DEPARTMENT OF DEFENSE
UNITED STATES STRATEGIC COMMAND

Reply To:
USSTRATCOM/J006 (FOIA)
900 SAC BLVD STE N3.150E
OFFUTT AFB NE 68113

20 November 2020
REF: USSC 21-003

[redacted]
Nautilus Institute for Security and Sustainability
2342 Shattuck Ave. #300
Berkeley CA 94704

Dear [redacted]

This is in response to your 25 October 2018 Freedom of Information Act (FOIA) request for a copy of USSTRATCOM Strategic Instruction 526-01.

After careful review of the enclosed document, the USSTRATCOM FOIA Initial Denial Authority, Rear Admiral William W. Wheeler III, determined certain portions are currently and properly classified according to Executive Order 13526, *Classified National Security Information*, Section 1.4.(a), and are therefore not releasable. Admiral Wheeler is also denying the release of certain unclassified portions as they meet the standards for classification pursuant to Executive Order 13526, Section 1.7.(e). Specifically, when these unclassified portions are combined, they reveal an additional association or relationship that: 1) meets the standards for classification under Executive Order 13526; and 2) are not otherwise revealed in the individual items of information. Lastly, Admiral Wheeler has declassified paragraph 3. on page C-3. This information no longer meets the classification standards of the Executive Order.

Upon review we also discovered an administrative error. Specifically, paragraph 6.b. on page B-10 is incomplete. The sentence is unclassified and should read as follows: "*(U) The expected operational service life of the system (as opposed to the design life) should be considered to ensure weapon system asset availability for Initial Operational Test and Evaluation and Follow-on Operational Test and Evaluation throughout the life of the system.*"

In accordance with 5 U.S.C. § 552, *Freedom of Information Act*, Exemption 1 is hereby invoked, and requires this information be withheld. If you are not satisfied with this action, you may appeal this response to the appellate authority, Ms. Joo Chung, Director of Oversight and Compliance, Office of the Secretary of Defense. The appellate address is: ODCMO, Director of Oversight and Compliance, 4800 Mark Center Drive ATTN: DPCLTD, FOIA Appeals, Mailbox #24, Alexandria VA 22350-1700. As an alternative, you may use the OSD FOIA request portal at http://pal.whs.mil/palMain.aspx; or e-mail your appeal to OSD.FOIA-APPEAL@mail.mil. Your appeal must be submitted within 90 calendar days of the date of this letter, should cite case number 21-003, and be clearly marked "Freedom of Information Act Appeal."

Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, e-mail at ogis@nara.gov; telephone at (202) 741-5770; toll free at (977) 684-6448; or facsimile at (202) 741-5769.

Sincerely

KENDALL L. COOPER
Command FOIA/PA/CL Manager

UNITED STATES STRATEGIC COMMAND INSTRUCTION (SI)

OPR: J593

SI 526-01
30 June 2020

(U) GUIDELINES FOR NUCLEAR WEAPON SYSTEM OPERATIONAL TESTING AND REPORTING

Reference(s):

a. (U) 10 USC IV, Ref "Operational Testing" Title 10 US Code parts IV Chapter 141, §2399

b. (U) CJCSI 3110.04B, Nuclear Supplement to Joint Strategic Capabilities Plan, 31 December 2004 (TS)

c. (U) SI 512-06, Guidelines for Reporting Prelaunch Survivability

1. (U) Purpose. This SI establishes guidelines for nuclear weapon system operational testing and reporting, and provides detailed background and guidance for the development of a testing program during the initial and follow-on phases of nuclear weapon systems. The test results are used to calculate estimates for Weapon System Reliability (WSR) and Circular Error Probable (CEP). The Navy refers to initial operational tests as Commander Evaluation Tests (CETs) and follow-on tests as Follow-on Commander Evaluation Tests (FCETs). The Air Force refers to initial operational tests as Initial Operational Test (OT) and Evaluation (IOT&E) and follow-on tests as either Follow-on OT and Evaluation (FOT&E) or Force Development Evaluation (FDE). Within this document, operational testing, IOT&E, and FOT&E refer to those operational tests conducted to support United States Strategic Command (USSTRATCOM) nuclear planning factors.

2. (U) Superseded/Cancellation. SI 526-01, 26 October 2015

3. (U) Applicability. This instruction applies to USSTRATCOM and all units, organizations, and agencies involved in the validation and reporting of nuclear weapon systems' capabilities in support of USSTRATCOM's nuclear weapons planning.

4. ~~(C)~~ Summary of Changes. This revision updates office symbols (throughout), reflecting USSTRATCOM structure as of 1 October 2019. It adds more defining terms to test size requirements establishing a 'year-to-year' degradation versus system lifetime degradation. It also recognizes the possibility of the Services' desire to conduct a phased testing strategy where the mission can be broken into several phases, each of which can be tested and scored independently from one another. (b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a) It adds a timeline to IOT&E tests to ensure IOT&E proceeds in a timely manner. Finally, changes emphasize the requirement for the Services, with Department of Energy (DOE)/National Nuclear Security Administration (NNSA) collaboration, (b)(1) Sec 1.4(a) It adds examples of a waiver letter to submit to USSTRATCOM.

5. (U) Releasability. This SI is approved for release to USSTRATCOM, all of its Components, and additional outside agencies as noted in Enclosure F.

6. (U) Effective Date. This SI is effective upon receipt.

RANDY S. TAYLOR
Major General, U.S. Army
Chief of Staff

Enclosures
A — General
B — Guidelines for Operational Testing
C — Initial and Follow-On Operational Testing
D — Reporting Criteria
GL — Glossary of Acronyms and Terms

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ENCLOSURE A

(U) GENERAL

1. (U) Introduction. USSTRATCOM utilizes Service estimates of nuclear weapon capabilities, known as "planning factors," during planning. SI 526-01 emphasizes the direct relation between the Service reported planning factors, confidence levels, and the quality of USSTRATCOM-generated nuclear options.

2. (U) Responsibilities

a. (U) USSTRATCOM will establish guidelines for nuclear weapon system operational testing and reporting.

b. (U) The Services will conduct IOT&E to provide operational planners with reference WSR and CEP planning factors which have a specified degree of precision. The Services will conduct enough FOT&E tests to detect, on an annual basis, a given amount of degradation from the previous year's established WSR and CEP planning factors within a specified level of confidence.

c. ~~(C)~~ The provided planning factors (b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a) Relevant statistical properties to achieve statistically significant objectives are specified in **Enclosure B, para 4.c.**

d. (U) If requirements cannot be met, the Services must submit a waiver request to USSTRATCOM Nuclear Consequence Assessments Branch (J593) detailing the methodology used, the risk incurred by not meeting test rate requirements, an estimate of the amount of detectable degrade at the required confidence level, planned efforts to achieve the highest confidence possible, and mitigating actions taken to reduce the risk incurred. The waiver will address the timeline required for mitigation and must be updated/renewed whenever details of the mitigation actions change.

e. (~~FOUO~~) The minimum planning factors required to be reported in the annual weapon system evaluation reports and Nuclear Planning Factors Workshop briefings include the following:

(1) (~~FOUO~~) WSR is the probability that a warhead on a given nuclear weapon system will detonate over or at its designated ground zero under given mission-related conditions, excluding the effects of enemy action. Ground zero is the point on the earth's surface closest to detonation. The phrase "over or at" pertains to air, surface, or subsurface bursts which occur within a vertical

cylinder, centered on the designated ground zero (DGZ), (b)(1) Sec 1.7(e)
(b)(1) Sec 1.7(e)

(2) (~~FOUO~~) Weapon system accuracy pertains to horizontal CEP and vertical height of burst (HOB) error. CEP is the radius of a vertical cylinder, centered on a reference point, within which 50 percent of the Reentry Vehicles (RV)/Reentry Bodies (RB)/missile payloads/gravity weapons are expected to be located at airburst or impact. HOB error is the difference between the actual and intended HOB.

(a) (U) The first required reference point for CEP calculation is the DGZ. This value should be annotated as CEP_{DGZ}.

(b) (U) The second required reference point for CEP calculation is the Mean Fuze Point (MFP). This value should be annotated as CEP_{MFP}.

(3) (U) Prelaunch Survivability (PLS) is the probability that a delivery vehicle will survive an enemy attack and be available for execution. Services should refer to reference c.

(4) (U) Command and Control Procedures (CCP) reliability is the probability that crews will receive a valid Emergency Action Message (EAM) and perform all necessary actions to commit a nuclear weapon when directed.

(5) (U) Other Measures of Performance. The Services will review and report weapon yield as provided by the NNSA. Other data may be collected and reported to more fully describe the performance of a weapon system from various documents including: NNSA Annual Weapons Reliability Report (WRR), individual weapons Program Limitations and Environments of Concern (PLEC) and individual weapon Major Assembly Release (MAR) documents. Where practical, validated engineering models may be used to assess subsystem performance measures, such as guidance or warhead reliability. Additional data, as well as any uncertainties that apply to such data, may include employment recommendations, reaction time, launch interval, and missile performance.

3. (U) Supplemental Data. The Services will provide USSTRATCOM/J593 with informational copies of test schedules, launch and impact reports, quick-look reports, annual evaluation reports, comparative analysis for methodology changes. Upon request, other technical reports may be required for USSTRATCOM J59 war plans analysis. The Services will provide the data used in calculations, describe the source of each datum used, and show step-by-step calculations for methodology changes of the estimates listed in **paragraphs 2.e.(1) through 2.e.(5)**. This information is necessary for

USSTRATCOM to meet the requirements of Chairman Joint Chiefs of Staff Instruction (CJCSI) 3110.04B; Nuclear Supplement to Joint Strategic Capabilities Plan.

(U) APPENDIX A TO ENCLOSURE A

DISTRIBUTION LIST

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USSTRATCOM/J53	3
National Nuclear Security Agency	1

ENCLOSURE B

(U) GUIDELINES FOR OPERATIONAL TESTING

1. (~~FOUO~~) Introduction. These testing guidelines establish IOT&E test statistics and are used to determine a reference nuclear weapon planning factor. The reference is compared annually throughout the system life by conducting FOT&E. Each annual test cycle for FOT&E refines the previous year's nuclear planning factor estimate. The new refined estimate is compared to the previous year's estimate to determine if the weapon system shows signs of degradation. Nuclear planning factors are used in USSTRATCOM operational plans (OPLANs) and in support of other nuclear weapons decisions. Commander, United States Strategic Command (CDRUSSTRATCOM) has the authority to approve incorporation of operational testing and pertinent non-operational testing data in determining these planning factors. CDRUSSTRATCOM, or a designee, will approve the design, conduct, analytic techniques, and methodologies of IOT&E and FOT&E used to determine planning factors. Any changes to previously approved techniques and methodologies need to be coordinated through USSTRATCOM/J593 NLT 90 days in advance of the annual Nuclear Planning Factors Workshop for approval by CDRUSSTRATCOM.

2. (U) Application. This guidance applies to all nuclear weapon system programs, whether new, deployed, or undergoing life extension. These guidelines pertain to the design of IOT&E and FOT&E nuclear weapon system test plans, presented for consideration at the Milestone C (Phase 6) deliberations, and the reporting and executing of these test plans over the operational service life of the system. This distinction is made to differentiate from tests conducted to support acquisition decisions for systems before entering production; as specified in Title 10, United States Code.

3. (U) General Requirements

a. (U) USSTRATCOM develops OPLANs which are assessed by numerous methods to include levels of damage achieved. Damage achieved is measured in terms of Damage Expectancy (DE), which is the probability of achieving the desired level of damage against a targeted facility. It is the product of Probability of Arrival (PA) and Probability of Damage (PD), as shown in **Table 1**. PA is the product of PLS, WSR, Probability to Penetrate (PTP) and one minus Probability of Clipping Terrain (1-PCLIP). PD is a function of weapon yield, HOB, CEP, the hardness of the target as measured by the Vulnerability Number/Target Type/K-factor (VNTK) system, the area including 95% of the targeted facility (R95), and offset distance of the target from the aim point. WSR, CEP, and HOB planning factors are calculated primarily using operational testing data. Sufficient testing is necessary to monitor performance

throughout a weapon system's operational life.

DE = PA x PD PA = PLS x WSR x PTP x (1-PCLIP) PD = f (Y, HOB, CEP, VNTK, R95, Offset)	
Legend:	
DE – Damage Expectancy PA – Probability of Arrival PD – Probability of Damage PLS – Prelaunch Survivability WSR – Weapon System Reliability PTP – Probability to Penetrate	PCLIP – Probability of Clipping Terrain Y – Yield HOB – Height of Burst CEP – Circular Error Probable VNTK – Vulnerability Number/Target Type/K-factor system R95 – area including 95% of the targeted facility

Figure 1. (U) Damage Expectancy Equation

b. (U) All failure modes observed during flight and non-flight testing of the deployed weapon system will be reported and considered when calculating WSR and CEP planning factors. The Services set the rejection or retention criteria of data. Standards for rejection and retention of data for calculating planning factors are specified in **paragraph 10.** Explanations of no-test, non-realistic, non-representative, reselection, and adjusted data categories are provided in **Enclosure D, paragraph 3.j.(2)** and **3.k.(3)**.

c. (~~FOUO~~) A (b)(1) Sec 1.7(e) or an approved statistical equivalent methodology thereof, should be used to determine accuracy outliers. Any weapon test determined to be (b)(1) Sec 1.7(e)
(b)(1) Sec 1.7(e)

d. (~~C~~) Flight testing should be as operationally representative as possible and test the entire mission. Operational tests constructs may be either holistic or phased, but must test all aspects of the mission/phase. Examples which do not meet this are (b)(1) Sec 1.4(a) test aircraft, test crew, etc. If feasible, holistic testing is preferred.

(1) (~~C~~) A holistic construct will employ beginning-to-end testing. If feasible, all flight tests will be initiated with the transmission of an exercise EAM. The OPR (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) is the USSTRATCOM, Global Operations Directorate, Nuclear Operations, Nuclear Operations Command and Control Division (J38). (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

(2) (~~FOUO~~) A phased construct breaks up the mission into several phases, each of which must be fully tested and scored independently. However, the phases can be tested holistically. If feasible, this should also include the Command and Control training as described in the holistic construct.

(3) (~~FOUO~~) Known issues where the holistic construct fails to meet the SI (but the phased construct works) include:

(a) (~~FOUO~~) Any release of multiple RVs/RBs from a single booster;

(b) (~~FOUO~~) Any release of multiple missile or gravity weapons from a single carrier;

(c) (~~FOUO~~) Any test ending pre-maturely due to weather, range safety concerns, or test-related equipment;

(d) (~~FOUO~~) Any phase specific functional ground or laboratory test (while under operational representative conditions) such as Functional Ground Test, Simulated Electronic Launch Minuteman (SELM), Operational Sequence Test, etc.

e. (U) Planning for flight tests will include Joint Test Assembly (JTA) requirements. Sufficient JTA missions, consistent with operational testing requirements, will be flown each year to allow the calculation of warhead reliability. NNSA requirements may necessitate that some of these JTAs be high fidelity. If deemed necessary by the NNSA, a high fidelity JTA or "instrumented high fidelity JTA" will be flown for each ballistic missile warhead type at least once every two years. Offices responsible for those ballistic missile weapon systems without a high fidelity JTA, for which the NNSA deems a high fidelity JTA is required, will report on the status of acquiring said JTA in the annual evaluation report of the weapon system.

f. (U) Differences between test weapon systems and the deployed weapon system forces will be explained and factored into the observed test-range WSR and CEP results.

g. (~~C~~) (b)(1) Sec 1.4 CEPs recommended for use in nuclear targeting and evaluation will be (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) Alternative methods may be used to provide additional insight into weapon system accuracy performance. These methods must be approved by USSTRATCOM.

h. (U) All required confidence statements must consider limitations of test-range instrumentation and the effect of these limitations on confidence statements. Test range measurement errors, including uncertainties in the location of sensors and their effect on CEP planning factors, should be presented in evaluation reports.

i. (U) Since PD is a function of weapon yield, the Services will review NNSA's assessment of weapon yield and report the yield value with its associated uncertainty range in their evaluation report.

4. (U) OT Planning and Execution

a. (U) Operational tests are the primary source of data for the planning factors of WSR, CEP, and HOB. An operational test can demonstrate a system's operational accuracy and reveal known and unknown operational failure modes of tested subsystems and interfaces, if performed under close-to-operational conditions with representative assets. Although operational testing is conducted throughout a system's service life, the required number of operational test assets must be procured early, or arrangements made for continued production, in a weapon system program.

b. (U) Primarily, IOT&E establishes reference WSR and CEP planning factors. After completion of IOT&E, FOT&E is used to refine the established planning factors annually.

c. (U) Test Sizing Requirements

(1) (~~C~~) IOT&E (for WSR). Perform a sufficient number of weapon system tests such that the (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) If IOT&E is to be conducted over multiple years, it is suggested the per year test rate should meet or exceed (b)(1) Sec 1.4(a) (b)(1) Sec 1.7(a)

(2) (~~C~~) FOT&E (for WSR). Perform a sufficient number of operationally relevant Weapon System Reliability (WSR) system tests that satisfies the following conditional probabilities:

(a) (~~C~~) (b)(1) Sec 1.4(a) reference WSR planning factor (b)(1) Sec 1.4(a) (b)(1) Sec

(b) (~~C~~) (b)(1) Sec 1.4(a) reference WSR planning factor (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

(c) (~~C~~) The reference WSR (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a):

1. (~~C~~) For weapon systems (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) as approved by USSTRATCOM/J593 of (b)(1) Sec 1.4(a)

2. (~~C~~) For weapon systems (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

3. (~~C~~) For weapon systems (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

4. (~~C~~) For weapon systems (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

(d) (U) On an annual basis, the Services must recalculate a FOT&E test size and must verify this test size with USSTRATCOM/J593.

(e) (U) For more implementation details regarding test size calculation, refer to Enclosure C.

(3) (~~C~~) To the maximum extent possible, (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

d. (U) Test Sizing Methods. There are a number of statistical methods suitable for test sizing the above requirements. However, the Services must be aware of fundamental differences between the IOT&E and FOT&E requirements. IOT&E is an expected value, confidence interval problem (i.e. not a statistical hypothesis test); whereas FOT&E is a statistical hypothesis test with two alternatives being: 1) the demonstrated WSR has not degraded be a

certain threshold, and 2) the demonstrated WSR has degrade by a certain threshold.

(1) (U) For IOT&E, any appropriate system-based method (holistic or phased) of generating a confidence interval may be used. Services must coordinate their chosen methodology with USSTRATCOM Global Strike Capabilities Division (J87) and USSTRATCOM/J593 for concurrence.

(2) (U) For FOT&E, any appropriate system-based method (holistic or phased) of conducting a hypothesis test may be used. The hypothesis test should use demonstrated WSR values as the parameters of their distributions. Services must coordinate their chosen methodology with USSTRATCOM/J593 for approval.

(3) (U) For newly developed systems or existing systems with major modifications, a forecasting test strategy can be applied for programming purposes. Only data obtained from testing sources fulfilling the FOT&E requirements in **paragraph 4.c.(2)** should be used for this forecasting test strategy.

e. (U) Scheduling of Tests. The Services are advised to schedule annual tests early in their test cycle to ensure test size requirements will be met and there is an opportunity to reschedule and/or add a test should the need arise. Services will provide USSTRATCOM/J593 copies of their latest testing schedule as they become available. USSTRATCOM/J593 prefers a 5-yr forecast at a minimum.

5. (U) Measures of Test Regime Quality

a. (U) Measures of Quality. The goals of operational testing are realism, representativeness, and sufficiency. Testing which mirrors operational conditions is realistic. Systems whose components are equivalent to those in the deployed operational system are representative. Test regimes that have adequate numbers of realistic and representative operational tests over the full range of operational parameters are sufficient. Realistic and representative tests provide randomly sampled, unbiased data from homogeneous populations. Depending on the type of operational mission and the planning factor, a test regime may be limited in how to achieve these goals.

b. (U) Realism of Tested Systems. To establish realism in the test regime, the responsible organization should provide the support, flight, and environmental characteristics that substantially affect WSR, CEP, and HOB accuracy. Major differences between test conditions and actual operations will be evaluated.

(1) (U) Test Conditions. Test conditions generally repeat from test to test and, over a period of years, can have a significant cumulative effect. To avoid biased planning factors, operational tests should replicate operational conditions that affect WSR, CEP, and HOB accuracy. For example, test preparation, weapon employment, support logistics and personnel, environment, and constraints on mission/trajectory parameters are all test conditions that must replicate operational conditions.

(2) (U) Test preparation is comprised of the events between selection of a weapon system and initial establishment of firing/release readiness. For operational forces, the equivalent events are between stockpile and non-generated and operational alert status. The evaluation report should provide a chronology of key events for test preparations. It should identify significant differences between the preparations for an operational test firing and the actual employment of the weapon. Topics of interest include the following:

(a) (U) Major handling and transportation operations.

(b) (U) Force generation timelines for non-alert aircraft.

(c) (U) Pre-flight testing, including procedures for identifying suspect weapons and repairing or excluding them.

(d) (U) Weapon system modification operations.

(e) (U) For submarine firings, the type of external navigation aids used, their accuracies, and the frequency of position and azimuth fixes.

(f) (U) Missile simulation and World Geodetic System models used in targeting calculations, special bias corrections for firing and other conditions that could affect the applicability of weapon system accuracy data.

(3) (U) Weapon employment comprises events from initial alert (test or operational) to weapon release. Each individual test report should briefly describe deviations of operational testing from operational procedure and significant findings should be included in the evaluation report. Topics of interest include the following:

(a) (U) Procedural changes resulting from non-tactical instrumentation, such as those required for destruction, telemetry, and range safety.

(b) (U) The Command and Control timeline from execution order to weapon release, including the execution order formats; decoding, authentication, and verification procedures; and Permissive Action Link operations.

(4) (U) The individual test reports should indicate the quality and quantity of logistic test support relative to comparable support for the operational weapon and significant findings are included in the evaluation report. Topics of interest include the following:

(a) (U) Number and types of checkout and repair equipment.

(b) (U) Periodic checks while maintaining firing alert and launching operations.

(c) (U) Corrective actions that may occur within the launch sequence that affect system reliability or accuracy. For example, launch crews can replace some parts, such as failed missile batteries or override failure alarms, if established to be false. The test report should describe such procedures and indicate which subsystems they affect.

(d) (U) Numbers and types of support personnel.

(e) (U) The numbers and skills of service and any contractor personnel who support tests compared with similar service assignments for deployed weapons.

(5) (U) The test report should compare environmental factors affecting tests to operational conditions. Topics of interest include:

(a) (U) Local sea, wind, and temperature conditions in the launch area for TRIDENT II.

(b) (U) Launch area ground conditions for Minuteman III.

(c) (U) Climatology conditions for Air Launch Cruise Missile (ALCM).

(d) (U) Wind conditions at altitude and ground level for high-altitude gravity bombs.

(e) (U) Climatology conditions in the target area for all weapons.

(f) (U) Time of day when testing occurred for all weapons.

(6) (U) The realism of operational tests could be affected by test range or other constraints on mission and trajectory parameters. Some examples include flight range, reentry trajectories, cruise missile ground track and fusing condition constraints. The test report should list such constraints and discuss the effect on WSR, CEP, and HOB accuracy planning factors.

c. (U) Representativeness of Tested Systems. The responsible organization can determine the representativeness of test hardware and personnel by

comparing appropriate characteristics of test and operational systems and evaluating any differences. Ideally, test and operational systems should have the same configuration, be from the same manufacturing lot, have a similar deployment history, and be employed by personnel with comparable skills and experience.

(1) (U) Tested systems can only approximate this ideal because nuclear weapon systems are manufactured and deployed over several years and undergo modifications over time. Over the life of a test program the responsible organization must assess whether each tested launch and/or weapon elements are sufficiently like the current operational elements and weapons to be an appropriate source of data for calculating planning factors.

(2) (U) In addition to hardware, the effectiveness of weapon systems depends on the skills and experience of operating personnel. For example, skilled submarine personnel can minimize launch delays. The responsible organization should assess whether test data for WSR, CEP, or HOB accuracy are biased due to differences in skills or experience between operating personnel selected for test and those in the deployed forces.

d. (U) Sufficiency of the OT Regime. Sufficiency can be accomplished by ensuring the test regime includes enough tests for each mission and hardware configuration to avoid major gaps in the variety of data needed for USSTRATCOM Air Room planners.

(1) (U) An operational test program should carefully allocate test resources among the many different weapon system applications to obtain accurate statistical precision of planning factors for each application.

(2) (U) Test allocations should emphasize the configurations and employment modes for which there are substantial allocations in war plans. Because of resource limitations, test regimes may not be able to perform testing over the full range of operational parameters for a weapon system. This inability to test over the entire spectrum of operational parameters results in risk to OPLAN. An explanation of any limitations within the proposed test plan and associated risk must be presented to USSTRATCOM for consideration. CDRUSSTRATCOM determines the final amount of acceptable risk.

(3) (U) The responsible organization can assess gaps in test coverage by examining the frequency of testing for the system modes. Of interest are particular hardware configurations or employment methods that have undergone little or no testing. Such gaps in testing are not necessarily significant. The assessment should focus on the gaps in testing that indicate a gap in knowledge about the deployed system or its use and affect planning factors for a system mode that appears in OPLANs.

6. (U) Additional Considerations for New Test Programs. The following factors should be considered when designing new test programs and determining the initial procurement requirement for operational testing of weapon systems:

a. (U) The size of the operational force, the histories of previous relevant weapon systems, and the employment concept and application for the weapon system.

b. (U) The expected operational service life of the system (as opposed to the design life) should be considered to ensure weapon system asset availability for

c. (U) The impact on IOT&E and FOT&E due to improvements or changes in the system because of aging.

d. (~~C~~) (b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a) may require additional testing for other purposes, added tests are not required merely to meet the requirements specified in **paragraph 4.c.**

e. (U) The use and applicability of data derived from non-flight tests. Utilizing data from sources other than flight test may be applicable; however, this does not supersede the requirements specified in **paragraph 4.c**. Applicable tests are those that are considered realistic and representative as described above. Each system's data scoring board will determine what types of non-flight test data are realistic, representative, and sufficient for use in calculating planning factors. Acceptance of this data must be approved by CDRUSSTRATCOM.

f. (U) The use and applicability of data from Survivability and Vulnerability testing. Survivability and Vulnerability testing is used to provide USSTRATCOM estimates of a weapon system's ability to survive manmade hostile environments. These tests may not be operationally representative and are not counted toward meeting the test size requirements. While Survivability and Vulnerability testing is normally conducted during developmental testing, newly developed threats may require additional testing during FOT&E. If Survivability and Vulnerability testing is required of a deployed weapon system and FOT&E assets will be used, responsible agencies must notify USSTRATCOM to determine the warfighting impact of the reduction in follow-on testing.

7. (U) Flight Test Monitoring. To improve flight test monitoring, Services will provide a schedule of aircraft/ballistic missile flight tests, including mission parameters, prior to scheduled test execution to USSTRATCOM/J593 Planning Factors Team, USSTRATCOM/J87 and USSTRATCOM/J383 Nuclear Current Operations Duty Officer. The Services will provide changes to the submitted schedule or mission parameters as soon as possible. Initial test

results and/or quick look reports will be provided to USSTRATCOM/J593 Planning Factors Team, USSTRATCOM/J87and USSTRATCOM/J383 Nuclear Current Operations Duty Officer in accordance with Operation Order Global Citadel (OGC).

8. (~~FOUO~~) Command and Control Procedures (CCP). In order to quantify the reliability of CCP from message transmission to execution, Services will provide CCP metrics that estimate the probability crews will receive a valid EAM and the probability they perform all necessary actions within the system's required time limit to commit a nuclear weapon.

a. (~~FOUO~~) The CCP timeline is from message transmission to weapon release. The timeline includes the following: message transmission, receipt, decoding, validating, authentication and verification procedures, and Permissive Action Link (PAL) operations. CCP reliability is currently required to identify deficiencies and/or trends; however, it is not used for WSR calculations.

b. (~~FOUO~~) The methodology used for calculating CCP is determined by the Services. However, a CCP planning factor should contain elements which closely resemble the current operational force. Services should address which methodology (e.g., weighted, moving average, cumulative) is used to calculate CCP at the Nuclear Planning Factors Workshop and in their annual evaluation report. The Service's chosen methodology for calculating CCP will be submitted to USSTRATCOM/J593 for approval.

9. (~~FOUO~~) Other Measures of Performance. Additional data may be collected in order to more fully describe the performance of a weapon system. Such data, as well as any uncertainties that apply to such data, may include reaction time, launch interval, and missile performance. This data should, at a minimum, be included in the Service's annual evaluation report and briefed at the Nuclear Planning Factors Workshop.

10. (U) Database Management

a. (U) A valid and adequate performance database is critical to calculating sound planning factors. Because weapon systems change over time, test databases require recurring validation to ensure the most accurate estimates of system performance. If a comprehensive database update is accomplished, the Service's will provide USSTRATCOM/J593 with the changes, impact of the changes, and an explanation regarding why the update was accomplished. Data reevaluation can lead to data being removed from planning factor calculations. Categories of removed data include no-test, unrealistic, and unrepresentative. The criteria for removal or retention are set by Service scoring panels.

b. (U) A test result is categorized as no-test when:

(1) (U) It is not tested due to anomalies or failures prior to its operation;

(2) (U) It is not clear if test equipment operated properly;

(3) (U) It is not known if the test environment was within specification; or

(4) (U) The weapon under test had non-representative components.

c. (U) Data from a test may be obtained under non-operational conditions and thus be categorized as unrealistic. For example, a missile test may use operationally representative hardware, but have special test requirements for the reentry angle. If the angle is not operationally realistic, RV/RB reliability and accuracy data from that test is unrealistic and should be excluded from planning factor calculations.

d. (U) If hardware is not typical of the deployed force, its test data is categorized as unrepresentative. Representative data can become unrepresentative over time as the weapon ages. Unrepresentative test data should be removed from planning factor calculations if a significant change in weapon system performance is detected when comparing earlier test data with more recent test data or the data derived from earlier in the test program is no longer considered representative because of weapon modifications or configuration changes.

(1) (U) For data that becomes unrepresentative due to weapon modifications, the selective exclusion of only portions of a body of unrepresentative data (e.g., failures only) from planning factor calculations is incorrect. The following guideline should be followed for excluding data because of system modifications. If a weapon system is modified to correct a failure mode experienced during testing and if the success of the modification has been demonstrated by a sufficient number of tests, then all tests (successes as well as failures) conducted with elements not incorporating this modification should be categorized as unrepresentative and can be excluded from planning factor calculations. (In other words, all successes and failures in a testing dataset must be removed if deemed unrepresentative due to a modification.)

(2) (U) For a given system, the true reliability is likely to be between that estimated by excluding none and excluding all of the failures for corrected subsystems, and the best estimate of reliability is that which is demonstrated by operational tests using only the modified weapon elements. This is a result eliminating all successes and failures from WSR planning factor calculations for the unmodified elements.

(3) (U) For a high level of statistical confidence in planning factors, the test data used to calculate planning factors should retain the largest possible number of tests or portions of tests that are realistic and representative of the deployed force.

e. (U) Weapon systems typically undergo ground testing prior to operational flight test. Subsystems that fail such tests may be replaced to preclude an unnecessary loss in flight test data. The subsystem replacement is a reselection and data from the ground test is reselected data. If the ground test failure is indicative of a likely flight failure, the reselected data should be scored a failure and included in WSR calculation. However, ground tests may not be definitive. In this case, a decision must be made to score the reselected data as a failure, success, or no-test. Additional information on the subsystem can aid this decision such as data from more definitive tests. In some cases, the additional tests can establish the system as a likely flight failure or success. Otherwise, the analyst should remember that reselected data is from suspect subsystems that have failed ground test. To avoid overestimates of reliability, the analyst should not score reselected data as no-test simply because of a lack of definitive information. Lacking information, the analyst should score reselection data as a failure.

f. (U) Anomalous events and test range limitations may affect test realism. Additionally, changes in the deployed force may cause previously representative data to be become obsolete and thus unrepresentative. Under these conditions the test data may be categorized as no test or unrepresentative. However, in some cases, there is a sound basis for adjusting the data and including it in the planning factor calculations. This is especially desirable if discarding the data would leave an inadequate amount of data.

(1) (U) Examples of anomalous test events that affect realism are non-tactical delays during the countdown due to test range, telemetry, or destruct electronics problems and delays in repairing a failure in tactical equipment because of range safety checkout requirements. Such delays might affect the estimate of average launch interval or cumulative time to launch which could in turn affect planning factors. In the simplest case, the correction for such delays is to remove them from the test's timeline.

(2) (U) An example of obsolete data is the accuracy data from missiles before an incremental upgrade to the guidance system. Such an upgrade might be the removal of a bias in gravity-field input data for the guidance computer. Since the physical theory of the effect of gravity on guidance systems should be well understood, correction of old data to reflect the improved input data should be feasible.

(3) (U) There may be fundamental differences among weapon systems hardware and missions, plus differences in operational testing realism. Because of such differences, the methods for adjusting operational test results and the magnitude of adjustments may vary within a system.

g. (U) When changes or additions occur to historical test databases, the updates require boldface formatting with a brief note explaining the circumstance in the annual evaluation report. If data is removed from historical test databases, a brief note explaining the circumstance for removing data and the specific data removed from the prior year is required.

ENCLOSURE C

(U) INITIAL AND FOLLOW-ON OPERATIONAL TESTING

1. (U) Initial Operational Testing

a. (U) Initial Operational Testing for Reliability

(1) (U) A reason for conducting IOT&E on nuclear weapon systems is to establish a reference WSR planning factor for use in USSTRATCOM OPLANs. The number of tests required to calculate a statistically significant WSR planning factor is determined NLT Milestone C (Phase 6), which is before any operational tests are conducted. Therefore, the responsible test organization, with approval of USSTRATCOM/J87 and USSTRATCOM/J593, must determine the number of IOT&E tests using engineering estimates and developmental test data to calculate the projected WSR. To the greatest extent feasible: IOT&E should consider test events jointly with NNSA warhead qualification tests, NNSA Retrofit Evaluation System Tests (REST) and other development/qualification tests when hardware fidelity is acceptable and objectives can be met using a single event. This information is assumed to be sufficient to establish an initial WSR planning factor.

(2) (~~C~~) The WSR requirement for IOT&E is to perform a sufficient number of weapon system tests such that the expected difference between the observed IOT&E (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) The required number (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

b. (U) Initial Operational Testing for Accuracy

(1) (~~FOUO~~) Another reason for conducting IOT&E on nuclear weapon systems is to establish a reference CEP planning factor for use in USSTRATCOM OPLANs. If a weapon test is a reliability success, its radial error is used to calculate CEP. (b)(1) Sec 1.7(e) (b)(1) Sec 1.7(e)

(2) (~~C~~) The required number of Initial OT and Evaluation tests is equal to the larger of two requirements (i.e. (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a). The (b)(1) Sec 1.4(a) requirement for Initial OT and Evaluation is that (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

c. (U) Initial Operational Testing for OPLAN assessment

(1) (U) Successful OPLAN assessment depends on having a statistically significant WSR and CEP. Both of these planning factors should be provided by operational test.

(2) (~~C~~) The required number of IOT&E (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a).

2. (U) Follow-On Operational Testing

a. (U) Follow-on Operational Testing for Reliability

(1) (U) Two reasons exist for conducting FOT&E.

(a) (U) The first reason is to validate and refine the current WSR planning factor.

(b) (U) The second reason is to detect degradation from the current WSR planning factor.

(c) (~~C~~) The current WSR planning factor is (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

(2) (U) The Service's chosen methodologies for calculating reliability planning factors and degrade detection will be submitted to USSTRATCOM/J593 for approval.

(3) (U) Perform a sufficient number of operationally WSR system tests that satisfies the following conditional probabilities:

(a) (~~C~~) (b)(1) Sec 1.4(a) from the reference WSR planning factor has occurred, the chance of (b)(1) Sec 1.4(a) (b)(1) Sec

(b) (~~C~~) (b)(1) Sec 1.4(a) from the reference WSR planning factor has occurred, the chance of (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a).

(c) (~~C~~) The reference WSR planning factor is based on the status of a weapon system's IOT&E program where:

1. (~~C~~) For weapon systems that (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) as approved by USSTRATCOM/J593 of their IOT&E program, then the reference WSR planning factor (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

2. (~~C~~) For weapon systems that are currently undergoing their IOT&E program and have passed the above threshold, then the WSR reference planning factor (b)(1) Sec 1.4(a) .

(U) 3. (~~C~~) For weapon systems that have completed their IOT&E program, then the reference WSR planning factor is the latest WSR estimate.

4. (~~C~~) For weapon systems that institute a life extension program, then the reference WSR planning factor could be the (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a)

(d) (U) On an annual basis, the Services must recalculate a FOT&E test size and must verify this test size with USSTRATCOM/J593.

b. (~~C~~) Follow-on Operational Testing for Accuracy

(1) (U) The same two reasons for conducting FOT&E for reliability also apply for conducting FOT&E for accuracy.

(2) (U) The Service's chosen methodologies for calculating accuracy planning factors and degrade detection will be submitted to USSTRATCOM/J593 for approval.

(3) (U) The CEP requirement for FOT&E is as follows:

(a) (~~C~~) If CEP (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) USSTRATCOM requires a (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) ; and

(b) (~~C~~) If CEP (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) USSTRATCOM requires a (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) .

c. (~~C~~) (b)(1) Sec 1.4(a) (b)(1) Sec 1.4(a) .

ENCLOSURE D

(U) REPORTING CRITERIA

1. (U) Introduction. The primary purpose of reporting the results from IOT&E and FOT&E is to provide statistically significant WSR and CEP planning factors to support the development of USSTRATCOM OPLANs and other nuclear planning. All supporting reports, plans, and documentation will be provided to USSTRATCOM.

a. (U) For WSR, Services will report a single planning factor, report the value of WSR (b)(1) Sec 1.7(e) and report results from WSR degrade detection analysis.

b. (U) For CEP, Services will report a single planning factor, report the value of CEP_{DGZ} (b)(1) Sec 1.7(e) and report results from CEP degrade detection analysis. Additionally, CEP_{MFP} calculation should be calculated and reported. However, CEP_{DGZ} will remain the primary accuracy planning factor for reporting purposes.

c. (U) Services will include supporting documentation in all evaluation reports for review by USSTRATCOM.

d. (U) Formal evaluation reports that provide initial planning factor recommendations will be submitted to CDRUSSTRATCOM for approval through USSTRATCOM/J593, as soon as possible, but NLT 2-years before the IOC of newly deploying systems. The use of non-operational test data may be required to develop initial planning factors.

e. (~~FOUO~~) (b)(1) Sec 1.7(e)

(b)(1) Sec 1.7(e)

f. (~~FOUO~~) Services should provide USSTRATCOM recommendations for weapon system employment. (b)(1) Sec 1.7(e)
(b)(1) Sec 1.7(e)

g. (~~C~~) If the test size requirements in **Enclosure B, paragraph 4.c.** cannot be met, the Services must submit a waiver request to USSTRATCOM/J593. The waiver request, in form of a memorandum or white paper, should include: the risk incurred by not meeting the requirement; an estimate of detectable degrade (b)(1) Sec 1.4(a); and mitigating actions planned to reduce the risk incurred by not meeting the requirement. If data from sources other than flight testing is used to compute planning factors and their respective statistical significance, it must be reported and the supporting data provided to CDRUSSTRATCOM. Should any of the mitigation actions of the original waiver change (i.e. additional assets now available for operational testing, Life Extension activities completed, data from other sources changes, etc.), the Services must provide USSTRATCOM an updated waiver and detailed justification for the new circumstances supporting the new waiver request.

2. (U) General Report Guidelines

a. (U) The weapon system evaluation report is the official record of the responsible organization's nuclear planning factors. Its preparation should reflect the importance of nuclear systems and the investment in funds and weapon systems. It serves short and long-term purposes. In the short term, it recommends the planning factors that USSTRATCOM uses for OPLAN assessment. In the long term, it provides information and background for methodologies used, trend analysis, and test planning.

b. (U) The evaluation report should include the information needed to demonstrate to USSTRATCOM that its data and analyses are sound. It should also include planning factors, confidence bounds for those planning factors, and qualitative assessments. These assessments should address issues of insufficient data and/or data not amenable to quantitative analysis. This includes the significance of isolated failures and long-term trends in system reliability. The report must provide enough detail so USSTRATCOM analysts can achieve a sound understanding of the data, analyses, and results.

c. (U) The operational test weapon selection policy needs to ensure that, over the long term, the test weapons comprise a true random sample of the deployed force. In the short term, weapon selection may be influenced by immediate needs such as the testing of new modifications. To substantiate the soundness of the selection process, the evaluation report should include a summary of the following items for each operational test:

(1) (U) The method of selection, including selection criteria.

(2) (U) Selection pool.

(a) (U) Number of launch elements and weapons in the deployed force, on alert and off alert, with reasons why they are not on alert.

(b) (U) Number of launch elements and weapons available for selection.

(c) (U) Portions of the launching elements excluded from selection and number of alert and non-alert launch elements and weapons excluded from selection. The discussion should include the reasons for exclusion. Sufficient information should be included to account for the difference between the number that are deployed and the number available for selection.

(3) (U) Launch elements and weapons selected for firing.

(a) (U) If launching elements, missiles, Reentry Vehicles/Reentry Bodies, or gravity weapons are excluded from firing operations following their selection, reasons for exclusion should be stated.

(b) (U) Performance tests conducted in connection with the selection process, such as Alert Readiness Tests for the Minuteman III. In the event these tests are not passed, the evaluation report should describe the actions taken and the effect of the performance tests on the operational test.

3. (U) Report Content

a. (U) Introduction. The purpose of the introduction is to provide context for the terminology, data, and other information in the report particularly information describing the deployed force to include its constituent hardware, software, personnel, and test regime.

b. (U) Executive Summary. The purpose of the executive summary is to provide a concise summary/table of planning factors, test anomalies, watch items, and significant system modifications.

c. (U) Status of the Deployed Force. Status of the deployed force is the main body of the report and will include the following:

(1) (~~C~~) For reporting purposes, the deployed force consists of weapon systems that are:

(a) (C) (b)(1) Sec 1.4(a);

(b) (C) (b)(1) Sec 1.4(a);

(c) (~~C~~) Normally assigned weapon systems that are (b)(1) Sec 1.4(a)
(b)(1) Sec 1.4(a)

(d) (~~C~~) (b)(1) Sec 1.4(a); and,

(e) (~~C~~) (b)(1) Sec 1.4(a).

(2) (U) General deployment location, force structure, Command structure, and command and communications nets.

(3) (U) The total number of weapons and launching elements in each major configuration during the reporting period and projected for the future period (in which the reported planning factors apply).

(4) (U) Major changes or modifications to the deployment concept, ground support equipment, or weapon system design that may have been instituted during or after the evaluation reporting period. The evaluation report will also include projected numbers of weapons in alternative configurations for the time period in which the reported planning factors apply.

(5) (U) Definition of the alert states of the deployed strategic force. For example, this might include the normal peacetime conditions. For periods of tension, this might include increased bomber alert status and increases in number of submarines at sea.

(6) (U) Timeline requirements for generating the force for weapon systems that do not stand peacetime alert

(7) (U) The various firing modes that could be operationally employed. Examples include firing modes to accommodate target changes in the launch execution order and programmed launch delays for selective response or time-on-target coordination.

(8) (U) A general description of the mission profiles, planned firing delays of the deployed force, and suggested employment considerations.

d. (U) Description of Deployed Systems. This section will describe primary characteristics of the deployed hardware, software, and personnel. The descriptions must be detailed enough to provide context for discussions of test data, including test failures. Typical configuration information includes general descriptions of the following subsystems, their alternative configurations and fusing options, and any major modifications:

(1) (U) Command and Control system;

(2) (U) Launching silo, submarine, or aircraft system;

(3) (U) Missile propulsion;

(4) (U) Missile guidance, including principles of operation;

(5) (U) RV/RB equipment section;

(6) (U) RV/RB or cruise missile warhead;

(7) (U) Gravity weapons;

(8) (U) Ballistic missile trajectories, cruise missile ground tracks or gravity weapon release modes;

(9) (U) Skill and experience of operating personnel; and

(10) (U) Mission planning and operating software.

e. (U) Test Realism. The purpose is to compare the conditions for operational testing (plus augmenting non-operational testing, if any) to those that are non-operational. For operational tests, it must address test preparation, weapon employment, logistic support and personnel, test constraints, and sampling of the deployed force. The section will contain enough descriptive material about test and operational procedures and conditions to justify the responsible organization's conclusions about test realism.

(1) (U) For augmenting non-operational tests, the section needs to identify the relevant conditions in the non-operational test environment and compare them to corresponding conditions in the operational environment. Typically, compared to non-operational flight and simulated segments of operational tests, ground tests of hardware components have purposes, procedures, and documentation formats that are least like those for operational tests. Thus, assessing the realism of ground tests may be difficult. If there is insufficient information to assess realism of any non-operational test, these guidelines recommend that the responsible organization indicate that it is not feasible to assess the test's realism.

(2) (U) The realism of operational tests could be affected by test range or other constraints on mission and trajectory parameters. For example, these could pertain to flight ranges, ballistic missile trajectories, cruise missile ground tracks or fusing conditions, and Terrain Contour Matching accuracy. The evaluation report must list such constraints and discuss their effect on planning factors.

f. (U) Test Representativeness. The purpose is to compare test hardware, software, and operating personnel to those in the operational force. This

section will concentrate on differences between test and operational systems, including enough detail to support the responsible organization's assessment of test representativeness. The evaluation report must indicate the quality and quantity of test logistic support relative to comparable support for the operational force. Topics of interest include the following:

(1) (U) Number and types of checkout and repair equipment.

(2) (U) Periodic checks while maintaining firing alert and launching operations.

(3) (U) Corrective actions that occur within the launch sequence that may affect system reliability or accuracy. For example, launch crews can replace some parts such as failed missile batteries or override failure alarms, if established to be false. The evaluation report must describe such procedures and indicate which subsystems they affect and how they impact test results.

(4) (U) Numbers and types of support personnel.

(5) (U) The numbers and skills of Service and any contractor personnel who support operational tests compared with similar service assignments for deployed forces.

g. (U) Realism/Representativeness of Tests that Augment OTs. The purpose is to highlight the use of non-operational test data in WSR and CEP planning factors.

(1) (U) OTs alone may not provide sufficient information to assess all measures of performance for a nuclear system. Other flight, field, or laboratory tests may provide needed supplementary information. Such tests are not operational but should replicate as many of the conditions for operational testing as possible. Examples include developmental, demonstration, surveillance, and weapon system readiness tests as well as realistic training exercises. If there is insufficient data to compare the realism/representativeness of the non-operational test to operational test, the responsible organization should consider omitting the data from planning factor calculation. This is not to preclude such tests for other purposes, such as determining change of component characteristics with age. If planning factors are supplemented by non-operational test data, the evaluation report must give the source and nature of the information and the data must be made available to USSTRATCOM.

(2) (U) Operational Testing of a new or highly modified weapon system begins after its initial deployment. In the interval before completion of a substantial number of operational tests it is necessary for the responsible test organization to use engineering estimates and other non-operational test data

in calculating its planning factors. Such information can significantly bias planning factors. Therefore, the evaluation report must document the nature of the information to include Research and Development (R&D), Demonstration and Shakedown Operations (DASO), special test programs, engineering estimates, and other non-operational test sources.

(3) (U) Modifications to selected test assets will be reported. At a minimum, report modifications for the following circumstances:

(a) (U) Modifications required for instrumentation, destruction, telemetry, recovery, and tracking. The report will address operational flight functions affected by these modifications such as reduced flight range capability and interruption of operational ignition circuits to allow for arming of the destruct ordnance.

(b) (U) Modifications required for updating or replacing components in operational test weapon systems which do not exist or only partially exist in the deployed systems.

(c) (U) Modifications to the weapon system required to meet test range and nuclear safety regulations. An example is electrical isolation of non-operational test submarine-launched missiles during firings. Another example is installation of control and checkout equipment for destruction and telemetry. The evaluation report should describe operational weapon system functions affected by range and nuclear safety modifications.

(d) (U) Non-operational instrumentation readout equipment or panel displays provided for the personnel participating in the operational tests (e.g. guidance diagnostic information from prelaunch telemetry readouts). This includes instances where such information, which would not be operationally available, is used to cancel a launch or to institute repair actions.

h. (U) The guidelines above help identify differences between deployed and tested systems that could affect planning factors. The responsible organization's assessment should determine which differences affect the utility of the planning factors. For example, the assessment could be summarized in a table such as **Table 1**.

System Component	Principle Differences between Test and Operations	Planning Factor Affected	Qualitative Assessment and Caveats For Planning Factors
Launching silo, submarine, or aircraft			
Missile Propulsion			
Missile Guidance			
RV/RB/Bus Equipment Section			
RV/RB/Bus/Bomb Body			
Warhead			
Other			

Table 1. (U) Example Summary Assessment of Representativeness for Tested Systems

i. (U) Sufficiency of the OT Program

(1) (U) The purpose is to establish whether the test program, from inception through the current year of the evaluation report, has performed a sufficient number of tests in a wide enough variety of situations. The material in this section needs to address the following three topics:

(a) (U) The parameters that significantly affect planning factors,

(b) (U) The actual value of each parameter for operational systems, and

(c) (U) The importance of any substantial differences between test and operational parameter values.

(2) (U) Of particular importance are operational modes that are numerically or qualitatively important in OPLANs but may be either untested or under tested based on USSTRATCOM guidance for statistical precision. For example, WSR might vary with fusing mode. For one mode there might be infrequent tests but frequent use in plans. A possible reason for this example could be that testing of other fusing modes includes all components used by the mode in question. In this case, the difference would not be important because adequate data exists for that mode. The responsible organization will identify such a difference in comparative frequencies and determine whether the relatively light testing is appropriate.

j. (U) WSR. This section will address the database for reliability successes and failures, excluded data, methods for data analysis, and reliability planning factors (e.g. WSR, missile reliability (MR), and carrier reliability (CR)).

(1) (U) The test database, as defined in these guidelines, includes all operational testing and related non-operational testing data obtained throughout the test program. The reliability database is part of the responsible organization's corporate memory of the test program. At a minimum, it will include enough detail to permit the reader of the evaluation report, using the provided methodology, to reproduce the calculated planning factors. Additionally, the database will provide reasons for test failures. Typically, the reliability database consists of a table of all reliability results, arranged in chronological test order, with comments explaining test failures and exclusions of data from planning factor calculations.

(2) (U) A particularly important part of the database is the clear identification of all data scored as no-test, non-realistic, non-representative, reselection, or adjusted data with a rationale for the identification. If the responsible organization adjusts test data to account for differences between tests and operations, this section of the database will include numerical values and rationale for the adjustment factors.

(3) (U) The evaluation report will accumulate data obtained from non-operational tests in the database that is separate than that from operational tests. This includes non-operational test data from the Joint NNSA RV/RB/missile payload sampling programs. Because such information is used in the absence of, or to augment, operational test data derived from the deployed weapon, the report must describe the source and nature of the non-operational test data. The description will contain enough detail to permit the reader of the evaluation report to compare the statistical and qualitative features of operational test and non-operational test data. For example, operational flight tests may exercise components of a RV/RB arming system. The flight test failure rate for these components could be compared to rates in laboratory tests for the same components.

(4) (U) If a comprehensive database update is accomplished, the Service's will provide USSTRATCOM/J593 with the changes, impact of the changes, and an explanation regarding why the update was accomplished.

(5) (U) Listed in **Tables 2, 3, and 4** are items generally included in the reliability databases for ballistic missiles, cruise missiles, and gravity weapons respectively. The responsible organization will augment this information according to the specifics of the tested system.

- Nickname or other designation for firing exercise
- Date and time of test
- Special test objectives, if any
- Test range name and launch location (if more than one is used in the test program)
- Target designation and location (if more than one is used)
- Designation of launching element (SSBN/crew designation (color), wing/launch facility)
- Test range operations number and serial number for each missile attempted to be fired
- Flight range, trajectory, footprint, deployment sequence, launch azimuth, time of flight, reentry angle, reentry velocity
- Payload type (JTA or other)
- Type of test RV/RB, fusing options, and planned HOB
- For Intercontinental Ballistic Missiles (ICBM), launch-area ground weather conditions
- For Submarine-Launched Ballistic Missiles (SLBM), sea conditions in the launch area
- Climatological and sea state conditions in the target area
- Flight performance results (including success/tests and, as appropriate, operating times) for launch, in-flight and payload performance, including:
- Launch support equipment
- Booster/missile motor
- Post-boost vehicle/equipment section
- Chaff
- RV/RB reentry
- Arming and fusing for each RV/RB
- Warhead
- Ancillary exercise and test results, including ground tests of RV/RB and warhead
- Failure cause(s)
- Reasons for scoring of data as no-test, non-realistic, non-representative, or reselection
- Data adjustments

Table 2. (U) Items for the Ballistic Missile Reliability Database

- Nickname or other designation for firing exercise
- Date and time of test
- Special test objectives, if any
- Test range name and location (if more than one is used in the test program)
- Target designation and location (if more than one is used)
- Designation of launching aircraft
- Serial number for each missile attempted to be fired
- Payload type (JTA or other)
- Flight range, time, last map to target distance, map set used in test
- Fusing option and planned HOB
- Launch area weather conditions
- In-flight climatological conditions
- Aircraft generation reliability performance results
- Flight performance results (including success/tests and, as appropriate, operating times) for launch, in-flight and payload performance, including:
- Airframe (nuclear payload certified)
- Launch support equipment
- Cruise initiation
- Cruise
- Arming and fusing
- Warhead
- Ancillary exercise and test results, including ground tests of warhead
- Failure cause(s)
- Reasons for scoring of data as no-test, non-realistic, non-representative or reselection
- Data adjustments

Table 3. (U) Items for the Cruise Missile Reliability Database

- Nickname or other designation for firing exercise
- Date and time of test
- Special test objectives, if any
- Test range name and location (if more than one has been used in the program)
- Target designations and locations (if more than one has been used)
- Designation of releasing aircraft/crew
- Serial number for each weapon attempted to be released
- Payload type (JTA or other)
- Fusing option and planned HOB
- Launch area winds
- Aircraft generation reliability performance results
- Flight performance results (including success/tests and, as appropriate, operating times) for release, in-flight, and payload performance, including:
- Releasing element
- Release support equipment
- In-flight
- Arming and fusing
- Warhead
- Ancillary exercise and test results, including ground tests of warhead
- Failure cause(s)
- Reasons for scoring of data as no-test, non-realistic, non-representative or reselection
- Data adjustments

Table 4. (U) Items for the Gravity Weapon Reliability Database

(6) (U) Reliability Analytic Methods. This section will describe the statistical methods the responsible organization applies to the reliability database to calculate WSR and subsystem reliability planning factors (e.g. MR, CR, and reentry reliability). It will include the following:

(a) (U) Definitions of each performance measure used.

(b) (U) A description of the statistical reliability model of the overall weapon system, including the assumptions underlying the model and the appropriate equations. The description must include enough detail to permit the reader to judge the appropriateness of the model for the tested system.

(c) (U) A description of the statistical method used to calculate the reliability's lower confidence limit. The description will address the assumptions for the method, particularly if it approximates a more complex method.

(d) (U) If models are used specifically for subsystem performance measures, such as guidance or warhead reliability, a description of the model and its assumptions are required. If the model is not amenable to a concise description of sufficient detail, the evaluation report will refer to a published report which documents the version of model. The published report will be provided as an attachment to the evaluation report or as supporting documentation.

(e) (U) If operational test and non-operational test data are combined, a description of the assumptions and method used for combining the data and a substantial description of the rationale and analyses that justify the method.

(7) (U) Reliability Estimates. The purpose of this section of the evaluation report is to provide a description of the methodology used for calculating WSR and subsystem reliability planning factors. Also, the (b)(1) Sec 1.7(e) (b)(1) Sec 1.7(e) for WSR will be reported. The section will include the following:

(a) (U) A complete chronological summary of data used in the calculations. The descriptive material must contain enough detail to permit the reader, using data from the database, to calculate WSR and subsystem reliability planning factors. This detail may include the types, quantities, and sources of test data used in the calculation of each planning factor.

(b) (U) A summary of the calculations for WSR with its confidence limit and subsystem reliability planning factors.

(c) (~~FOUO~~) For systems with (b)(1) Sec 1.7(e) and their reliabilities may impact weapons employment considerations as they pertain to consequences of execution (b)(1) Sec 1.7(e) The responsible organization must provide separate reliability planning factors for (b)(1) Sec 1.7(e) (b)(1) Sec 1.7(e)

(d) (U) Separate WSR planning factors for configurations or missions for which the nuclear system is estimated to have distinct true reliabilities. However, while configurations and missions may vary within a deployed force, the extent of these variations and their measured effects on system performance may be so small as to justify a single estimate of performance.

(e) (U) If a comprehensive database update is accomplished, the Service's will provide USSTRATCOM/J593 with the changes, impact of the changes, and an explanation regarding why the update was accomplished.

k. (U) Weapon System Accuracy. This section will address the database for horizontal and vertical accuracy, HOB error, data analysis methods, and accuracy planning factors (e.g. CEP and HOB accuracy).

(1) (U) The accuracy test database includes all operational test data and related non-operational test data on horizontal and vertical accuracy obtained throughout the test program.

(2) (U) Because of differences between test range and operational trajectories, the estimation of operational accuracy may require the use of an engineering model to adjust test range accuracy to values for operational trajectories.

(3) (~~FOUO~~) The accuracy database must describe the rationale for assigning test results as no-test, non-realistic, non-representative or reselection data and describe any data adjustments. Additionally, the database will contain a list of weapons that failed because of miss distances (b)(1) Sec 1.7(e) (b)(1) Sec 1.7(e) (or a statistically equivalent test) and, if possible, describe the reasons for the failure.

(4) (U) This section of the evaluation report must include:

(a) (U) A graphical representation of weapon system horizontal (i.e. two dimensional) miss distances relative to the (DGZ);

(b) (U) The mean horizontal miss distance relative to the DGZ;

(c) (U) The standard deviation of horizontal miss distance relative to the DGZ;

(d) (U) The CEP relative to the mean horizontal miss distance and DGZ; and

(e) (U) The observed versus planned HOB.

(5) (U) Variations in one or more trajectory/mission-dependent factors (such as flight range, loft angle, or position in the deployment sequence) may have a significant effect on accuracy. If this occurs, several graphical representations are necessary.

(6) (U) If a comprehensive database update is accomplished, the Service's will provide USSTRATCOM J593 with the changes, impact of the changes, and an explanation regarding why the update was accomplished.

(7) (U) Listed in **Tables 5** and **6** are items generally included in the accuracy databases for ballistic missiles, cruise missiles, and gravity weapons.

• Nickname or other designation for firing exercise • Date of test • Footprint and in-flight spacing of RVs/RBs • RV/RB airburst and/or impact locations in a standard coordinate system centered on the intended burst point and aligned to the target approach azimuth • Observed versus planned HOB for each RV/RB deployed

Table 5. (U) Items for the Ballistic Missile Accuracy Database

• Nickname or other designation for firing exercise • Date of test • Airburst and/or impact locations in a standard coordinate system centered on the intended burst point and aligned to the target approach azimuth • Observed versus planned HOB for each missile or gravity weapon

Table 6. (U) Items for the Cruise Missile and/or Gravity Weapon Accuracy Databases

(8) (U) Accuracy Analytic Methods. This section must follow the guidelines for definitions, statistical analysis, and data combination which **paragraph 3.i.6** describes for reliability analysis methods. As indicated in **paragraph 3.k.(2)**, analysis of accuracy planning factors may require the use of an engineering model to adjust test accuracy estimates to values for operational trajectories. If such a model is used, this section must justify that use.

(9) (U) Accuracy Results. The accuracy results section must describe the methodology for calculating weapon system accuracy planning factors. This section must also present the accuracy planning factors. The CEP planning factor must include its (b)(1) Sec 1.7(e) statistical confidence limit. The section will include the following:

(a) (U) A complete chronological summary of data used in the calculations. The descriptive material must contain enough detail to permit the reader, using data from the database, to calculate accuracy planning factors.

(b) (U) A summary of the calculations for each accuracy planning factor and confidence limit. For CEP, the summary will include downrange and crossrange biases, standard deviations, and the correlation coefficients between downrange and crossrange. For HOB accuracy, the summary will include mean, standard deviation, mean HOB error, and any other appropriate measure of central tendency and dispersion. If horizontal and vertical miss distances are correlated, the summary will also include the resultant correlation coefficients.

(c) (U) The responsible organization will report separate CEP and HOB accuracy planning factors for configurations and missions for which the nuclear system is estimated to have a distinct CEP or HOB accuracy. Such configurations might include different ranges, reentry angles, or fusing options. However, while configurations and missions may vary within a deployed force, the extent of these variations and their measured effects on system performance may be so small as to justify a single planning factor.

(d) (~~FOUO~~) For ballistic missile systems, (b)(1) Sec 1.7(e)
(b)(1) Sec 1.7(e)
a significant difference between primary and backup CEP, the responsible organization must provide separate CEP planning factors for (b)(1) Sec 1.7(e)
(b)(1) Sec 1.7(e)

(e) (U) HOB accuracy planning factors are used by planners to determine single-shot damage probabilities. Depending on the HOB statistics, responsible organizations need to choose a measure that serves this purpose. For systems with approximately normal distributions for HOB error, HOB accuracy is described by the mean and standard deviation of HOB error. This error is the difference between the actual and intended HOB and will be reported as a positive or negative value. For systems with non-normal distributions for HOB error, the responsible organization may report other statistical parameters, subject to methodology approval by CDRUSSTRATCOM.

(f) (U) In reporting the results of analyses, the responsible organization must clearly distinguish between unadjusted operational test planning factors and adjusted operational test planning factors for CEP or HOB accuracy.

1. (U) CCP section of the report will identify:

(1) (U) Any CCP changes which have occurred,

(2) (U) The impact of CCP changes on ability of the weapon system to successfully complete its mission,

(3) (U) CCP calculation methodology, and

(4) (U) CCP test results.

m. Airborne Launch Control System (ALCS) Test Reporting. In addition to SI 512-06 requirements, include the following ALCS data in the Operational Evaluation Report:

(1) (U) ALCS test methodology (Giant Ball, SELM, & Glory Trip (GT)).

(2) (U) ALCS test results.

(3) (U) **Table 7** shows the grading criteria for Wing Launch Facilities' ability to receive ALCS UHF data during last 12 months through ALCS Giant Ball connectivity results.

Connectivity Rate	Color Code
> 99%	Blue
98% to 99%	Green
97% to 98%	Yellow
96% to 97%	Orange
<96%	Red

Table 7. ALCS Connectivity Rate (12mo)

(4) (U) **Table 8** shows the grading criteria for a 12-month, 2-way UHF voice connectivity rate for the same facilities.

Connectivity Rate	Color Code
> 97.5%	Blue
95% to 97.5%	Green
92.5% to 95%	Yellow
90% to 92.5%	Orange
<90%	Red

Table 8. 2-way UHF Voice Connectivity Rate (12mo)

(5) (U) ALCS test limitations.

(6) (U) E-6B STRAT Airborne Command Post EAM Reception Success Rates.

APPENDIX A TO ENCLOSURE D

(U) EXAMPLE OF WAIVER LETTER SUBMISSION

~~CONFIDENTIAL~~

DEPARTMENT OF DEFENSE

DD MMM 20XX

MEMORANDUM FOR: USSTRATCOM J593
900 SAC BLVD. RM NL2.100
OFFUTT AFB NE 68113-6800

FROM: (Your Organization Here)

Subject: USSTRATCOM SI 526-01 Waiver Relief Request (C)

1. (U) Statement of Services SI requirement and associated methodology.

2. (U) Reason for not meeting SI requirements.

3. (U) Outline risk (if any) for meeting requirement and associated mitigation strategies and their timelines.

4. (U) POC information:

BRANCH CHIEF or HIGHER
GS-14 equivalent or higher
Organization and Title

~~CONFIDENTIAL~~

APPENDIX B TO ENCLOSURE D (U)

EXAMPLE OF WAIVER LETTER RESPONSE

~~CONFIDENTIAL~~

DEPARTMENT OF DEFENSE
UNITED STATES STRATEGIC COMMAND

Reply To:
USSTRATCOM J593
900 SAC BLVD. RM NL2.100
OFFUTT AFB NE 68113-6800

DD MMM 20XX

MEMORANDUM FOR (Your Organization Here)

Subject: (U) Response to (Your Organization here) Waiver Relief Request (C)

1. (U) Reference. (Your Organization Here) memorandum, Subject: USSTRATCOM SI 526-01 Waiver for Relief Request, signed MMM 20XX.

2. (U) We acknowledge (Your Organization Here) are unable to meet USSTRATCOM's Strategic Command Instruction 526-01 (SI 526-01) test rate requirement for…….. We also acknowledge your mitigation strategy and realize that….. Please advise my staff if test rates further decline by submitting and updated waiver request. This waiver is good through FYXX.

3. (U) We look forward to working with your staff on this important issue. POC's for this issue are…..

BRANCH CHIEF
GS-14, DAFC
Chief, War Plans Analysis

Copy To:
USSTRATCOM/J87
USSTRATCOM/J38

~~CONFIDENTIAL~~

ENCLOSURE GL

GLOSSARY OF ABBREVIATIONS AND TERMS

ALCS	Airborne Launch Control System
ALCM	Air Launch Cruise Missile
CCP	Command and Control Procedures
CDRUSSTRATCOM	Commander, United States Strategic Command
CEP	Circular Error Probable
CET	Commander's Evaluation Test
CJCSI	Chairman Joint Chiefs of Staff Instruction
CR	Carrier Reliability
DE	Damage Expectancy
DT	Developmental Test
DGZ	Designated Ground Zero
EAM	Emergency Action Message
ESB	Executive Summary Brief
FCET	Follow-on Commander's Evaluation Test
FDE	Force Development Evaluation
FOT&E	Follow-on Operational Test and Evaluation
HOB	Height of Burst
IOC	Initial Operating Capability
IOT&E	Initial Operational Test and Evaluation
J38	Nuclear Operations Command and Control Division, Nuclear Operations, Global Operations, U.S. Strategic Command
J531	Nuclear Plans Branch, Nuclear Mission Planning Division, Plans and Policy Directorate, U.S. Strategic Command
J593	Nuclear Consequence Assessments Branch, War Plans Evaluation Division, Plans and Policy Directorate, U.S. Strategic Command
J87	Global Strike Capabilities Division, Capability and Resource Integration Directorate, U.S. Strategic Command
JTA	Joint Test Assembly
MR	Missile Reliability

NNSA	National Nuclear Security Administration
OPLAN	Operational Plan
OPR	Office of Primary Responsibility
OT	Operational Test
PA	Probability of Arrival
PCLIP	Probability of Clipping Terrain
PD	Probability of Damage
PLS	Pre-Launch Survivability
PTP	Probability to Penetrate
RB	Reentry Body
RV	Reentry Vehicle
R95	Area including 95 percent of targeted facility
SELM	Simulated Electronic Launch Minuteman
SI	Strategic Instruction
USSTRATCOM	United States Strategic Command
VNTK	Vulnerability Number/Target Type/K-factor system
WSR	Weapon System Reliability
Y	Yield