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FROM: SA-ALC/NWIC (AFMC)
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SUBJECT: HPRF Phase 2 Study General Meeting 94-1 (# 8) Minutes
ACTION MEMORANDUM

Attached is a copy of the Minutes from the High Power Radio Frequency Phase 2 General Meeting 94-1 (# 8) held 10 March 1994 at the Phillips Laboratory, Albuquerque, New Mexico. If you have any questions or comments please call me at (505) 846-9575 or my direct number of 846-4001 ext. 208, DSN is 246-9575 or 246-4001 ext. 208.

Keith M Baird
KEITH M. BAIRD
HPRF Study Director
Nuclear Advanced Concepts Branch

Attachments:
HPRF Phase 2 Study General Meeting 94-1 (# 8) Minutes including Distribution List

Redacted Copy

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NAME: C Lenagy	2. CLASSIFICATION CHANGED TO:
2ND REVIEW-DATE: 11/7/94	3. CONTAINS NO DOE CLASSIFIED INFO
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MINUTES

HIGH POWER RADIO FREQUENCY (HPRF)
PHASE 2 STUDY GENERAL MEETING 94-1 (# 8)
10 MARCH 1994

Keith M. Baird
HPRF Study Director

NUCLEAR ADVANCED CONCEPTS BRANCH
NUCLEAR WEAPONS INTEGRATION DIVISION
SA-ALC NWIC (AFMC)
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MINUTES

HIGH POWER RADIO FREQUENCY

PHASE 2 STUDY GENERAL MEETING 94-1 (# 8)

10 MARCH 1994

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MINUTES

HIGH POWER RADIO FREQUENCY

PHASE 2 STUDY GENERAL MEETING 94-1 (#8)

10 MARCH 1994

I. (U) **INTRODUCTION.** The High Power Radio Frequency (HPRF) Phase 2 Study General Meeting 94-1 (# 8) was hosted by the Phillips Laboratory (PL), Albuquerque, New Mexico, on 10 March 1994. Mr Keith Baird, HPRF Study Director, Nuclear Advanced Concepts Branch (NWIC), Nuclear Weapons Integration Division (NWI), chaired the meeting.

A. (U) **Administration.** Mr Baird welcomed the attendees and Mr Sam Gutierrez, PL, provided administrative information. A special thanks to Mr Gutierrez and PL for hosting the meeting. The meeting agenda and list of attendees are attached as Appendices A and B, respectively.

B. (U) **Review of Executive Working Group Membership.** All members and observers or their representatives, except for the Ballistic Missile Office, were present.

USMC b(1)

Current members and observers, and their organizations are identified in Appendix C.

(U) of the Secretary of the Air Force for Acquisition (SAF/AQQ), Space Command, 20th Air Force and the Strategic Command (USSTRATCOM) have been postponed and will be rescheduled for the April-May 1994 timeframe. Headquarters Department of Energy (HQ DOE) will also be scheduled for a briefing in the same week with SAF/AQQ. A meeting is scheduled for 24 March 1994 at NWI in Albuquerque, New Mexico to rework the briefing and briefing schedule.

B. (U) Surety Working Group Report.

CG-HPRF-1 presented a status of the activities associated with nuclear detonation safety, use control, and operational safety addressed at the 9 March 1994 Surety Working Group (SWG) meeting (Appendix E). The evaluation process for nuclear detonation safety is essentially complete and a preliminary evaluation of the warhead candidates safety themes is complete. Except for possible minor changes, the methodology is in place to evaluate the final warhead candidate designs. The use control evaluation methodology is evolving. Some ideas involving Category F equivalency have been discussed. Areas where use control would provide added security have been identified. Key communication issues involving the missile computer, warhead programmer and silo/missile interfaces need to be defined. The use control theme needs to be developed. The Quality Function Deployment (QFD) methodology for operational safety is essentially complete. The House of Quality (HOQ) has been reviewed for consistency, accuracy and its applicability to the warhead candidate designs. A matrix of the warhead candidates' parameters corresponding to the HOQ's

USAF b(1)

(U) measures and their respective target values has been assembled. Warhead measures evaluation criteria relative to target values have been defined. A preliminary evaluation of the candidates at their present state of development has been performed. An action item was assigned to NWIC to investigate the HOQ evaluation process for use on future warhead conceptual programs (Reference AI 94-1-6).

C. (U) **Requirements Working Group Report.** CG-HPRF-1 [redacted], presented a status of the topics addressed at the Requirements Working Group (RWG) meeting held 8 March 1994 and an RWG study schedule (Appendix F). The main purpose of the RWG meeting was to review outstanding action items from previous meetings. Reviews of the Military Characteristics (MCs) and Stockpile-to-Target Sequence (STS) were held during an RWG Technical Interchange Meeting (TIM) on 23-24 February 1994. The MCs Draft 3 document, dated 8 March 1994, will be distributed to the HPRF Working Group Chairmen and all RWG members during the week of 14 March 1994, and includes all changes agreed to at the 23-24 February 1994 TIM. The initial HPRF WXX STS Draft document needs to be updated to include the latest changes to the Minuteman III including the Single Reentry Vehicle. Changes to the initial Draft document will be incorporated to support a Draft 2 document review at an RWG meeting scheduled for 14-15 June 1994. The STS Draft 2 document will be mailed during the third week of April 1994 to RWG members for review and comments. An action item was assigned to the VWG and Warhead Design Working Group (WDWG) to review MC requirements in paragraphs 2.2.1 and 2.6.1 and provide

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3. (S-RD(N)) TRW Missile System Interface and Flight Analysis Status. An outline for the missile system interface and flight analysis to be conducted on HPRF warhead designs was presented by TRW, and a subgroup of the SEWG set up details for the TRW analysis.

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The New Mexico team is responsible for the nuclear explosive package, and the California team is responsible for the support structure and missile integration.

DOE b(3)

4. ~~NRW~~ Use Control Status

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DOE, USAF DTRA

The SEWG is attempting to define the term "Category F equivalent", which is part of the use control issue.

E. (U) <u>Mission Analysis Working Group Report.</u>

CG-HPRF-1 presented a status of the topics addressed at the 7 March 1994 joint MAWG/VWG meeting and the 9 March 1994 MAWG meeting.

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(U) (Appendix H).

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Status of the penetration analysis was presented.

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DOE, USAF DTRA

DOE b(3)

F. (U) Warhead Design Working Group Report.

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presented a status of the topics addressed at the 8 March 1994 WDWG meeting and a WDWG study schedule (Appendix I).

1. **Limited Life Component Exchange (LLCE) and Intrinsic Radiation (INRAD) Update.** Two action items assigned to the WDWG by the RWG were discussed associated with LLCE and INRAD.

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2. **Warhead Candidates Design Update.**

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G. (U) Vulnerability Working Group Report.

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Progress of the LLNL, PL and SNL test and analysis programs was reviewed.

The tests are expected to include measurements on representative target equipment.

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DTRA

III. (U) **ACTION ITEMS.** Six action items were closed from previous meetings and twenty action items remain open. Six new action items were assigned as a result of this meeting and the various Working Groups.

A. (U) **Old Action Items.**

1. (U) **AI-25. Assigned to the RWG:** Provide Military Characteristics (MCs) and Stockpile-to-Target Sequence (STS) documents to the SWG. *This action item is a requirement for a Working Group during the course of the HPRF Phase 2 Study, therefore, it will remain open.* This action item is **ongoing**.

2. (U) **AI-26. Assigned to the RWG:** Provide MCs and STSs to the SEWG. *This action item is a requirement for a Working Group during the course of the HPRF Phase 2 Study, therefore, it will remain open.* This action item is **ongoing**.

3. (U) **AI-27. Assigned to the SEWG:** Provide information to support the development of HPRF surety themes to the SWG. *This action item is a requirement for a Working Group during the course of the HPRF Phase 2 Study, therefore, it will remain open.* This action item is **ongoing**.

4. (U) **AI-29. Assigned to the SWG:** Provide the Deputy Assistant Secretary for Military Applications (DASMA) HPRF Phase 2 Study draft surety theme to the SEWG.

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20. (U) AI-7-2. Assigned to the SWG. Develop a separate safety section for the MCs to address a new requirement for the HPRF warhead. Provide information to the RWG as it becomes available. This action item is **ongoing**.

21. (S-FRD) AI-7-3. Assigned to the WDWG. What is the minimum LLCE interval determined by individual warhead candidate design features? Provide information to the RWG as it becomes available.

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This action item is **closed**.

22. (U) AI-7-4. Assigned to the WDWG. The TBDs in the intrinsic radiation paragraph 2.7.12 of the MCs need to be worked as the warhead design is finalized. Provide information to the RWG as it becomes available. This action item is **ongoing**.

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24. (U) AI-7-6. Assigned to the RWG. What STS radiation environment levels must the HPRF warhead survive during launch, mid-flight and reentry? Provide information to the SEWG. **Suspense: June 1994.**

25. (U) AI-7-7. Assigned to the RWG. Provide HPRF MCs' Use Control requirements to the SEWG. *Use control is being worked based upon a new draft DoD Directive C-3150.aa., but is currently TBD for the HPRF program.* **Suspense: June 1994.**

26. (U) AI-7-8. Assigned to Each Working Group Chair. Provide plan of action, along with timelines, to include major activities between December 1993 and end of study. Also, need Working Group schedules with milestones to incorporate into overall study schedule. Provide information to the HPRF Phase 2 Study Director. **Suspense: June 1994.**

B. (U) <u>New Action Items.</u>

1. (U) AI 94-1-1. Assigned to the VWG and WDWG. Review MC requirements in paragraphs 2.2.1 and 2.6.1 and provide the RWG recommended wording for the warhead's design enhancement. **Suspense: 29 April 1994.**

2. (U) AI 94-1-2. Assigned to the WDWG.

Suspense: June 1994.

DOE b(3)

3. (U) **AI 94-1-3.** Assigned to the VWG. Provide to NWIC funding requirements for continued test data refinements to FAAT estimates through Kaman Sciences Corporation. **Suspense: 29 April 1994.**

4. (U) **AI 94-1-4.** Assigned to the VWG. Provide to NWIC funding requirements for SAIC analysis of target power systems. **Suspense: 29 April 1994.**

5. (U) **AI 94-1-5.** Assigned to the MAWG and VWG. DOE b(3)

Suspense: June 1994.

6. (U) **AI 94-1-6.** Assigned to NWIC. Investigate the HOQ evaluation process for use on other new warhead programs/concepts/designs. This action item is **ongoing**.

IV. (U) NEXT MEETING. The HPRF Phase 2 Study General Meeting 94-2 (# 9) will be held on 16 June 1994 at Los Alamos National Laboratory, Los Alamos, New Mexico. The Working Groups will hold their meetings independently at the call of the respective chairmen at a time and place agreeable to those involved.

APPENDIX A
MEETING AGENDA

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APPENDIX B
LIST OF ATTENDEES

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HPRF General Mtg 94-1 Attendance List 10 Mar 94 @ PL

Agency	Rank	First Name	Last Name	DS	AC	Phone #	City or Base	ST	ZIP Code
Sandia National Labs									
SNL(NM)	Dr	Jerry	Cuderman	244	505	844-8063	Albuquerque	NM	87185-0482
SNL(NM)	Mr	Dave	Fordham		505	844-8968	Albuquerque	NM	87185-0417
SNL(CA)	Mr	Ken	Buck		510	294-1324	Livermore	CA	94550-0969
SNL(CA)	Mr	Doug	Henson		510	294-2729	Livermore	CA	94551-0969
SNL(CA)	Dr	Jim	Hogan		510	294-2853	Livermore	CA	94550-0969
CONTRACTORS									
Logicon/RDA	Dr	Phil	Castillo		505	842-8156	Albuquerque	NM	87119-5000
Kaman Sciences	Mr	Clifford	DeJong		719	599-1932	Colorado Spring	CO	80933-7463
TRW, 953/1120	Dr	Frederick W.	Keene	876	909	382-8486	San Bernardino	CA	92402-1310
Orion International T	Mr	Mike	Rafferty		505	881-2500	Albuquerque	NM	87110-6501

APPENDIX C
HIGH POWER RADIO FREQUENCY
EXECUTIVE WORKING GROUP MEMBERSHIP

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APPENDIX D
PROGRAM UPDATE

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Program Update

- EWG Membership
- Full day Study Group Mtg
- WG Mtgs held independent at Chairs call
- MAWG/VWG joint mtgs
- Mtg & Action Item numbering
- Milestone/Timeline/Schedule
- Start drafting Final Report
- Documentation of WG data
- Briefing plans

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HPRF Phase 2 Study Schedule

Thursday, March 10, 1994

Item	Date	Where	Remarks
Meetings			
Planning Mtg	11 Aug 92	ANSER	
Kick Off Mtg 92-1(#1)	10 Sep 92	Phillips Lab	
Mtg 92-2(#2)	22 Oct 93	HQ DOE	21 Oct WG Mtgs
Mtg 92-3(#3)	11 Dec 92	SNLA	9/10 Dec WG Mtgs
Mtg 93-1(#4)	18 Mar 93	LLNL	16/17 Mar WG Mtgs
Mtg 93-2(#5)	17 Jun 93	LANL	16 Jun WG Mtgs
Mtg 93-3(#6)	16 Sep 93	SNLL	14/15 Sep WG Mtgs
Mtg 93-4(#7)	9 Dec 93	SNLA	7/8 Dec WG Mtgs
Mtg 94-1(#8)	10 Mar 94	Phillips Lab, NM	8/9 Mar WG Mtgs
Mtg 94-2 (#9)	16 Jun 94	LANL, NM	
Mtg 94-3 (#10)	7 Sep 94	USSTRATCOM, NE	
Mtg 94-4 (#11)	17 Nov 94	AF SPACE Cmd, CO	
Mtg 95-1 (#12)	26 Jan 95	LLNL, CA	
Mtg 95-2 (#13) Final Mtg	23 Mar 95	DOE/AL, NM	
Reports			
Mid Term			
Published	26 Jan 94		
Distributed	2 Feb 94		
Working Group Draft Reports	5 Nov 94		
VWG			
Test Data			
FAAT			
MAWG			

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Item	Date	Where	Remarks
USAF Delete			
○ WDWG			
• LANL Designs			
• LLNL Designs			
○ SEWG			
• LANL/SNL(NM) Pkg			
• LLNL/SNL(CA) Pkg			
○ SWG			
• House of Quality			
○ RWG			
• MCs			
• STS			
• Unique Issues			
○ Final	15 Apr 95		
○ Action Items			
• Schedule/Milestones	9 Mar 94		AI 7-7 on all Chairs
○ Briefings			
○ Mid-Term			
• SAF/AQQ	15 Mar 94	Pentagon,Wash DC	BGen Richards
• AFSPC/DO	30 Mar 94	Colorado Sp, CO	MGen Parker
• AFSPC/XP	30 Mar 94	Colorado Sp, CO	BGen Dekok
• 20th Air Force	31 Mar 94	Cheyene, WY	LtGen Jameson
• USSTRATCOM	6 Apr 94	Omaha, NE	MGen Linhard
○ Final			
• SAF/AQQ/NWCSC	30 May 95	Pentagon, Wash DC	Gen Richards

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APPENDIX E

SURETY WORKING GROUP REPORT

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SURETY WORKING GROUP REPORT (U)

CG-HPRF-1

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HPRF MEETING #8

March 8-10, 1994
PHILLIPS LABORATORY
ALBUQUERQUE, NM

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warhead measure values relative to the target values, and finally, we made a preliminary evaluation of the candidates at their present state of development. Table 2 presents the measures and their respective target values. Figure 1 is the current HOQ. Tables 3-6 summarize the current status of the QFD study on operational safety. Table 6 presents a preliminary first cut evaluation of the present warhead candidates. All candidates are evaluated relative to NM-1 which is taken as reference. One observes, first of all, that a good spread was obtained in evaluation ratings for the various candidates.

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The preliminary ratings obtained appear both reasonable and consistent. Quite a number of the measures appear to be non-players since all candidates currently feature them. However, these measures are still important Operational Safety concerns, and it seems desirable to carry them along through the final evaluation of the candidates.

CG-HPRF-1

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Table 2. Measures and Target Values

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DEFINITIONS FOR MEASURES

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Table 3. Measure Values for Warhead Design Concepts. Candidate NM-1 is the Reference

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Table 4. Measure Evaluation Criteria. To maximize the sensitivity a range of +/-2 was used wherever possible. NM-1 is the Reference.

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Table 5. Preliminary Operational Safety Evaluation (Unweighted). The appropriate +/- ratings are assigned to the individual candidate features/measures. In this matrix, they are not multiplied by the weighting values identified in earlier QFD sessions.

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Table 6. Preliminary Operational Safety Evaluation. This is the so called PUGH matrix in which the values from Figure 5 are multiplied by the previously agreed upon weighting / importance factors

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APPENDIX F

REQUIREMENTS WORKING GROUP REPORT

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HPRF Warhead Phase 2 Study Group
General Meeting #8
10 March 1994
Phillips Laboratory, Kirtland AFB NM

Requirements Working Group Report

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NUCLEAR WEAPONS MANAGEMENT BRANCH
1651 FIRST STREET SE
KIRTLAND AFB NM 87117-5617

HPRF Warhead Phase 2 Study Group
General Meeting # 8
10 March 1994
Phillips Laboratory, Kirtland AFB NM

MC & STS STATUS

- RWG TIM held on 23-24 Feb 94
  - Reviewed Draft 2 of the MCs
  - Reviewed initial draft of the STS
- Draft 3 of MCs will be distributed to all WG chairperson during the week of 14 Mar 94
- Draft 2 of STS document will be distributed to RWG members plus others as appropriate by 18 Apr 94.
- RWG Technical Interchange Meeting scheduled for 13-14 Jun 94.

HPRF Warhead Phase 2
Requirements Working Group
8 Mar 94

HPRF AI 7-8 to EACH WORKING GROUP

Provide plan of action, along with timelines, to include major activities between December 1993 and end of study.

Suspense: March 1994

HPRF Warhead Phase 2 Study Group
General Meeting # 8
10 March 1994
Phillips Laboratory, Kirtland AFB NM

SCHEDULES/MILESTONES

- MCs Draft 3 - 14 Mar 94 (All WGs)
- STS Draft 2 - 18 Apr 94 (RWG)
- RWG TIM - 13-14 Jun 94
- MCs Draft 4 - 4 Jul 94 (All WGs)
- STS Draft 3 - 4 Jul 94 (All WGs)
- RWG TIM - 15 Aug 94 (Tentative)
- MCs Draft 5 - 1 Sep 94 (All WGs)
- STS Draft 4 - 1 Sep 94 (All WGs)
- RWG TIM - 10 Oct 94 (Tentative)
- RWG TIM - 1 Nov 94 (Tentative)
- Phase 2 WXX MCs - 15 Nov 94
- Phase 2 WXX STS - 15 Nov 94

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(U) The HPRF Systems Engineering Working Group held a joint meeting with the Surety Working Group on 9 March 1994. The Design Teams reported on significant accomplishments, or changes in the designs implemented since December 1993. The substance of the presentations is summarized below.

(U) New Mexico Design Team:

The details were reported by the Warhead Design Working Group in the December 1993 meeting.

B3 DOE, USAF DTRA

(U) The safety theme for all candidates is being reviewed. Changes in the designs are being examined to assure consistency with nuclear detonation safety, SNM dispersal safety, and use control requirements.

(U) California Design Team:

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The use control issue has been studied, and a few comments about one possible method of implementing FARR requirements were presented.

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Nothing is settled, a meeting was planned for designers to discuss the design ground rules. The group still is attempting to define the term "Category F equivalent".

(U) TRW San Bernardino Support:

TRW presented the outline for the missile system interface and flight analysis that will be conducted on HPRF designs. A small subgroup of the SEWG met to set up the details of the TRW study. In the interest of efficient use of limited resources, the group decided on the following approach.

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DOE, USAF DTRA

New Mexico is responsible for the nuclear explosive package (NEP), and California is responsible for the support structure and missile integration.

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(U) Administration and Planning:

(U) The schedule for completing all design tasks consistent with submitting the final SEWG report to the Executive Working Group was presented and accepted.

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Assessing CAT-F PAL Equivalent Options for HPRF Warhead(U)

-SEWG and SWG Meetings

by

Charles T. S. Chow
LLNL

Gerald Strandin
Sandia, Livermeore

March 9, 1994

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The FARR directive and HPRF warhead:

- The soon-to-be-issued DoD comprehensive use control directive based on the FARR recommendations requires that all nuclear weapon systems be equipped with use control devices, such as the CAT-F PAL. The devices preclude unauthorized use but do not inhibit use authorized by the President.

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The important issue is: What constitutes a CAT-F equivalent, and will a retrofit-able system be a viable option?

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APPENDIX H

MISSION ANALYSIS WORKING GROUP REPORT

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High Power Radio Frequency
Mission Analysis Working Group Report

(U) The Mission Analysis Working Group (MAWG) held two separate meetings during 7-9 March 1994.. The first meeting, on 7 March 1994, was a joint working meeting between selected representatives from the Vulnerability Working Group (VWG) and MAWG.

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(U) The second meeting was the scheduled quarterly MAWG.

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This last issue was raised again for the Executive Working Group.

HPRF Phase 2 Analysis

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Overview

- **Background**
  - » HPRF Phase 1 Results
  - » "Draft" Penetration Plan
  - » Map
  - » Threats and Targets
- **MAWG / VWG discussions...**
- **Current schedule**
  - » Timelines
  - » Upcoming meetings
- **Summary: Action Items**

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Background

- HPRF Phase 1 Results

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- Major points in the Penetration Plan

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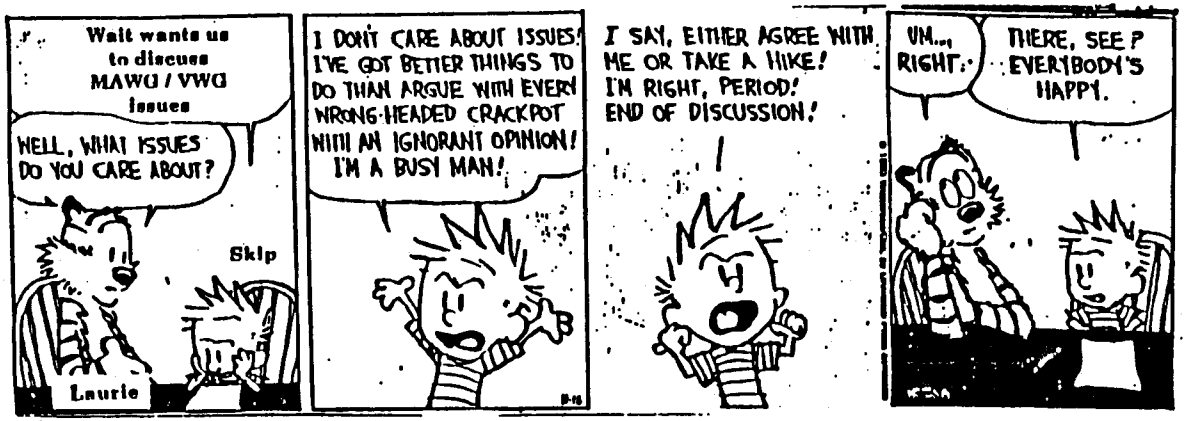
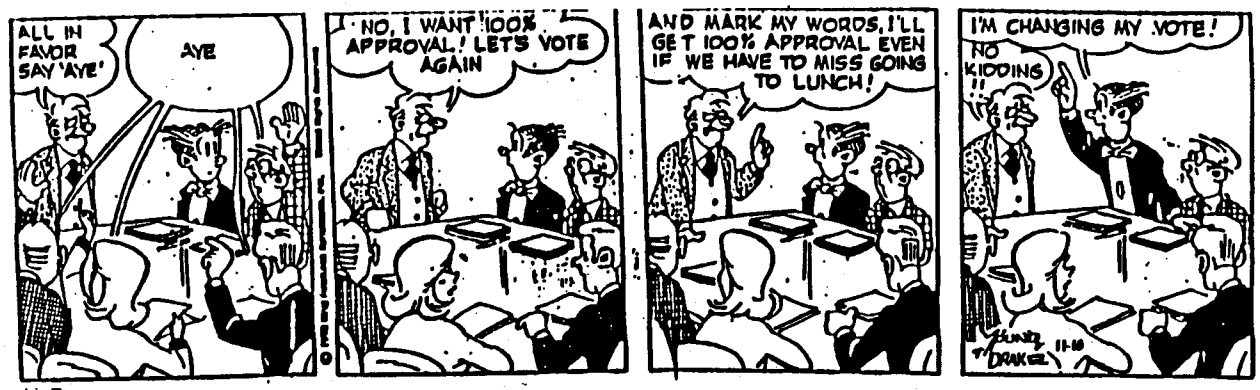
MAWG / VWG Discussions





Remember, we need to reach an agreement...

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MAWG Activities at LLNL continued to focus on...

Modeling for Penetration Mission

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APPENDIX I

WARHEAD DESIGN WORKING GROUP REPORT

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Minutes of the Phase 2 HPRF Warhead Design Working group, March 8, 1994

Old Action Items

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The first was what minimum time would the limited life component exchange, LLCE, be; and the second was what would be the intrinsic radiation of the weapon?

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WDWG Milestones

Both the Livermore and Los Alamos design teams have begun to make progress on their respective designs. While much work remains to be done, it is prudent at this time to set timetables for its completion. At this time there appears to be two milestones that can be set.

The first is that by the September 1994 meeting both Livermore and Los Alamos will independently provide preliminary written reports of their final or near final work.

The second milestone is that by the November 1994 meeting these separate reports will be collated and edited into a tentative Warhead Design Working Group report which will include sections of joint agreement and, if necessary, separate sections from each Laboratory on points of disagreement.

[redacted]

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Warhead Design Working Group: LLNL Activities Status Report (u)

Deborah Wojtowicz

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High Power Radio Frequency Phase Two
Meeting # 8

Phillips Laboratory

March 8-10, 1994

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[redacted]

Derivative Classifier:
Gene Burke Date: 3/8/94
F Group Leader, A Division

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HPRF Phase 2 Study

Michael Bernardin

Los Alamos National Laboratory

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Outline

1. Background

2. The emerging story from VL+E testing

4. The emerging HPRF story

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APPENDIX J

VULNERABILITY WORKING GROUP REPORT

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Outline

- Test Goals and Strategy
- Test Results - Update

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Test approach has been defined and coordinated

- Tests are progressing

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