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ADDENDUM #1 TO THE MINUTES OF THE 2nd RELIABLE REPLACEMENT WARHEAD PROJECT OFFICERS GROUP MEETING Dated 9 Jun 05 (U)

LANL DESIGN OPTIONS

A-05-243(R)

9 June 2005

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1st REVIEW-DATE: 11/9/06 AUTHORITY: (DC) DD NAME: TY SANDERS 2nd REVIEW-DATE: 1-22-07 AUTHORITY: DD NAME: Eric Ziegler	DETERMINATION [CIRCLE NUMBER(S)] (1) CLASSIFICATION RETAINED 2. CLASSIFICATION CHANGED TO: 3. CONTAINS NO DOE CLASSIFIED INFO (4) COORDINATE WITH: DOD 5. CLASSIFICATION CANCELED (6) CLASSIFIED INFO BRACKETED 7. OTHER (SPECIFY):

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Addendum #1 To The 2nd Reliable Replacement Warhead Project Officers Group Meeting (U)
LANL Design Options (U)
Sandia National Laboratories, Albuquerque, NM

9 June 2005

(U) This document contains the limited distribution LANL Proprietary Design Options Review presentations from the 2nd Reliable Replacement Warhead Project Officers Group Meeting.

(U) The List of Attendees for this LANL Proprietary breakout session is on the following page.

(U) LIST OF APPENDICES

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O	LANL RRW DESIGN OPTIONS	O-1

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Addendum #1 To The 2nd Reliable Replacement Warhead Project Officers Group Meeting (U)
LANL Design Options (U)
Sandia National Laboratories, Albuquerque, NM

(U) List of Attendees for the LANL Design Options Meeting

9 June 2005

Exemption 6 (b)(6)

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APPENDIX N

LANL PRIMARY DESIGN & CERTIFICATION (U)

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PRIMARY DESIGN AND CERTIFICATION

(WITHOUT NUCLEAR TESTING) (U)

RRW JPOG

June 9, 2005

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Los Alamos

N-2

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RRW Meets Requirements for the Future Nuclear Deterrent

- **RRW must be credibly certified w/o nuclear testing**
  - Design technology and space selected for certification
  - [redacted] 1.4 (a)(e)
  - Use gates and QMU for certification
- **RRW must reduce costs**
  - Infrastructure costs (factories)
  - Manufacturing costs (personnel and processes)
  - Maintenance costs (field level repair and rebuild)
- **RRW must be mission flexible**
  - Multiple missions and delivery platforms
  - DOE b(3) [redacted] Sec 6.2 RD
- **RRW must be used to train new nuclear staff**
  - Judgment is lacking in inexperienced staff

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N-3

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Design Space is Essentially Unlimited

Sec 6.2 RD

DOE 6(B)

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N-4

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LANL RRW Design Derivation

~~SECRET RESTRICTED DATA / CNWDI / PROPRIETARY~~

N-5

1.4(a)(e)

~~SECRET RESTRICTED DATA / CNWDI / PROPRIETARY~~

DOE b(3)

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Sec 6.2 RD

DOE
b(3)

Sec 6.2 RD

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DOE b(3)

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DOE b(3)

TECHNOLOGY SUMMARY

Sec 6.2 RD

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LANL RRW Design Derivation

- **Technology selection for certification**
  - Lack of nuclear RRW testing limits technology choices

[redacted]

1.4 (a)(e)(g)

[redacted]

1.4 (a)(e)(g)

- **Pedigree**
  - LANL design by NTS experienced designers with a proven record

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DOE 6(3)

Lesson on Manufacturing Changes

Sec 6.2 RD

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DOE b(3)

Lesson on Material Change

Sec 6.2 RD

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Lesson on Alpha and Yield

DOE b(3)

Sec 6.2 RD

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DOE b(3)

Lesson on Safety

Sec 6.2 RD

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DOE b(3)

Lesson on Surety

Sec 6.2 RD

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NUCLEAR TEST LESSONS SUMMARY

DOE b(3)

Sec 6.2
RD

1.4 (a)(e)(g)

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Calculations are Insufficient for New Design

DOE b(3)

Sec 6.2 RD

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Los Alamos

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Calculations are Insufficient for New Design

DOE b(3)

Sec 6.2

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Calculations are Insufficient for New Design

DOE b(3)

Sec 6.2

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Sec 6.2

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~~SECRET/RD~~

CALCULATION SUMMARY

- **Computer models can be inferior to physics models**
  - B54 test history fit better by simple physics models
  - Never underestimate the value of insight

[redacted] 1.4(g)

DOE b3 N-27

[redacted] 6.2

  - Never overestimate the value of calculations
- **NTS data + primitive computers are superior to modern computers alone**
  - Never underestimate the value of data

[redacted]

  - Design and data can enhance confidence
  - Never underestimate the value of thinking

1.4(g)

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LANL RRW Design Derivation

- **Technology selection for certification**

[redacted] 1.4(g)

[redacted] 1.4(g)

- **Limits to computer simulations**
  - Without experienced designer judgment, calculations are questionable

- **Design for certification without nuclear testing**

[redacted] 1.4(g)

- **Pedigree**
  - LANL design by NTS experienced designers with a proven record

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DOE b.(3)

Sec 6.2

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N-32

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Non-Nuclear Experiments can be used with Gates/QMU

1.4(a)(e)

DOE b(3)

Sec 6.2

1.4(a)(e)

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Certification by Era

- **Classical era (real kt at NTS)**
  - 1945 to 1992
  - Scientific method
  - Highly optimized designs win cold war
- **Transitional era (derivative kt)**
  - 1992 to 2007
  - Perturbation calculations from specific events
  - SLEPS maintain deterrence but are expensive
- **Future era (calculated kt)**
  - Begin 2007
  - Much improved simulations, maybe predictive
  - General tie to NTS data base, not specific shots
  - Advanced diagnostics for legacy and RRW weapons
  - Designs optimized for 21st century appear

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[redacted]

DOE b(3)

~~SECRET/RD~~ G2 RD

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Los Alamos

RRW DESIGN SUMMARY

(Design choices and statistics lead to certifiable weapon)

- **Historical precedent guides RRW design**
  - Technology selection for success without testing
  - Lessons from NTS show limits to judgment and calculations
- **Eliminate known problems through design**
  - Leave the margin for unknown unknowns

DOE b(3)

Sec 6.2 RD

[redacted]

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LANL has Long History with SLBM

(Design Continuity for Excellence)

DOE b(3)

6.2 RD

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N-40

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LANL has Long History with SLBM

(Design Continuity for Excellence)

DOE b(3)

Sec 6.2 RD

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LANL has Long History with SLBM

(Design Continuity for Excellence)

DOE 6(3)

Sec 6.2 RD

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DESIGN PEDIGREE SUMMARY

- **LANL has successfully met SLBM requirements**
  - 30 year history of successful support
- **LANL designs to SLBM specifications**
  - Not recycled concepts adapted to SLBM use
- **LANL innovations to meet SLBM needs**
  - Stockpiled systems were developed, stockpiled, and maintained
  - [redacted] 6.2 RD
  - RRW is SWPP
- **Design team continuity for the future**
  - Overlap of designers ensures excellence
  - Designers of the future trained on the systems they will maintain

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N-44

LANL RRW DESIGN CONCLUSION

DOE b(3)

6.2 RD

[redacted]

1.4(c)(g)

- Keep it simple with respect to options we cannot test

❑Limits to computer simulations

N-45 DOE b(3)

- Judgment and insight are prerequisites to calculations

6.2 RD

[redacted]

❑Pedigree

- LANL SLBM design by NTS experienced designers with a proven record

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APPENDIX O

LANL RRW DESIGN OPTIONS (U)

[redacted]

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Outline

Overview of Design Options

RRW-1a Secondary Design Work

Next Steps

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The trade space under consideration based on TOR guidance includes the following.

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6.2

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Sec 6.2 RD

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DOE b(3)

Sec 6.2 RD

[redacted]

[redacted]

[redacted]

DOE b(3)

Current Calculational Model

Sec 6.2 RD

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DOE b(3)

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DOE b(3)

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DOE 6(3)

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Future Design Activities

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