Directive 5210.2</del>

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# Overview

- W78/mK12A Characteristics
- W78/Mk12A Military Characteristics
- W78 Military Characteristics and Stockpile-To-Target Sequence
- Environment
- Mk12A Reentry Vehicle System
- Mk12A Dimensions and Mass Properties
- Mk12A Arming and Fuzing System
- System Operations and Schematic
- Environmental Requirements
- Conclusion



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# W78/Mk12A Characteristics (U)

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# W78/Mk12A Military Characteristics (U)

- Nuclear safety
- DOE and DoD components compatible w/ Mk12A
- Operational reliability
- Survivability in normal environments
- Yield
- Security
- Minimum maintenance
- Operational simplicity



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**Military Characteristics & Stockpile-To-Target Sequence (U)**

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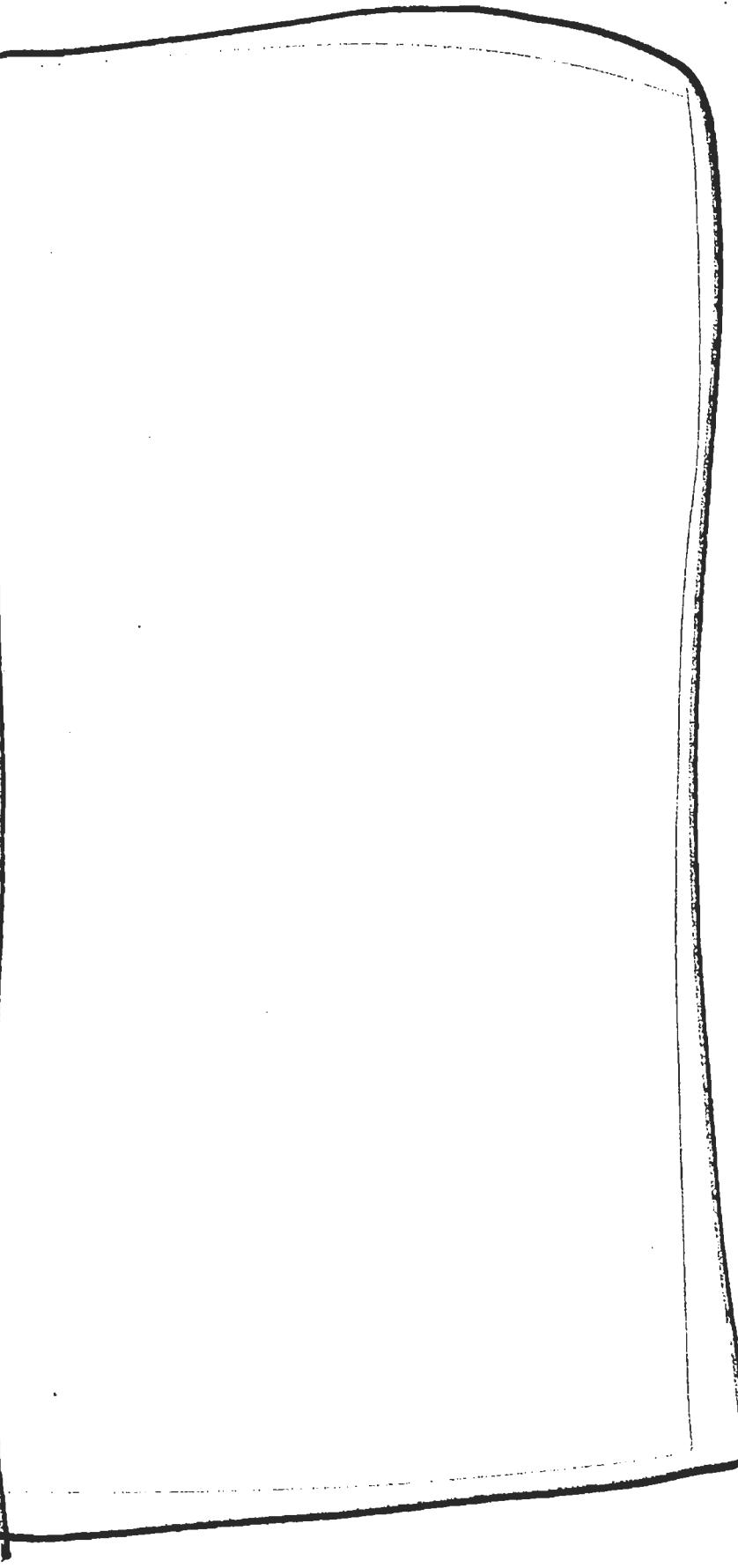
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# Environment (U)

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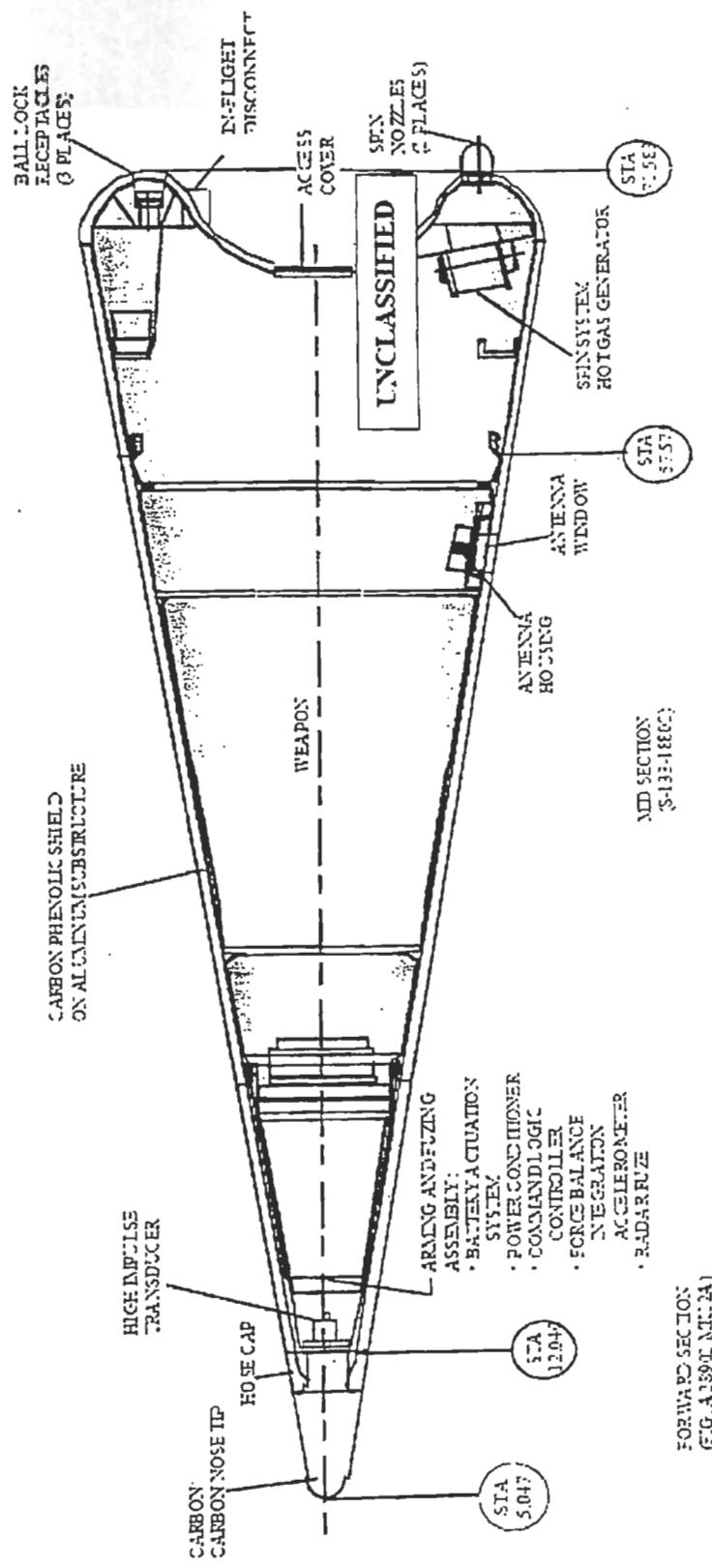
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# Mk12A Reentry Vehicle (U)



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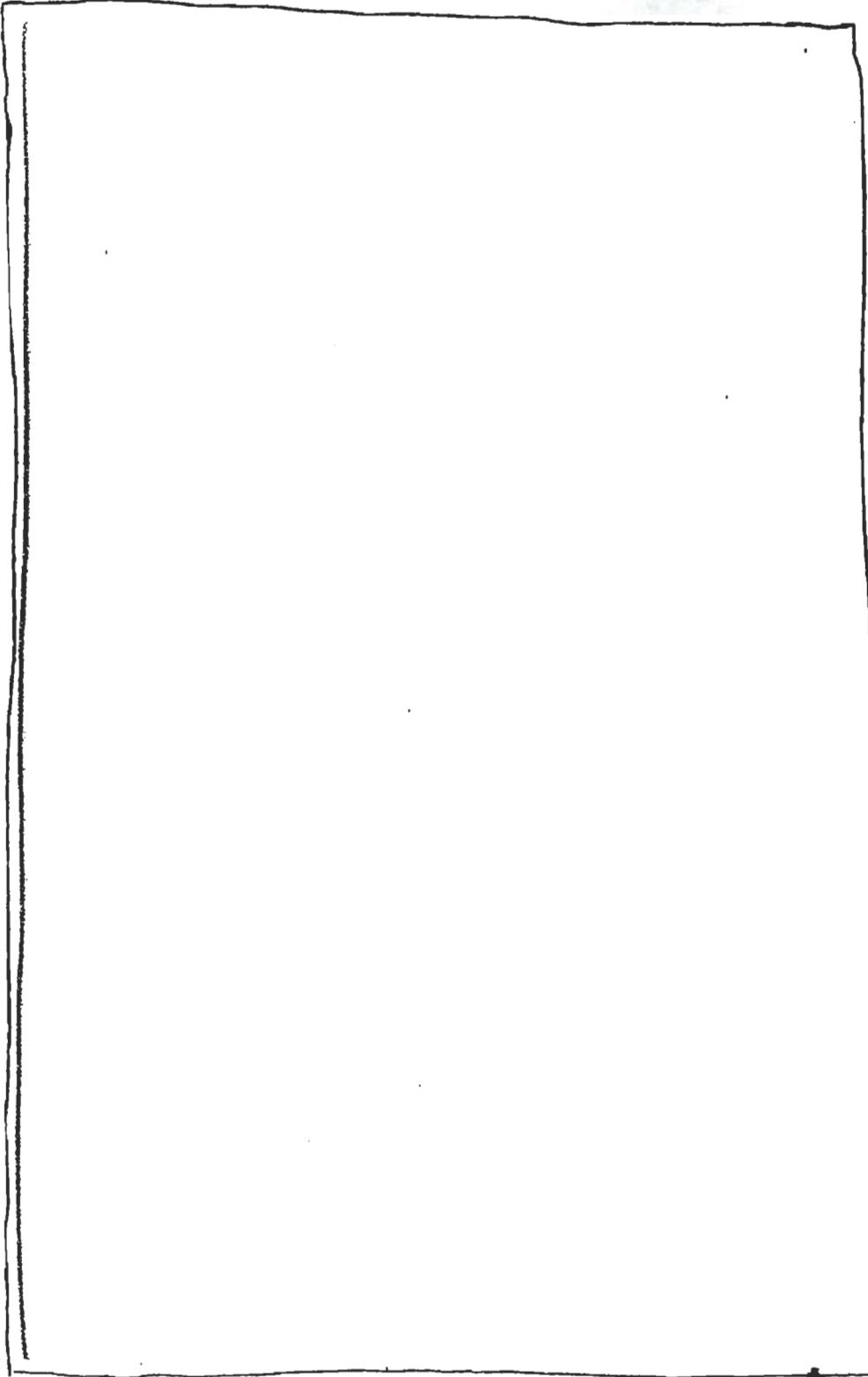
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**MIM-III Mk12A Reentry System  
External Dimensions (U)**



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# Mk12A RV External Dimension and Mass Properties (U)

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~~SECRET RESTRICTED DATA / ONWID~~

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# Mk12A Arming and Fuzing Assembly (U)

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ARMING FUZING ASSY (AFA)

MK12A

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# Arming and Fuzing System

- High Impulse Transducer (HIT)
- Arming and Fuzing Assembly (AFA)
- Battery Activation System (BAS)
  - Pressure Activated Valve (PAV)
  - Remotely Activated Battery
- Command Logic Controller (CLC)
- Force Balance Integrating Accelerometer (FBI A)
- Power Conditioner (PC)
- Radar Fuze Assembly
- Warhead Firing System

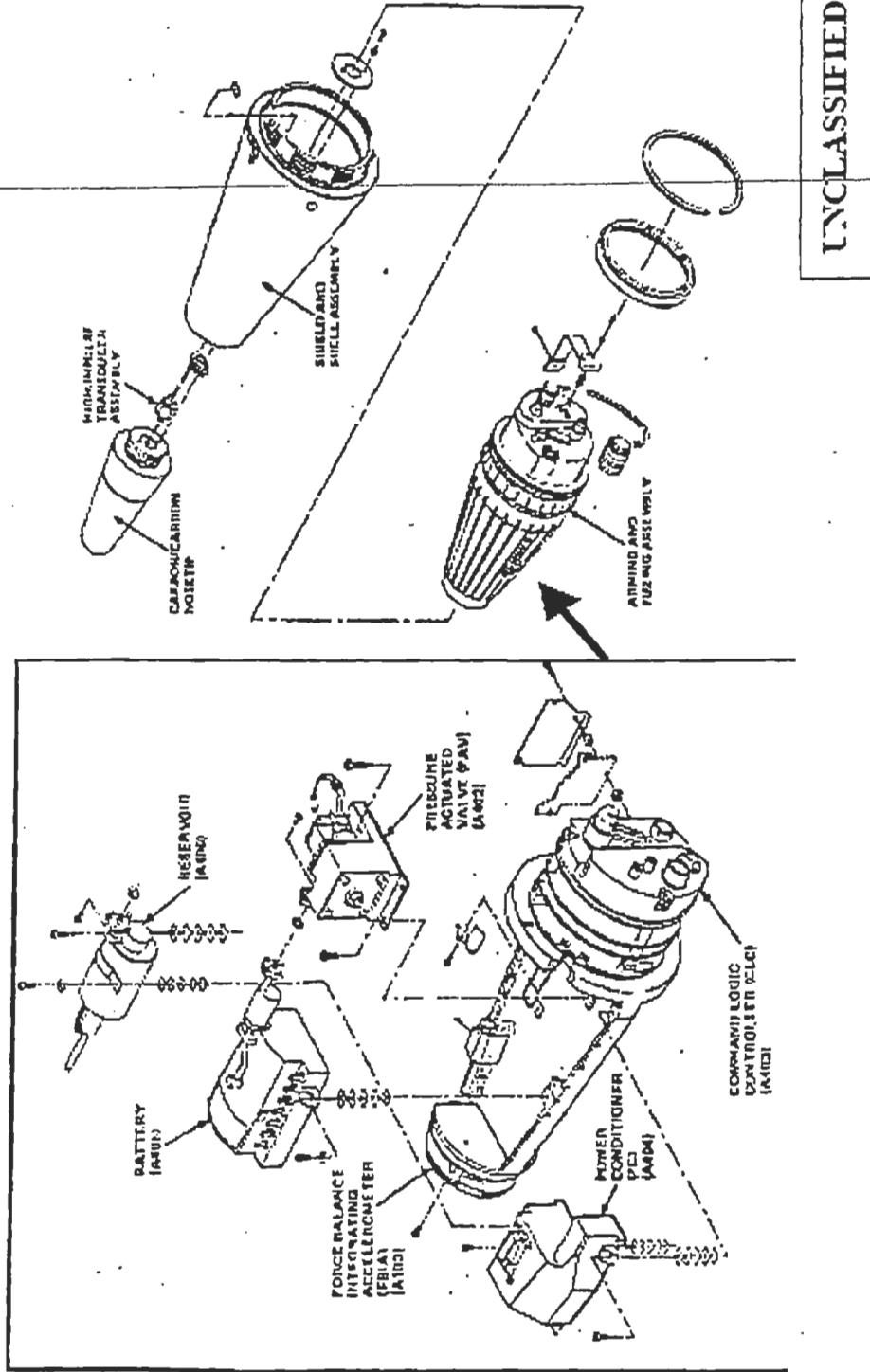


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# MK12A Forward Section

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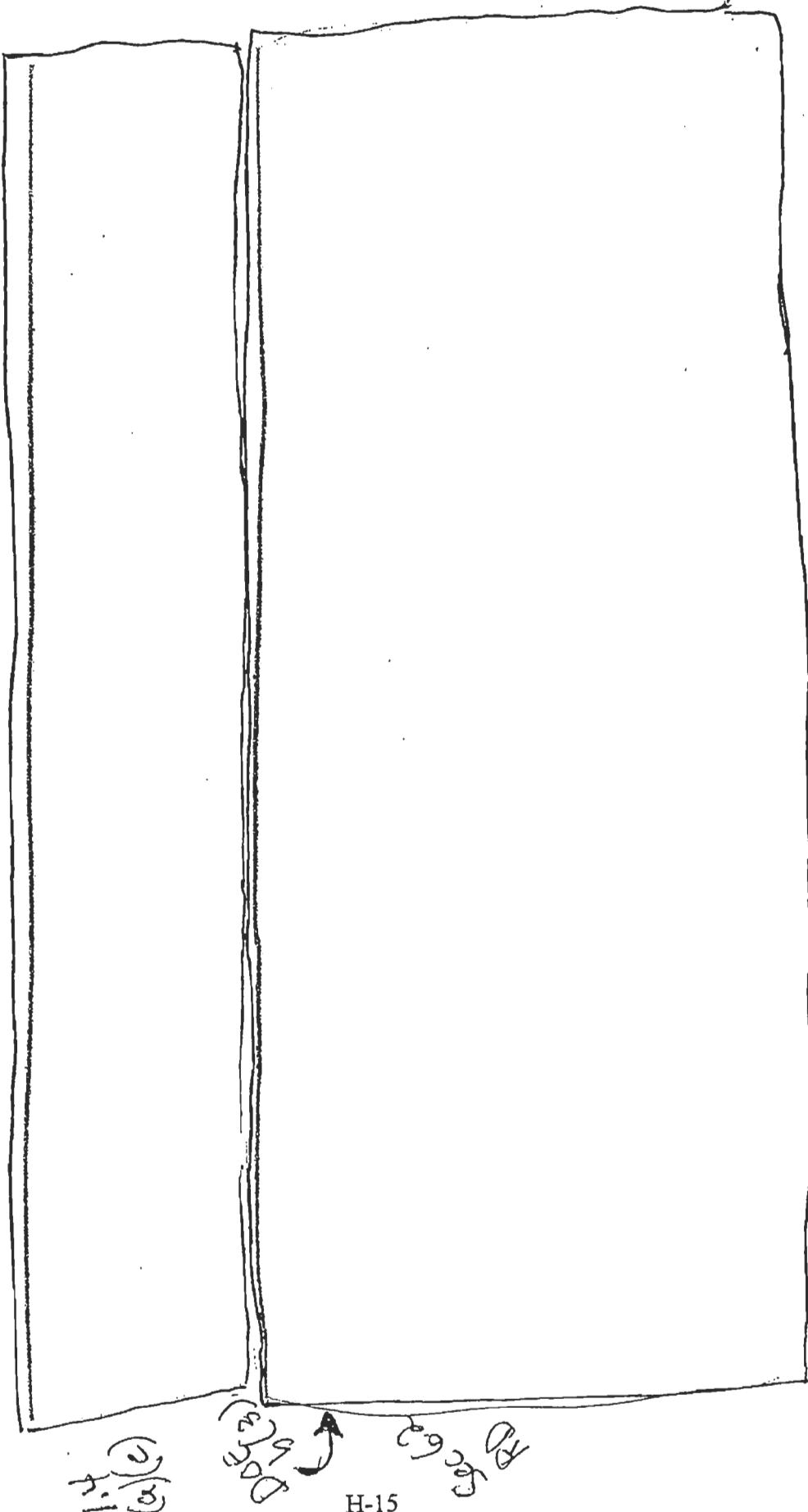




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# ~~SECRET~~ Mk12A Arming and Fuzing System (U)

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# Arming and Fuzing System Operation (cont'd) (U)

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~~SECRET//RD~~

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~~SECRET RD~~

# *W78 Arming and Fuzing System*

## *Sequence of Events (U)*

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~~SECRET RD~~

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~~SECRET RESTRICTED DATA / CNWDL~~

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~~SECRET RD~~

# *W78 Arming and Fuzing System Operations Schematic*

**U.S. AIR FORCE**

6.2 RD

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# Conclusion

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- Military Characteristics
- Platform Requirements and Mass Properties
- Arming and Fuzing System
- Environmental Requirements

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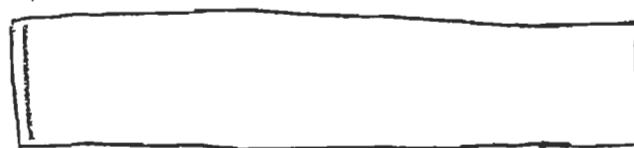
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APPENDIX I

NNSA RESPONSIVE INFRASTRUCTURE IMPLEMENTATION



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Privacy Act  
(1974)

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# NNSA Responsive Infrastructure Implementation

Presented to

*Reliable Replacement Warhead (RRW)*

*Project Officers Group (POG) Kickoff Meeting*

by

Exemption  
C(6)(b)(6)

Privacy Act. 1974

*National Nuclear Security Administration (NNSA)*

May 11, 2005



# RRW and Responsive Infrastructure Implementation Must Be Linked



"The National Nuclear Security Administration (NNSA), in conjunction with the Department of Defense (DoD), will explore Reliable Replacement Warhead (RRW) options for ensuring the long-term sustainability of the military capabilities provided by warheads in the existing stockpile. With the support of Congress, we are undertaking the RRW program to understand whether, if we relaxed warhead design constraints imposed on Cold War systems (e.g. high yield to weight ratios that have typically driven "tight" performance margins in nuclear design), we could provide replacements for existing stockpile weapons that could be more easily manufactured with more readily available and more environmentally benign materials, and whose safety and reliability could be assured with highest confidence, without nuclear testing, for the long term. We intend that such an effort will also result in reduced infrastructure costs for supporting the stockpile. Indeed, we see the RRW program as the "enabler" for both stockpile and infrastructure transformation."

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# Responsive Infrastructure Implementation



## Definition of an NNSA Responsive Infrastructure:

**Responsive infrastructure includes people, facilities, and practices at agile National Laboratories and production plants that meet identified and unanticipated nuclear security needs related to the nuclear weapon stockpile in a timely manner at a sustainable cost.**

## Objective of a Responsive Infrastructure Implementation:

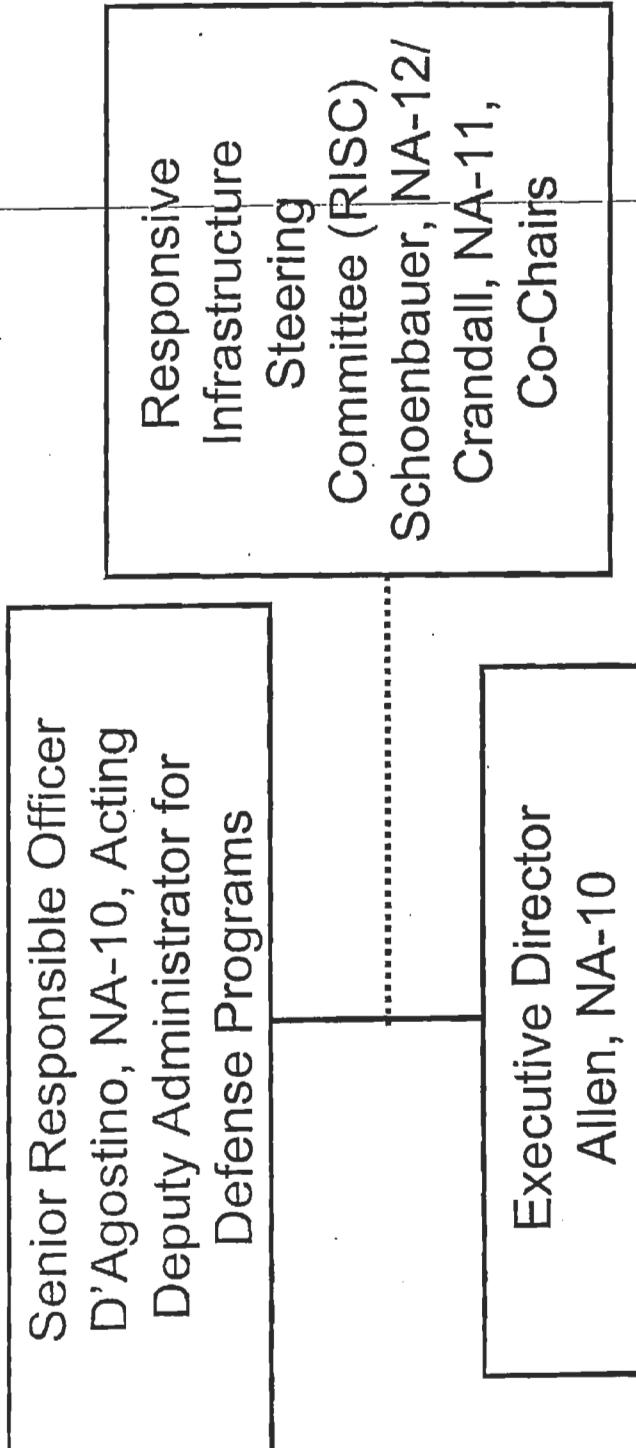
**To manage the strategy to implement a responsive nuclear weapons infrastructure that supports transformation of an aging stockpile, is resilient for unanticipated events, and meets future requirements in a timely and agile manner at lower cost.**



# Responsive Infrastructure (RI) NNSA Management Structure



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- Planning and initiating RI Implementation
- Interfacing with Reliable Replacement Warhead (RRW) Project Officers
- POG (POG) & DoD RI transformation initiatives
- Integrating RI goals with Directed Stockpile Work (DSW), Campaigns, Readiness in Technical Base and Facilities (RTBF) activities



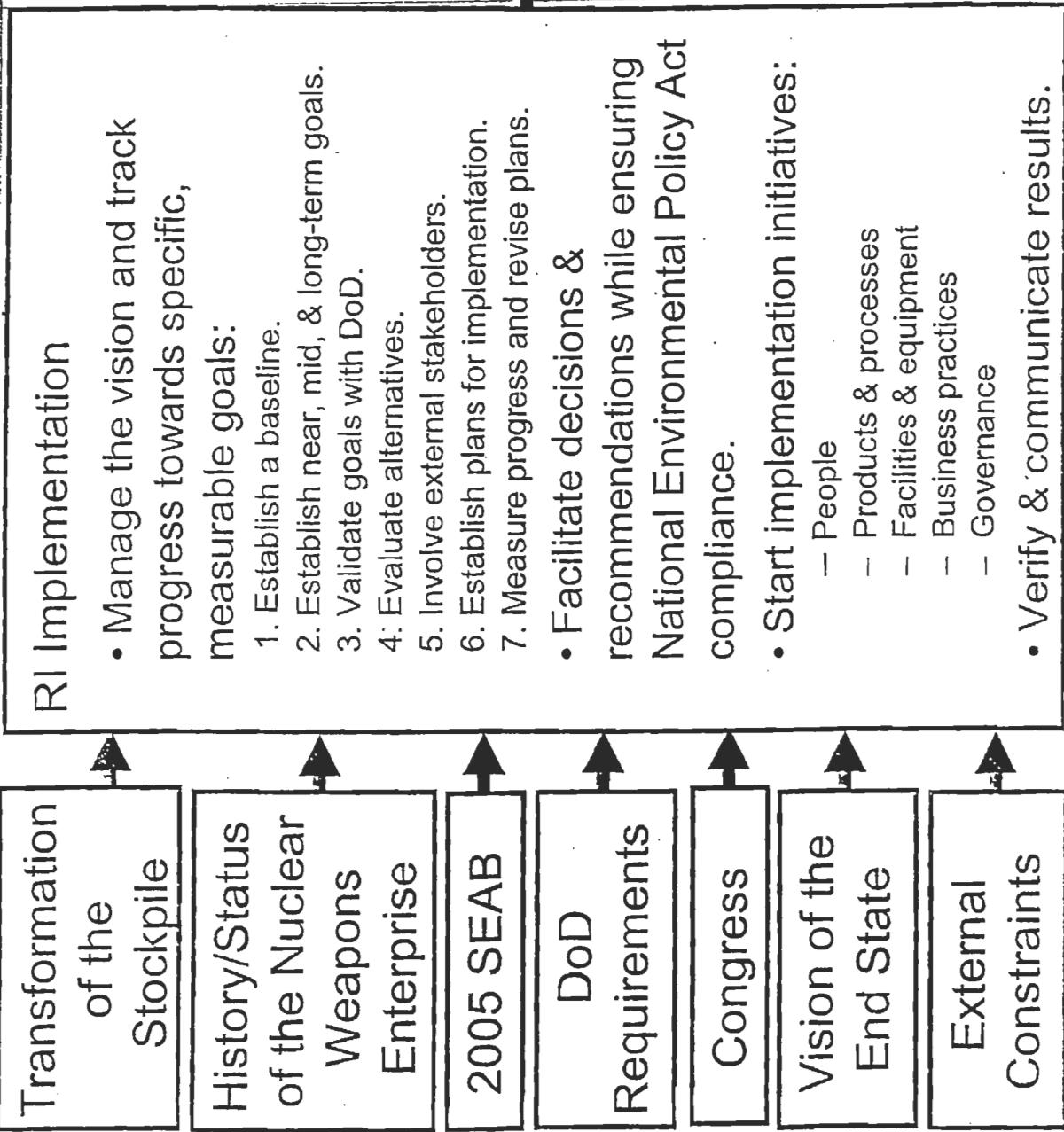
# Responsive Infrastructure (RI) Implementation Approach



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5

Desired  
End State  
Of  
The  
Enterprise



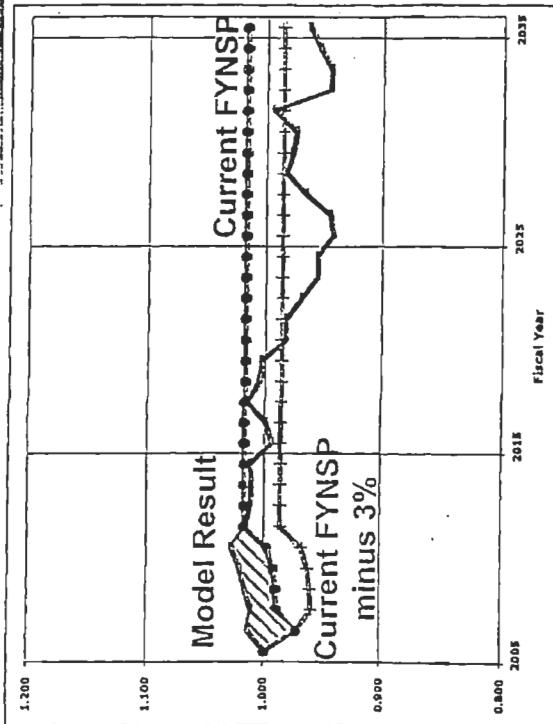


# NNSA Enterprise Models Support Evaluation of Future Alternatives



National Nuclear Security Administration

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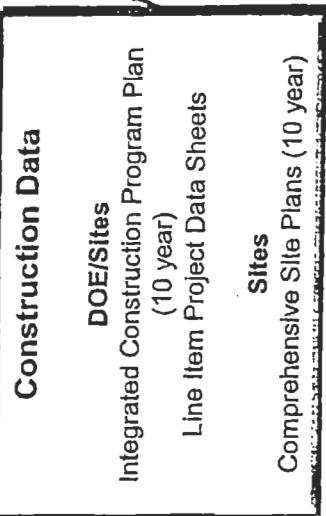
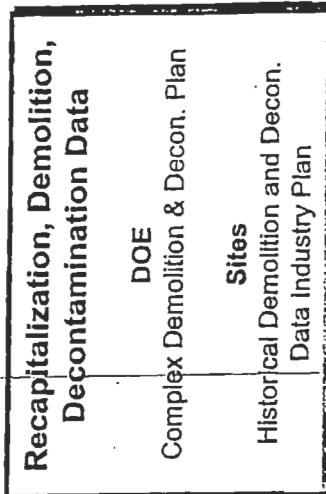
## Program Execution Data

DOE Configuration Control Implementation Plans  
Production Capability  
R, D, & T Capability  
Y-12, Pantex  
Savannah River,  
Kansas City  
LANL, LLNL,  
SNL, NTS

## Budget

DOE/Congress/OMB  
Five-year Budget  
Congressional Budget Tables  
Site Splits  
Direct/Indirect Cost Analysis  
Appropriation Data  
External Audits and Analysis

## Enterprise Models



# Characteristics of Current Infrastructure



**NNSA**  
National Nuclear Security Administration

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- Limited data on development process has not been exercised

• Limited data

- Focus of life extension programs has been on replacement of parts.
- Limited data on development in modern safety, security, and no testing era.
- Fixed costs dominate:
  - For the most part, the NNSA Nuclear Weapons Complex has been capability-driven rather than capacity-limited during the past 15 years.
  - Maintaining a broad range of capabilities results in high fixed costs that may no longer be sustainable.
- Safety and security compliance are major factors
  - Significant impact on responsiveness, cost, and future options.
- Stockpile transformation is essential to achieving a responsive infrastructure.
  - Infrastructure must be exercised to be responsive.
  - Right-sizing to reduce cost and increase responsiveness depends on the long-term product requirements of the enterprise.



# RRW Can Facilitate Transformation to a Responsive NNSA Infrastructure



National Nuclear Security Administration

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<u>Responsive Infrastructure Objective</u>	<u>RRW Linkage</u>
Reduce manufacturing time duration and costs	<ul style="list-style-type: none"><li>• Eliminate or simplify process steps</li><li>• Eliminate or reduce hazardous materials</li><li>• Develop and qualify modular components</li><li>• Increase use of commercial off-the-shelf parts</li></ul>
Reduce certification time duration and costs	<ul style="list-style-type: none"><li>• Establish robust margins or reduce uncertainties</li><li>• Maintain certification without underground testing</li></ul>
Reduce surveillance and maintenance costs and time commitments	<ul style="list-style-type: none"><li>• Reduce uncertainties of system aging</li><li>• Reduce surveillance/maintenance complexity and frequency</li></ul>
Sustainable safety posture	<ul style="list-style-type: none"><li>• Eliminate/reduce materials that add to safety basis complexity and costs for facilities and operations.</li></ul>
Sustainable security posture	<ul style="list-style-type: none"><li>• Enhance intrinsic security and use control features that contribute to reductions in security costs.</li></ul>
Reduce dismantlement costs	<ul style="list-style-type: none"><li>• Plan for eventual disposal and disposition</li></ul>

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RRW life-cycle costs need to be considered in total system context.

## Closing



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- Achieving responsive infrastructure goals depends on the RRW and successful transformation of the stockpile.
  - Infrastructure must be exercised to be responsive.
  - Right-sizing to reduce cost and increase responsiveness depends on the product requirements of the enterprise.
  - RRW approach can make achieving a responsive infrastructure easier or more difficult.
- Secretary of Energy Advisory Board (SEAB) - Responsive infrastructure recommendations expected June 2005.
- Initial NNSA Plan for Responsive Infrastructure Implementation – Late summer 2005

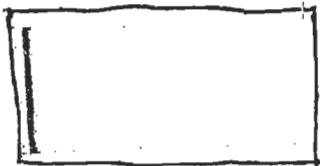
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APPENDIX J

FORCE STRUCTURE REQUIREMENTS (U)



Exemption  
6(b)(6)

Privacy Act  
1974

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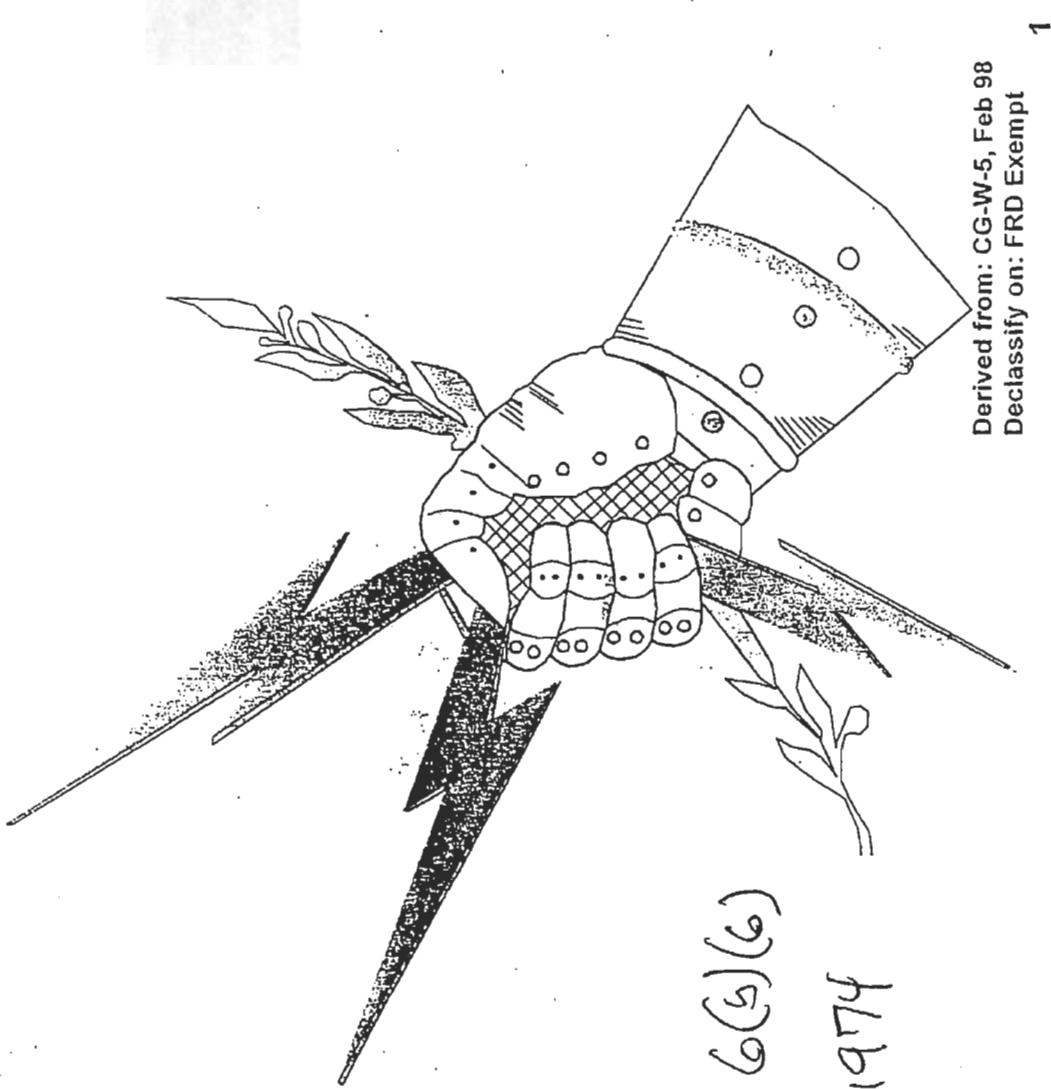
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# ~~SECRET~~ FORMERLY RESTRICTED DATA RRW Force Structure Requirements



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## ~~FORMERLY RESTRICTED DATA~~

This material contains Formerly Restricted Data as defined in the Atomic Energy Act of 1954.  
Handle as Restricted Data in foreign dissemination. Unauthorized disclosure subject to administrative and criminal sanctions.

Exemption 6(g)(6)

Alvey At 1974

This slide is unclassified.

Derived from: CG-W-5, Feb 98  
Declassify on: FRD Exempt



# AGENDA

- 2012 Ballistic Missile Force Structure
- Notional Ballistic Missile Force Structure with RRW
- RRW Yield Analysis
- Warfighter Desired RRW Attributes



# 2012 FORCE STRUCTURE REQUIREMENTS

REPORT OF THE STRATEGIC STUDIES GROUP

Sec 6.2  
FRD

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(b)(3)

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~~SECRET FORMERLY RESTRICTED DATA~~



# NOTIONAL FORCE STRUCTURE WITH RRW

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Sec 6.3  
FRD

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DOE b(3)

# RRW YIELD TRADE ANALYSIS

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~~SECRET FORMERLY RESTRICTED DATA~~

J-7

Sec 6.2 F&D

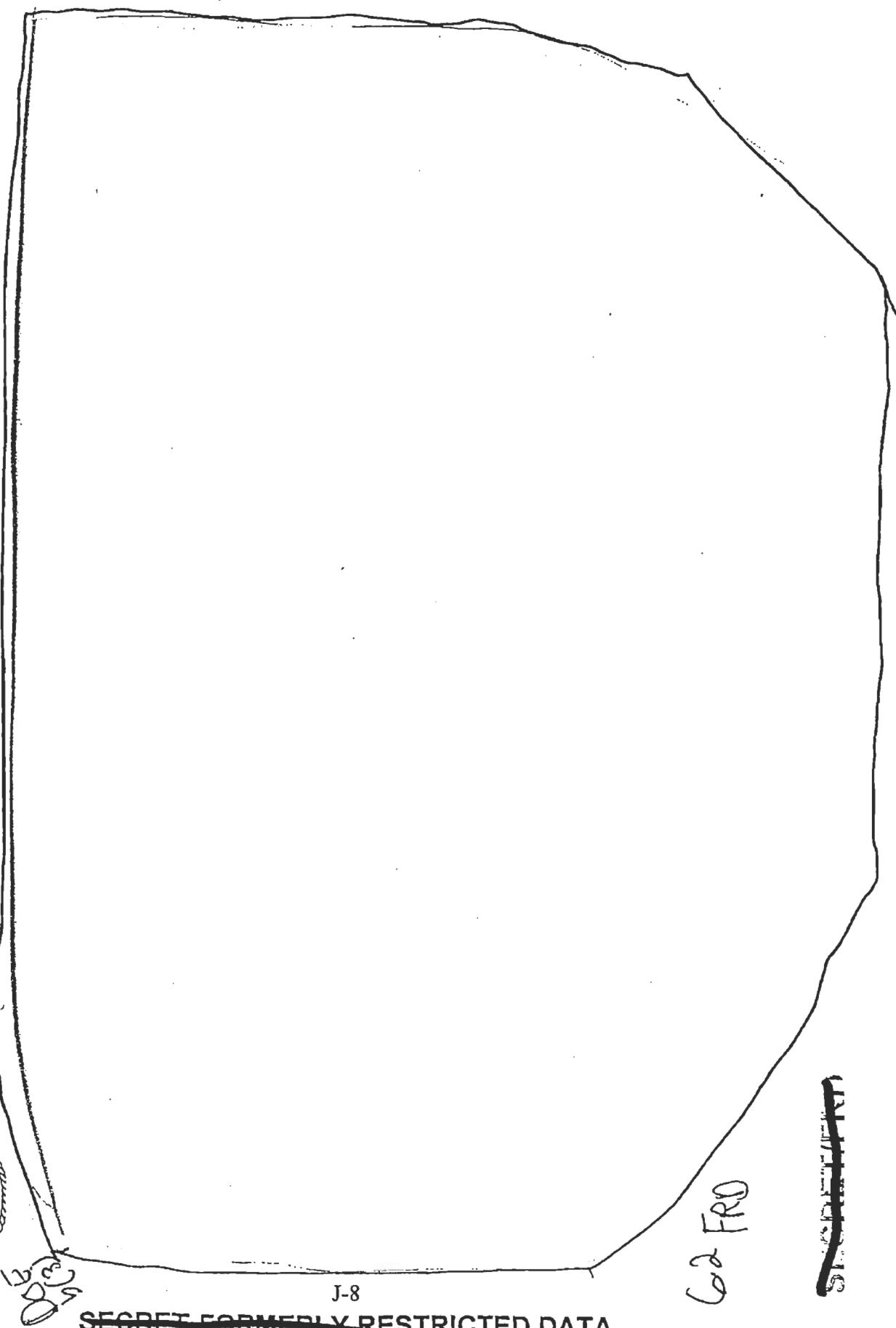
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# RRW YIELD TRADE ANALYSIS RESULTS



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## WARFIGHTER DESIRED RRW ATTRIBUTES

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Sec 6.2 FWD

DOE 5(3)

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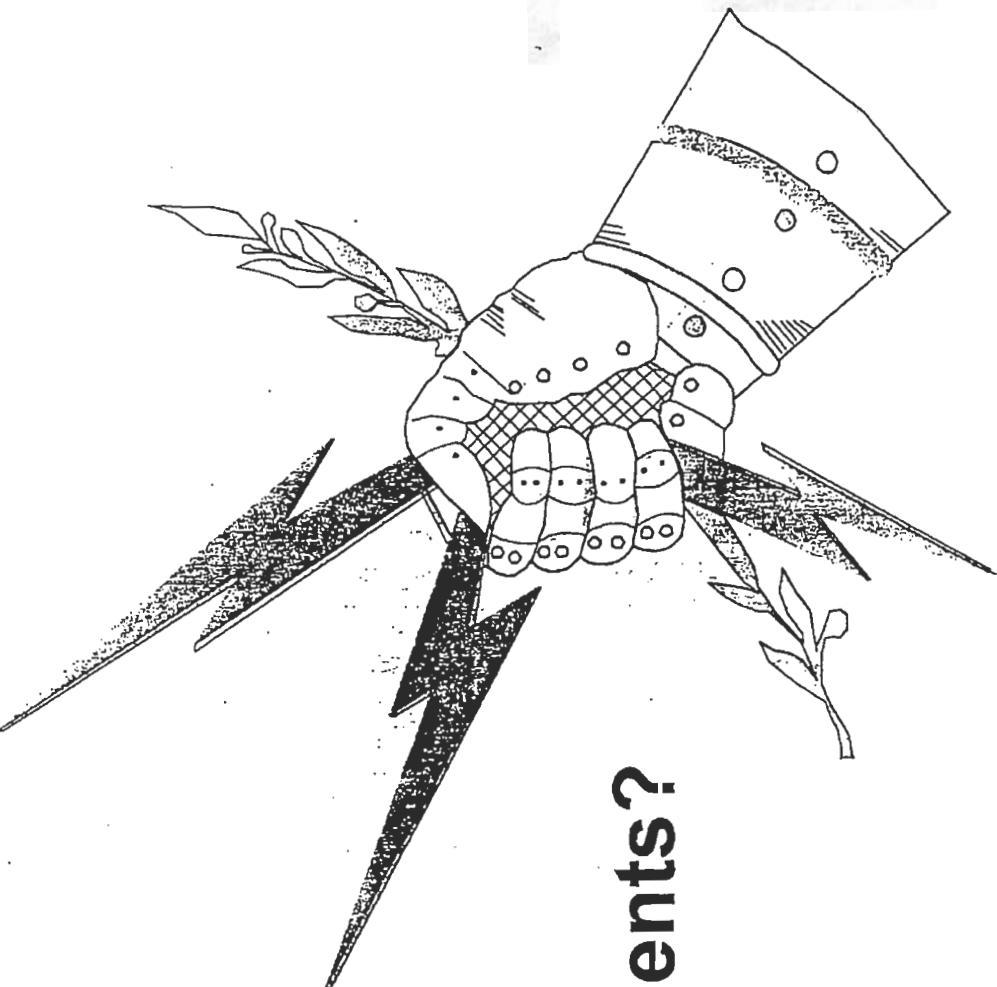
- Integrated, enhanced surety features
- Compatible with ICBM delivery system
  - Compatible with Mk12A
  - Size must accommodate up to 3 RVs per ballistic missile

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# RRW Force Structure Requirements

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## Questions/Comments?



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## WARRIOR CONCERNS

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- Political will to fully execute concept and reap potential benefits
- Success of infrastructure recapitalization efforts
  - Transformation not complete until 2030+
  - Ability to meet projected FPU and LOC dates
- Operational risks associated with concept and transformation
  - May require delivery system modifications / improvements
- Must be aligned with JCIDS process

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## APPENDIX K

### LLNL DESIGN OPTIONS



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K-2

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## LLNL Design Options for RRW POG Kickoff (U)

As presented to:

### RRW POG Kickoff Meeting

11 May 2005

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May be exempt from public release under the Freedom of Information Act (5 U.S.C. 552), exemption and category:  
Exemption 5: Deliberative Process Privilege  
~~Department of Energy review required before public release~~  
Date: 11 May 2005  
Name/org: K. Henry O'Brien, DNT  
Guidance (if applicable):



*Exemption (c) (5)*

*Privacy Act  
1974*

## Defense and Nuclear Technologies

This work was done under the auspices of the Department of Energy by the University of California Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48  
Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94551



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## Outline

- RRW goals
- LLNL design approach
- Planned activities
- Summary

K-4

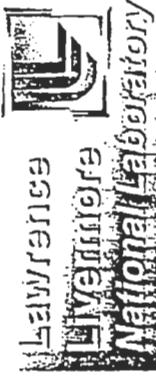
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## Reliable Replacement Warhead Study

- RRW to enable transformation to responsive and sustainable infrastructure
  - Ease of manufacture & certification; reduced lifecycle cost; safe, secure, and reliable

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- Minimum Cost W76 Risk Reduction - FPU 2010

RRW Study purpose, scope, and issues outlined in  
Terms of Reference document



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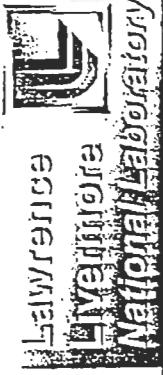
## LLNL RRW design approach

b(5)

- Engineering weaponization
  - Ease of manufacture and service
  - Mk5 integration and ICBM compatibility
  - Accommodate advanced surety as an option
- Quantification of Margins and Uncertainties (QMU) drives design and provides certification strategy



# Unclassified



## LLNL RRW manufacturing approach

- Pit manufacturing development on site and on the team
  - Tied with LANL manufacturing through pit campaign
- New LLNL-developed safe detonator much more manufacturable than MSAD
- Responsive infrastructure projects
  - Rapid case design and manufacture
- Collaboration with plants must expand during study
- Fully integrate RRW and Responsive Infrastructure
- Dynamic Enterprise Modelling is used to collate data on enterprise focus on high-leverage areas for infrastructure transformation



**Unclassified**



## Study plan in development

- Preliminary draft requirements being gathered
- Integration with SNL/CA started, need contacts with military interface
- Preliminary design concepts definition this fiscal year
- Pit manufacturing studies started
  - Feasibility test of fabrication process proposed next FY
- Support costing studies and infrastructure transformation studies
- Leading to assessment of feasibility of preliminary designs and other study deliverables (e.g. Certification Plan)

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## **Minimum cost W76 risk reduction options**



- Concepts discussed in run-up to RRW POG are straightforward
- Review previous studies that have assessed W76 backup options
- Update previous studies
  - Candidate warheads are aging
  - Stockpile Stewardship Program findings need to be incorporated into concept assessments



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## **Summary**

- Reliable Replacement Warhead (RRW) design studies underway
- Beginning weapon concept integration process
- Limited experimental work on preliminary design and manufacturing concepts planned to be accomplished in course of 18-month study
- Ready to engage POG and POG Subgroups and Working Groups

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APPENDIX L

LANL DESIGN OPTIONS



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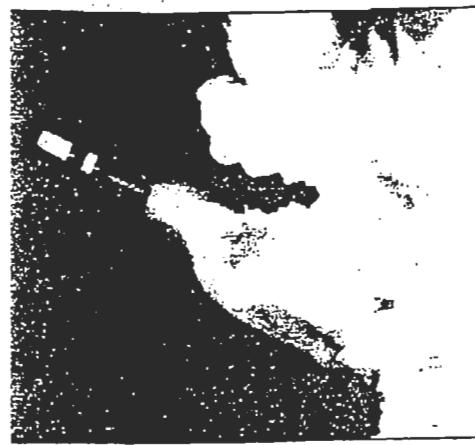
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# Reliable Replacement Warhead Joint Project Officers Group

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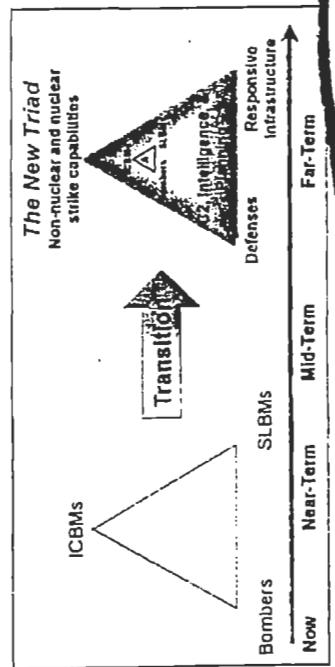
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Los Alamos National laboratory

11 May 2005



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## Opening Comments

- RRW is an exciting opportunity for the nation and has captured significant national interest, we are excited to see it develop as a formal study
- It requires design laboratories to partner with manufacturing agencies and end users to develop engineered solutions
- The study period coincides with certification efforts on the W76-1 and the W88—this provides a unique design opportunity to augment the analysis efforts underway

*RRW is seen as both a product and a process,  
with varying expectations from each of four  
primary customers*

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~~ANSWER~~

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## Design data package for preferred RRW-1 options

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- Design options based on requirements (MCs, STS, surety, etc.)
  - Develop SLBM designs using modular design approach
  - Provide bridge to later design efforts that further enhance surety and are compatible with ICBM requirements
  - Key material decisions need to be addressed early in the study based on tradeoffs between cost, availability, ease of manufacture, ease of certification and performance requirements
- We are considering a broad suite of conceptual designs, some of which are based on the success of the earlier Strategic Warhead Protection Program (SWPP)

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## Efforts to Enable Design & Certification of RRW-1

- RRW will use programmatic synergism with Campaigns and DSW to achieve the highest quality product
- Development & Certification plans will be developed including lessons learned from the W76-1, B61 Alt 357 and W88 pit certification efforts
  - QMU-based certification methodology
  - Well established baselines for legacy warheads
  - Legacy-ASC models V&V
  - Small-scale science to underpin physics and characterize materials
  - Establish path for validation through small, mid and large scale integrated experiments



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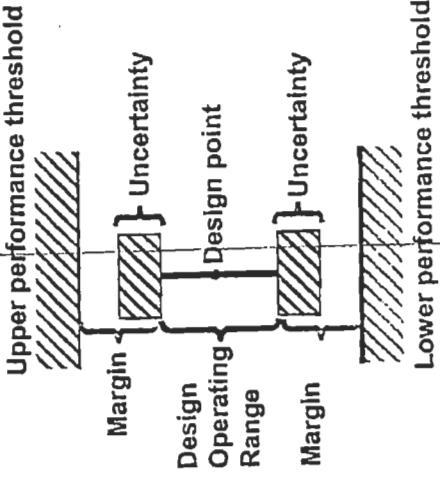
Published information -- May NOT be distributed outside  
the Department of Energy

## Development, Production, & Certification Plan

- Development & Production planning
  - Manufacturability is the interface between RRW as a product and a process!
  - LANL will work with plants and suppliers to establish & codify advantages and disadvantages for manufacturability



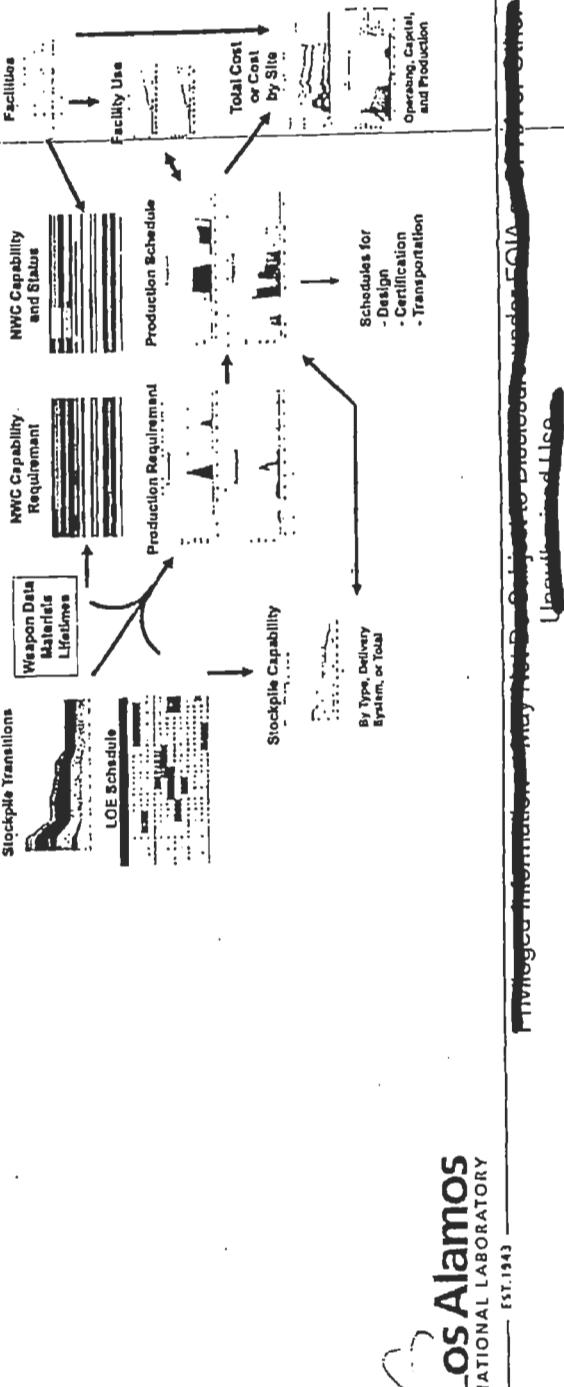
- Certification
  - Strategy and plan for preferred option will be based on Quantification of Margin and Uncertainties (QMU) methodology established on the W76-1 and W88 pit certification efforts.



## OCW Monitor Study

### Life cycle cost report on preferred design

- Recommend establishing subgroup for enterprise modeling and life cycle cost analysis—if intended for infrastructure working group to address, include in charter
  - Subgroup to establish common cost algorithms for design labs, production plants, and potentially DoD facilities
  - Subgroup responsible for consistent and fair comparisons for whatever model(s) is used



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## The deliverables are not parallel activities

TOR Deliverable	Phase 1	Phase 2	Phase 3	Phase 4
Risk Assessment	X			
Recommendation of Optimal Balance.....		X		
Design Data Package for risk reduction option			X	
Coordinated MC & STS Requirements (RRW-1)	X			
Design Data Package for RRW-1		X		
Development, Production & Certification plan for each option			X	
Cost report detailing resources to produce & maintain through lifecycle				X
Report describing how each RRW design fosters infrastructure transformation			X	

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## Conclusion: Key Discussion Points

- Alignment of customer expectations with scope, schedule and budget
- Scope:
  - System requirements
  - Surety requirements
  - Material selection and certification
  - Extent of experimental validation
- Schedule
  - The deliverables are order dependent and require a significant amount of integration across the complex in order to deliver a quality product
- Budget
  - The present budget is a constraint when spread across the list of deliverables
- Expectations: What do we see as the next steps at the end of the study and what level of confidence is necessary in order to take those steps?

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APPENDIX M

SNL DESIGN OPTIONS



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# RRW Opportunities

RRW POG Kick-off  
May 11, 2005

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Department of Energy review date: 5/11/2005  
Name/Org: Edna Talbot Date: 5/11/2005  
Guidance (if applicable) N/A



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## RRW is the first opportunity to fundamentally reshape surety implementation in response to the post 9/11 environment

- Advanced weapon surety enables transformation by significantly reducing the possibility of unauthorized nuclear detonation
  - Advanced surety can increase responsiveness by eliminating hazards (NDSE and NBE throughout the life-cycle)
  - Advanced surety enables balanced focus across access denial, containment, and recovery to significantly reduce both risk and life-cycle cost
- Advanced surety can be implemented without significant impact to military capabilities
- Previous experience has convinced us that these technologies can be implemented with minimal risk and without UGT



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## Comprehensive RRW systems engineering enables desired capabilities while minimizing risk

- Advanced surety technologies eliminate the surety burden on firing systems
  - Advanced surety technologies are deeply buried
  - Deeply buried surety eliminates bypasses and frees up significant weight and volume
- This available weight and volume can enable desired capabilities
  - Eliminate MAR exceptions (NDSE)
  - Reduce cost
  - Robustness (increased static margin, range)
  - Increase LLCE interval
  - Other capabilities
- Comprehensive system engineering across the entire weapon system lifecycle enables full exploitation of the opportunity presented by RRW

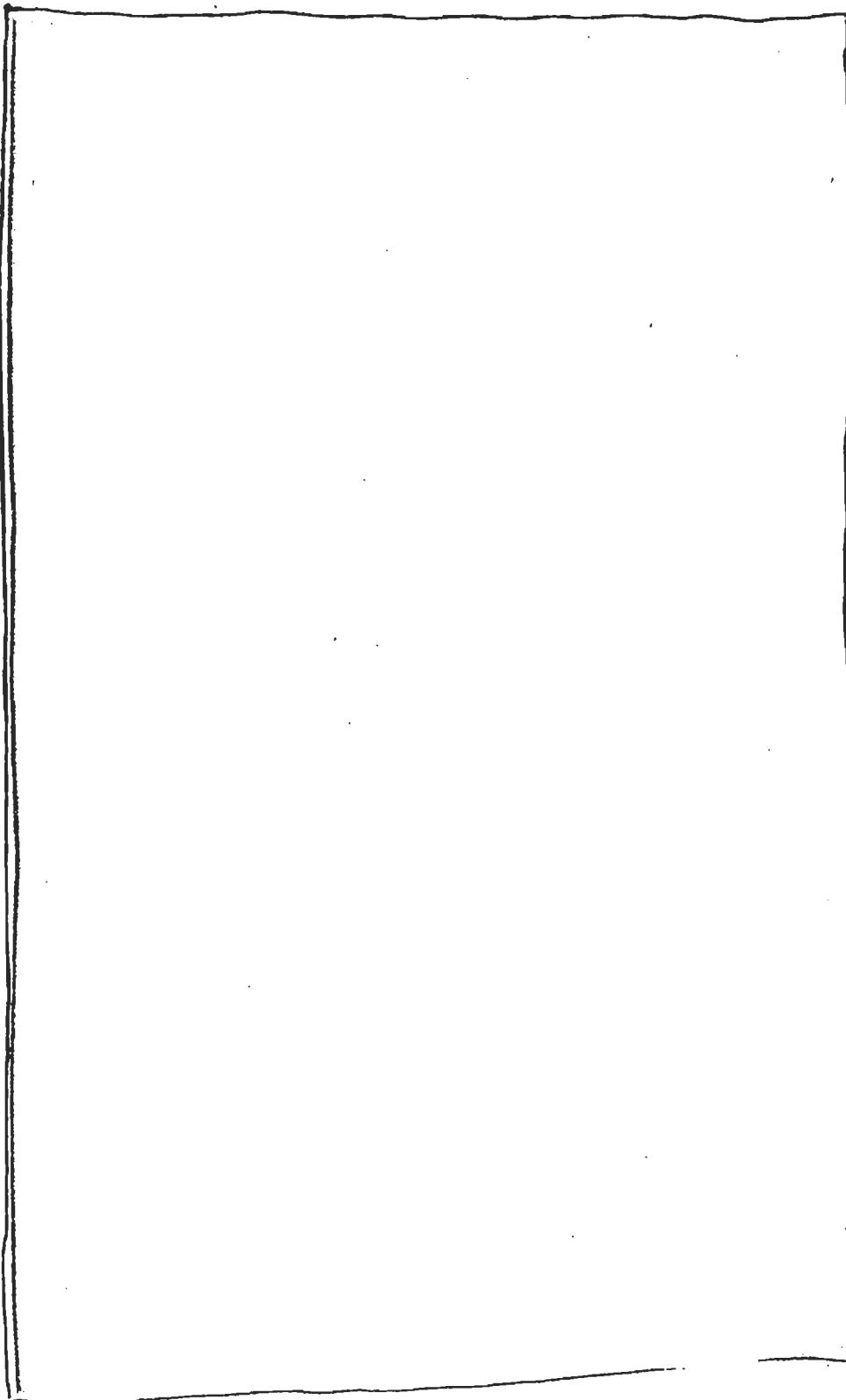
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## Advanced surety technologies push surety elements deeper to eliminate MAR exceptions

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RRW Opportunities – May 11, 2005 – Page 4

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Advanced surety technologies enable reductions in the cost, weight, and volume of firing systems.

See (6.2) SFRD

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~~See G.2 FRG~~

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## Advancements in UC technologies preserve capabilities while reducing impact

- Advanced surety technologies may enable implementation without significant impact to military capabilities

- Old:
  - Thick █
  - Big
  - Hungry
- New:
  - Thin █
  - Small (20x)
  - Frugal (50x)



ISS can provide extended awareness

***Delay can be increased without significant impact on military capabilities***

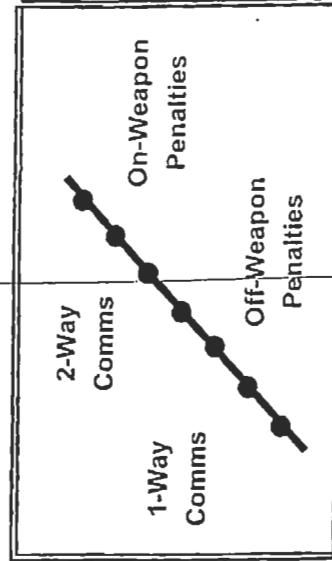
## Future Global Strike doctrine indicates a need for global communication links

"Future Global Strike missions will use weapons possessing two-way secure communications that allow for real-time command, targeting, retargeting, disarm, and disablement from the time of weapons release through impact/detonation."

From the *Strategic Deterrence Joint Operating Concept*, February 2004, page 37

Section entitled "Necessary Military Capabilities and Attributes (Means)", subsection entitled "Global Strike"

- Situational awareness
- Communications
- Penalties
- Autonomous behavior



Weapon C2 Can Entail Various Combinations  
Of Communications & Penalties

## Weapon C2 can provide desired Global Strike capabilities



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# “Re-integration” will be required for RRW to successfully transform the enterprise

## RRW solutions

- Weapon systems
  - joint systems
  - modular payloads
- Surety
  - use control / security systems integration
  - inherently sure systems
- Weapon design
  - robust margins
  - single stage options
  - ease of manufacture
- Stewardship approach
  - surveillance alternatives
  - field replaceable components

## DOD/DOE impacts

- Lower cost enterprise
  - fewer weapons, types
  - less costly infrastructure
  - reduced overhead (security, surveillance, M&O,...)
- Robustly secure
  - insensitive to DBT
  - flexible response options
- Mission effectiveness
  - flexible to changes
  - robust to failures
- Sustained confidence
  - demonstrated capabilities
  - less “tightly wound”

Re-integration required

## RRW is the first opportunity to fundamentally reshape surety implementation in response to the post 9/11 environment

- Advanced weapon surety enables transformation by significantly reducing the possibility of unauthorized nuclear detonation
  - Advanced surety can increase responsiveness by eliminating hazards (NDSE and NBE throughout the life-cycle)
  - Advanced surety enables balanced focus across access denial, containment, and recovery to significantly reduce both risk and life-cycle cost
- Advanced surety can be implemented without significant impact to military capabilities
- Previous experience has convinced us that these technologies can be implemented with minimal risk and without UGT

**Excerpt from the RRWATOR**  
**Weapons that are safe and secure by design!**

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**APPENDIX N**

**ACTION ITEMS**

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ACTION ITEMS from the RELIABLE REPLACEMENT WARHEAD  
PROJECT OFFICERS GROUP KICKOFF MEETING  
ITT AES, Arlington, VA  
11 May 2005

(Status as of 1 June 2005)

AI 1-1	NNSA (NA-11)/ ATSD(NM)	Provide clarification as to what constitutes a "new" weapon.  ECD: Next POG meeting STATUS: OPEN
AI 1-2	POG Principals	Provide names of members for each subcommittee and working group.  ECD: 20 May 05 STATUS: CLOSED
AI 1-3	POG Principals	Provide distribution list for general POG materials.  ECD: 20 May 05 STATUS: OPEN
AI 1-4	ITT	Distribute USN and USAF MCs and STS as appropriate.  ECD: 20 May 05 STATUS: CLOSED
AI 1-5	RSC	Brief POG on consolidated requirements.  ECD: Next POG meeting STATUS: OPEN
AI 1-6	RSC	Distribute draft RRW MCs/STS that reflect consolidated requirements.  ECD: 6-8 weeks STATUS: OPEN
AI 1-7	SNL/NM	Determine MK4A AF&F radar performance in MK5 shell. SNL/NM will provide proposed ECD no later than 16 May 2005. (Completed)  ECD: 30 Jun 05 STATUS: OPEN
AI 1-8	USAF/XOS	Identify USAF fuze for RRW study.  ECD: Next POG meeting STATUS: OPEN
AI 1-9	All SC/WG	Review draft charters; present revised charter to POG for review/approval.  ECD: Next POG meeting STATUS: OPEN
AI 1-10	POG Principals	Provide list of names for SIGMA 15 access.(20 May 05) Principals, alternates and key significant representatives.  ECD: Next POG meeting STATUS: OPEN

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**APPENDIX O**

**RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP  
MASTER MEETING SCHEDULE**

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**Reliable Replacement Warhead Project Officers Group Schedule**

ID	Task Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	<b>AO Briefings</b>														
2	RRW POG Plan														
3	RRW POG Status														
4	RRW POG Status														
5															
6	<b>SSC Briefings</b>														
7	RRW POG Plan														
8	RRW POG Status														
9	RRW POG Status														
10															
11	<b>NWC Briefings</b>														
12	RRW POG Plan														
13	RRW POG Status														
14															
15	<b>RRW POG Meetings</b>														
16	Kickoff RRW POG														
17	2nd RRW POG														
18	3rd RRW POG														
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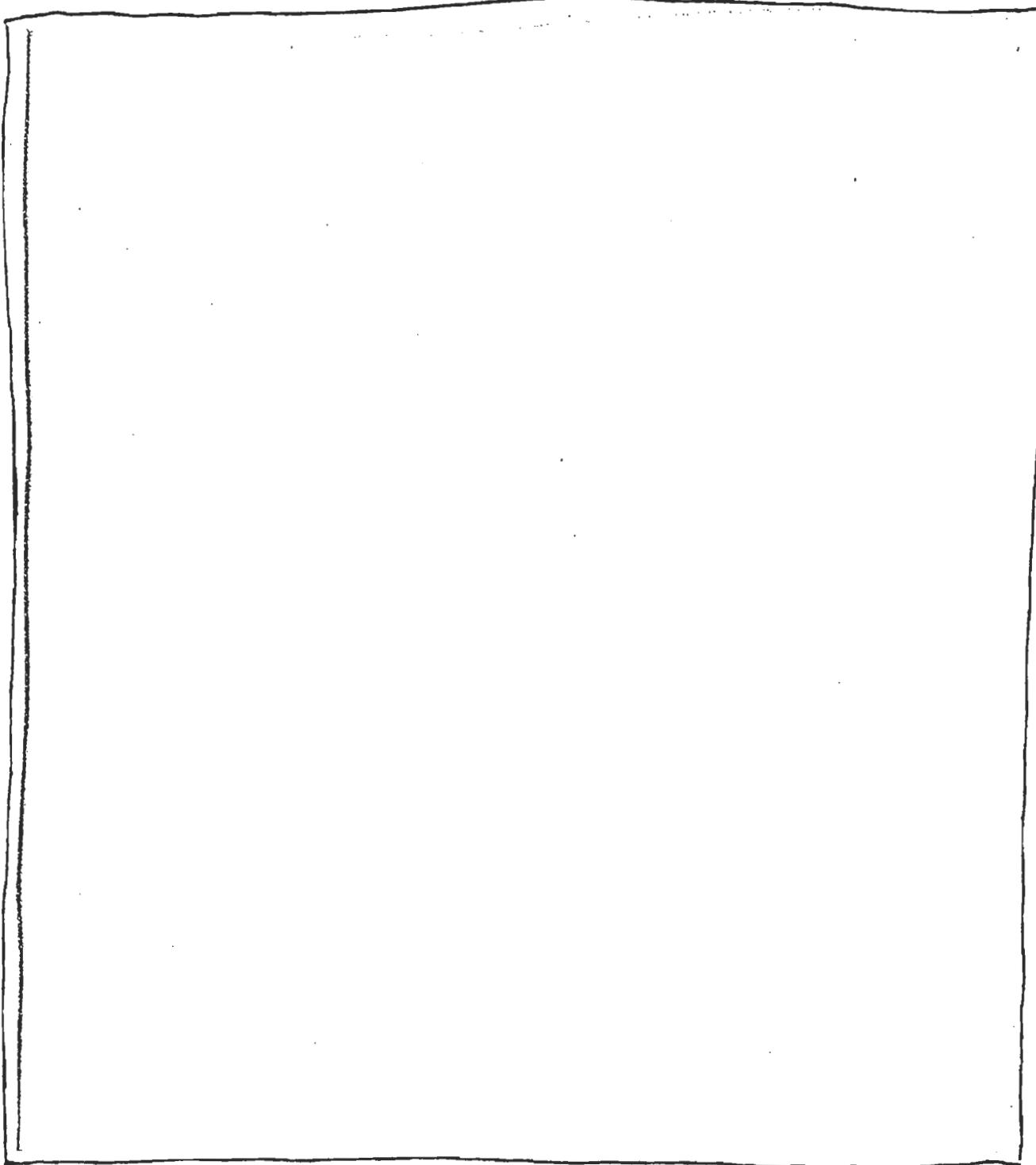
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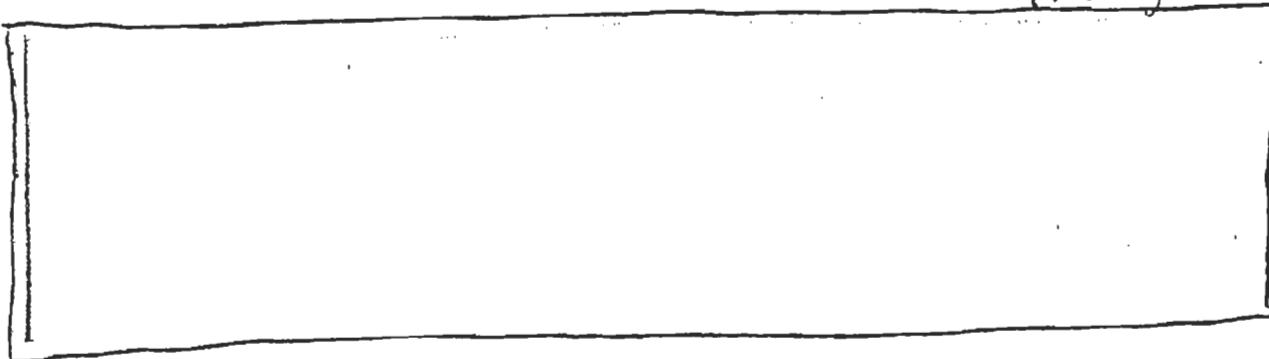
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