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DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND (AFMC)
NUCLEAR WEAPONS INTEGRATION DIVISION

8 September 1994

MEMORANDUM FOR DISTRIBUTION

FROM: SA-ALC/NWIW
1651 First Street SE
Kirtland AFB NM 87117-5617

SUBJECT: High Power Radio Frequency (HPRF) Military Characteristics, Draft 5

1. Attached is a copy of Draft 5 of the Military Characteristics for the WXX HPRF Nuclear Warhead. This Draft consolidates all comments received and discussed at the HPRF Requirements Working Group Meeting 94-3 held 23-24 August 1994 at Orion International Technologies, Albuquerque NM.

2. Please submit comments on Draft 5 of the MCs to me at the above address. I can be reached at commercial (505) 846-6767 or DSN 246-6767.

3. This letter is **UNCLASSIFIED**.

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Attachment:
MCs for the WXX HPRF Nuclear Warhead,
Draft 5, including Distribution List, 1 Sep 94 (S-RD)

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11/6/99
C Kenagy
11/6/99
Thom Callahan
WITH ATTACHMENTS/ENCL

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MILITARY CHARACTERISTICS FOR THE WXX HIGH POWER RADIO FREQUENCY NUCLEAR WARHEAD (U)

DRAFT 5
1 September 1994

NUCLEAR WEAPONS INTEGRATION DIVISION
DIRECTORATE OF NUCLEAR WEAPONS
SAN ANTONIO AIR LOGISTICS CENTER
AIR FORCE MATERIEL COMMAND
1651 FIRST STREET SE
KIRTLAND AIR FORCE BASE, NEW MEXICO 87117-5617

Classified by: CG-W-5, January 1984.
Air Force Nuclear Weapons Security Classification Guide, 1 June 1985.

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MILITARY CHARACTERISTICS FOR THE WXX HIGH POWER RADIO FREQUENCY NUCLEAR WARHEAD (U)

DRAFT 5

1 September 1994

TABLE OF CONTENTS

(All portions of this Table of Contents are UNCLASSIFIED.)

1.0 (U) GENERAL.

1.1 (U) Purpose. These Military Characteristics (MCs) define the Department of Defense (DoD) requirements for a WXX High Power Radio Frequency (HPRF) nuclear warhead.

1.2 (U) Contingencies. Should it appear impractical for the Department of Energy (DOE) to meet any of these MCs, or should it appear meeting any criterion specified herein will delay the initial operational capability, modify the delivery rate, or increase the warhead cost by an amount deemed by the joint DoD/DOE WXX HPRF Project Officers Group to be unreasonable, immediate notification shall be made to the Nuclear Weapons Council Standing Committee (NWCSC).

1.3 (U) Definitions.

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1.3.2 (U) The reentry vehicle (RV) is the DoD provided structure to contain DOE warhead components as well as the arming, fuzing, and firing.

1.3.3 (U) The RS is defined to be the RV and DOE warhead components as well as the arming, fuzing, and firing within the structure.

1.3.4 (U) The Reentry System Assembly (RSA) is defined as the mated RS, Deployment Module and Ascent Shroud.

1.3.5 (U) The Deployment Module is defined as the structure which includes the payload bulkhead support for mounting the RVs and chaff dispensers.

1.3.6 (U) The Ascent Shroud is defined as the low-drag aerodynamic shape which covers the arrangement of payload RVs during powered flight in the atmosphere.

1.4 (U) Competing Characteristics. In the event compliance with these MCs results in design conflicts, the WXX HPRF Project Officers Group shall evaluate design options on a case-by-case basis and forward recommended changes to the NWCSC for approval. Trade-offs for reasons of technical feasibility and cost may be made with the guidance and approval of the WXX HPRF Project Officers Group and NWCSC.

1.4.1 (U) Highest priority will be given to nuclear safety.

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1.5 (U) Warhead Endurance. It is desired the warhead have an inherent endurance obtained as a result of design considerations which address: warhead lifetime consistent with the weapon delivery system lifetime and the ability to replicate the warhead at a future date. Therefore, the design, development, and production of the warhead must be well documented, and involve processes which, to the extent practical, allow replication at a future date.

2.0 (U) WARHEAD CHARACTERISTICS.

2.1 (U) General Requirements.

2.1.1 (U) The warhead shall be designed to interface with the RS with interface details coordinated by the WXX HPRF Project Officers Group.

2.1.2 (U) The handling, storage, and transportation requirements as denoted in the WXX HPRF STS document shall be compatible with existing systems as close as practical.

2.2 (U) Operational Requirements.

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2.2.4 (U) Provisions which allow instrumentation for operational testing shall not degrade performance, physical considerations, interface capability or safety of the war reserve unit.

2.3 Physical Requirements. The WXX warhead shall have the following physical characteristics. The final dimensions, configuration and weight distribution of the warhead shall be defined by the WXX HPRF Project Officers Group during the development program consistent with the performance and design requirements.

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2.3.1 (U) The maximum weight shall be TBD.

2.3.2 (U) The maximum length shall be TBD.

2.3.3 (U) The maximum diameter shall be TBD.

2.3.4 (U) The center of gravity shall be located at TBD.

2.4 (U) Functional Requirements.

2.4.1 (U) The warhead shall respond and operate properly within the required reliability requirements of paragraph 2.6 when signals and power specified in the interface control document are supplied to the DoD/DOE interface.

2.4.2 (U) The warhead shall not require functional testing.

2.4.3 (U) Operational testing using joint DoD/DOE test assembly units without nuclear materials is required. Provisions which allow instrumentation for this testing shall not degrade test reliability or nuclear safety as determined by the WXX HPRF Project Officers Group.

2.5 (U) Environment and Vulnerability Requirements.

2.5.1 (U) The warhead reliability and nuclear safety shall not be degraded in the normal environments specified in the WXX HPRF STS document.

2.5.2 (U) The warhead nuclear safety should not be degraded in the abnormal environments specified in the WXX HPRF STS document.

2.6 (U) Reliability Requirements. The following reliability requirements apply to the warhead in the normal environments specified in the WXX HPRF STS document.

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2.6.2 (U) Stockpile sampling to aid in determining serviceability and reliability of warhead functional components is required.

2.7 (U) Nuclear Safety Requirements. The warhead design requires positive measures to prevent premature detonation in normal and abnormal environments as defined in the WXX HPRF STS document.

2.7.1 (U) The warhead shall contain a human intent unique signal driven stronglink which shall prevent prearming until the unique signal is received. The warhead shall contain features which preclude arming until the warhead experiences environments and events associated with normal missile flight and receipt of a nuclear arming signal from the missile. At least two independent signals shall be required to arm the warhead and at least one signal shall be continuous. The warhead design shall allow arming to occur as late in the functional sequence as practical.

2.7.2 (U) In the event of a high explosive one point initiated detonation, the probability of achieving a nuclear yield greater than the equivalent of 4 lbs of TNT shall not exceed 1 in 10^6. This feature must be inherent in the nuclear system design.

2.7.3 (U) The probability of a premature nuclear detonation of the warhead for the specified normal environments in the WXX HPRF STS document shall not exceed the following.

2.7.3.1 (U) One in 10^9 per warhead lifetime in the absence[1] of the warhead prearming (intent) stimulus, the enabling (environmental) stimulus, and the warhead arming signals.

2.7.3.2 (U) One in 10^6 per warhead lifetime after application of the prearming stimulus, but in the absence[1] of the enabling stimulus and the warhead arming signals.

2.7.3.3 (U) One in 10^3 per event[2] after application of prearming and enabling stimuli, but in the absence[1] of the warhead arming signals.

2.7.4 (U) The probability of a premature nuclear detonation of the warhead, during and after exposure to the abnormal environments described in the WXX HPRF STS document, shall not exceed the following.

2.7.4.1 (U) One in 10^6 per occurrence in the absence[1] of the warhead prearming and enabling stimuli.

2.7.4.2 (U) One in 10^3 per occurrence after application of the prearming stimulus, but in the absence[1] of the enabling stimulus.

2.7.5 (U) Upon removal of arming power, the warhead firing set shall automatically discharge the energy in its storage devices to a safe level within TBD minutes in the normal environments specified in the WXX HPRF STS document.

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[1](U) The DoD system is responsible for ensuring the absence of critical prearming and enabling stimuli, and warhead arming signals.

[2](U) An event is the application of a prearm command and deliberate deployment (weapon launch or release).

2.7.6 (U) Warhead subsystems shall fail in a predictable manner in the abnormal environments specified in the WXX HPRF STS document.

2.7.7 (U) The intrinsic radiation output from the warhead shall be as low as reasonably achievable to minimize hazards to personnel during all pre-launch phases of the STS.

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The DOE shall provide the DoD with this information as measured.

2.7.8 (U) Prior to prearming, no prearming and arming circuits shall function when exposed to monitoring current (100 ma or less).

2.7.9 (U) Credible configurations of warheads with intact pits shall remain subcritical (no nuclear reaction) in normal environments, and when immersed in or flooded internally with water, as specified in the WXX HPRF STS document.

2.7.10 (U) An undamaged warhead shall be compatible with features to contain plutonium for as long as reasonably achievable in a fuel fire as specified in the WXX HPRF STS document.

2.7.11 (U) War reserve warheads will be identified with conspicuous permanent markings per established DOE procedures.

2.7.12 (U) The warhead shall be designed so all electrical explosive devices exposed during handling and maintenance shall be insensitive to electrostatic discharges as defined in the WXX HPRF STS document.

2.7.13 (U) To the maximum extent practical, the warhead shall:

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2.7.13.2 (U) Facilitate EOD render-safe procedures with minimal need for sophisticated equipment and to minimize the hazard risk to EOD personnel.

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2.7.13.4 (U) Not present high explosive, chemical, or other personnel hazards during maintenance, handling, and other operations in normal environments.

2.7.13.5 (U) Include provisions to minimize the probability of high explosive detonations and plutonium dispersal in abnormal environments.

2.7.13.6 (U) Include human engineering characteristics to reduce the opportunity for personnel error including, but not limited to, all maintenance and EOD operations.

2.7.14 (U) All material used in the warhead design shall be chemically compatible in normal WXX HPRF STS environments.

2.7.15 (U) The warhead shall contain no electrical power source, either dormant or active, which could arm or fire the warhead detonating system.

2.8 (U) Maintenance, Monitoring and Equipment Requirements.

2.8.1 (U) Warhead Maintenance. The warhead shall be designed for ease of maintenance.

2.8.1.1 (U) The warhead shall require no scheduled maintenance between the shortest LLCE interval.

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2.8.1.2 (U) The warhead shall be designed so field level maintenance, handling, and inspections can be accomplished in the normal WXX HPRF STS environmental conditions. As a goal, the warhead shall be designed so only existing nuclear certified special and test equipment, and standard mechanics' tools are required for all field-level maintenance, handling, and inspection tasks.

2.8.1.3 (U) The warhead shall be designed so all coatings, materials, and compounds, exposed during maintenance will be chosen to minimize personnel safety hazards.

2.8.1.4 (U) Provisions shall be made for ease of assembly/disassembly of the RS so repair or component retrofit of the warhead can be achieved.

2.8.2 (U) DOE-Supplied Equipment.

2.8.2.1 (U) DOE-supplied equipment to be used with this warhead shall be capable of functioning in the same normal environments as the warhead, as defined in Stages 1 through 4 of the WXX HPRF STS document.

2.8.2.2 (U) If required, newly developed DOE equipment shall be as compatible as possible with existing warheads. To the extent practical, all such equipment shall be kept to a minimum and be compact, lightweight, transportable by common carrier, adequately identified, provided with operating instructions, and designed to minimize human error.

2.8.2.3 (U) As a goal, the DOE maintenance and support equipment will require no calibration or be self-calibrating.

2.8.2.4 (U) Any DOE warhead shipping and storage container for DoD use shall be compatible with the warhead storage, transportation, and handling systems identified in the WXX HPRF STS document. Specific container requirements will be defined in a separate, jointly approved requirements document. If additional requirements are driven by DoD

use of this container, funding details will be addressed in a DOE/DoD Memorandum of Understanding for the Division of Responsibilities.

2.8.3 (U) Maintenance Procedures.

2.8.3.1 (U) The RS shall be compatible with removal from, or installation on, an RSA as defined in the WXX HPRF STS document in less than TBD hour(s), with a goal of TBD minutes.

2.8.3.2 (U) The DOE-defined warhead maintenance and LLCE procedures shall be compatible with the requirements of the WXX HPRF STS document. All maintenance activities must be performed within TBD 8 hour shift(s). To support this requirement, the LLCE will take no longer than TBD hours, with a goal of TBD hours, once the warhead has been placed in the maintenance stand and all preparatory actions have been accomplished.

2.8.3.3 (C-FRD) Provisions shall be made for relatively simple replacement of LLCs by the Services with a minimum of special facilities or controlled environments.

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2.8.4 (U) Monitoring. Weapon system serial numbers and other data as determined by the WXX HPRF Project Officers Group shall be obtained from the warhead by either visual, electronic or optical means.

2.9 ~~(S/RD)~~ Command and Control Requirements.

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~~layered approach to achieving use control for the weapon system is required.~~

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