412TW-TIH-25-01

412TH TEST WING
TEST SAFETY HANDBOOK

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TECHNICAL INFORMATION HANDBOOK

412TH TEST WING
EDWARDS AIR FORCE BASE, CALIFORNIA
AIR FORCE MATERIEL COMMAND
UNITED STATES AIR FORCE

SUMMARY OF CHANGES

Revision	Date	Changes
412TW-TIH-25-01	02/18/25	• Updated to reflect current policy, instructions, and guidance documents • Rewritten into TIH format • Added additional special subjects to include Dive Planning & Time Safety Margin, Training Packages, and Envelope Expansion with a 412 TW Unit as PTO
22.A	06/10/22	Substantial clarifications to existing policy, incorporated AFTCI 91-202 GM2021-01.
21.A	06/02/21	Initial publication

For any questions regarding this handbook or the 412th Test Wing Test Safety Process, please contact: 412 TW/SET Workflow (412.TW.SET@us.af.mil).

CURRENCY OF REFERENCES

This technical information handbook compiles guidance from the following sources, all of which are available either via the Air Force ePublishing website (https://www.e-publishing.af.mil/) or the 412 TW/SET SharePoint (https://usaf.dps.mil/teams/22774/SE/SETwebsite/default.aspx).

Reference	Date Published
412 TW-TIH-22-01	16 November 2022
AFI 11-215_AFMCSUP	1 August 2022
AFI 21-101_AFMCSUP_EDWARDSAFBSUP	5 January 2022
AFMAN 11-2FTV3	29 December 2020
AFMAN 13-212V1	14 March 2023
AFMAN 13-212V1_EDWARDSAFBSUP	22 January 2024
AFMAN 11-214	29 November 2022
AFTCI 63-101_20-101	2 November 2018
AFTCI 91-202	23 November 2022
AFTCI 91-202_412TWSUP	16 February 2023
DAFI 91-202	10 April 2024
DAFI 91-202_AFMCSUP	23 September 2024
DAFI 91-204	10 March 2021
DAFI 91-204_AFMCSUP	6 January 2022
DAFMAN 11-401_AFMCSUP_EDWARDSAFBSUP	16 May 2024
EDWARDSAFBI 13-204	28 June 2024
EDWARDSAFBI 21-126	27 February 2024
EDWARDSAFBI 99-101	15 September 2016
EDWARDSAFBI 99-105	13 September 2019
DESR6055.09_DAFMAN91-201_AFMCSUP_AFMCGM2024-01	12 March 2024*
DODI5000.89_DAFI99-103	12 September 2024
DODI5000.89_DAFI99-103_AFMCSUP	17 October 2022
DODI 6055.07, Change 2	11 June 2019
R-2508 Complex User's Handbook	23 April 2024
Policy on Test Approval Board Attendees	25 September 2023
Delegation of Authority to Approve High Risk Tests Memorandum	9 August 2024
Delegation of RUGR Authority for NRRs Memorandum	27 April 2021

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14. ABSTRACT
The purpose of this handbook is to consolidate guidance and best practices for using the 412th Test Wing (TW), Edwards AFB, California, test safety processes, as well as to direct users' attention to requirements in existing regulations. Test safety requirements are specified in guidance documents from the DoD, Defense Explosives Safety Regulation (DESR), AF, Department of the Air Force (DAF), AFMC, AFTC, Edwards AFB, and 412 TW levels.

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1.0 INTRODUCTION

1.1 How to Use this Handbook. The purpose of this handbook is to consolidate guidance and best practices for using the 412th Test Wing (TW), Edwards AFB, California, test safety processes, as well as to direct users' attention to requirements in existing regulations. Test safety requirements are specified in guidance documents from the Department of Defense (DoD), Defense Explosives Safety Regulation (DESR), United States Air Force (USAF), Department of the Air Force (DAF), Air Force Materiel Command (AFMC), Air Force Test Center (AFTC), Edwards AFB, and 412 TW levels. This handbook frequently refers to the requirements located in those documents and others listed on the References page (see also section 14.0 of this handbook). While the 412 TW Test Safety Office (412 TW/SET), Edwards AFB, California, has made every effort to synthesize pertinent guidance here for ease of use, this handbook does not alleviate requirements specified elsewhere. This handbook should not be considered a primary source for any guidance beyond best practice recommendations.

1.1.1 This handbook and the Air Force Test Center instruction (AFTCI) 91-202_412 TW Supplement (SUP) are intended to be companion documents. The paragraph numbering of AFTCI 91-202_412 TW SUP was intended to roughly reflect that of the handbook; organizing the 412 TW SUP as appendices was the least complex way to do this. Each 412 TW SUP section should be viewed as feeding into the appropriate section of the handbook.

1.1.2 For any questions regarding this handbook or the 412 TW Test Safety Process, please email the 412 TW/SET Workflow (412.TW.SET@us.af.mil).

1.2 Scope of Air Force Test Center Instruction (AFTCI) 91-202. The 412 TW Test Safety Process is required for activities specified in AFTCI 91-202, paragraph 1.6, in which the 412 TW is a participant. In addition, this guidance applies to 412 TW-developed flight test training activities, including USAF Test Pilot School (TPS) curriculum activities.[1] Activities that the team considers to not be tests may still be within the scope of the AFTCI 91-202.[2] The test safety review process may be applied to operations other than testing. Examples include range operations, training, exercises, support plans, testing support to operational missions, air shows, or contractor demonstrations, etc.[3] Any questions or disputes as to whether an activity is in-scope will be directed to 412 TW/SET who will make the final determination.[4]

1.2.1 AFTCI 91-202, paragraph 1.6.1, specifically references test activities. A test is the act of generating empirical data during the research, development or sustainment of systems, and the creation of information through analysis that is useful to technical personnel and decision makers for reducing design and acquisition risks.[5] A test can be a ground or flight activity to gather specific information, answer a customer's question, or provide information not wholly covered by an approved instruction/ training manual.[6]

1.2.2 Any activity utilizing AFTC assets that presents unique hazards not covered by U.S. Military-approved procedures or management directives is in-scope of the AFTCI 91-202.[7]

[1] AFTCI 91-202_412 TW SUP, front matter
[2] AFTCI 91-202, 1.6.2, 1.6.3 and 1.6.4
[3] DAFI 91-202_AFMCSUP, 16.11.2
[4] AFTCI 91-202, 1.6
[5] DODI5000.89_DAFI99-103, Definitions / AFTCI 91-202, Terms
[6] EDWARDSAFBI 99-101, 3.2.2
[7] AFTCI 91-202, 1.6.3

1.2.3 Generally, system check-out and maintenance troubleshooting activities are not in-scope of AFTCI 91-202 because they follow approved procedures, such as technical orders (T.O.s), where the government has accepted the risk of performing those activities. However, for check-outs and troubleshooting with a system under test (SUT), use of contractor-approved procedures on AFTC assets usually requires a government-led safety review because unique hazards may be presented which are not covered elsewhere.[8] In that case, the test execution authority (TEA) would need to accept the risk of potential damage to AFTC assets and/or a mishap.

1.2.4 Recommendations for training safety plans are found in section 4.3.10 of this handbook.

1.3 Lead Developmental Test Organization (LDTO), Executing Test Organization (ETO), and Participating Test Organization (PTO) Roles. The lead developmental test and evaluation organization (LDTO) functions as the lead integrator for a program's developmental test and evaluation (DT&E) activities.[9] The LDTO is selected from the list of qualified candidates published by AFMC.[10] For most 412 TW tests, the LDTO is AFTC/412 TW. The LDTO will ensure independent safety and technical reviews are completed.[11] The LDTO may designate a sub-organization, such as an executing test organization (ETO) or participating test organization (PTO), to conduct the test with LDTO oversight.[12]

1.3.1 The ETO is charged with accomplishing the test under the supervision of the LDTO.[13] The PTO assists other test organizations as described in test evaluation master plans (TEMPs) or test strategies, test plans, and other program documentation.[14] If program documentation is insufficient to identify the ETO or PTO (if applicable), then 412 TW/SET will consider the functional role of the unit (i.e., "acting in the capacity of").

1.3.1.1 If an AFTC unit is assigned or acting in the capacity of an ETO, then the residual safety risk will be for the entire test unless otherwise agreed to by the relevant parties (e.g., Program Office and the test unit) and specified in the safety plan. At a minimum, the residual safety risk to be accepted by the AFTC TEA will be for those assets under AFTCI 91-202, paragraphs 1.6.1 and 1.6.2, and for other test assets when under the control of the AFTC unit.[15]

1.3.1.2 If an AFTC unit is assigned or acting in the capacity of a PTO, then the residual safety risk to be accepted by the AFTC TEA will only be for those assets under AFTCI 91-202, paragraphs 1.6.1 and 1.6.2, and for other test assets when under the control of the AFTC unit. If the residual safety risk to be accepted by the AFTC TEA is for more than the aforementioned assets then it must be agreed to by the relevant parties (e.g., Program Office and the test unit) and specified in the safety plan.[16]

1.3.1.3 The Chief Developmental Tester and/or Test Manager represent the Program Office and may direct the LDTO to limit its oversight as appropriate to a test program.[17]

[8] AFTCI 91-202, 1.6.3
[9] DODI5000.89_DAFI99-103, 2.20. a.
[10] DODI5000.89_DAFI99-103, Definitions
[11] DODI5000.89_DAFI99-103, 2.20. c. and i.
[12] DODI5000.89_DAFI99-103, 2.20. c
[13] AFTCI 91-202, terms
[14] DODI5000.89_DAFI99-103, 2.21.b
[15] AFTCI 91-202, 2.2.3.5.1
[16] AFTCI 91-202, 2.2.3.5.2
[17] DODI5000.89_DAFI99-103, 2.19.c. and e

Example 1: Functional testing of an AFMC asset under the possession of Defense Contract Management Agency (DCMA) when an AFTC unit is the ETO. If program documentation directs DCMA to provide safety planning and oversight, then AFTC safety planning and approval would not be required.

Example 2: An AFTC unit is assigned as ETO for testing, but the test is entirely contractor-owned, contractor-operated (COCO). The program office (Chief Developmental Tester) uses their authority to direct the contractor to be responsible for risk to their own assets during that phase of testing. During the first testing phase, AFTC safety planning would only assess and accept the risk to AFTC assets. This effort may be a great candidate for the negligible risk review (NRR) process.

Example 3: An AFTC unit is assigned as ETO for envelope expansion testing, but no AFTC assets are directly at risk; the missions will be flown as COCO in non-AFTC-owned airspace. The control room will monitor safety-of-test (SOT) parameters, clearing the aircraft from one test point to the next; the team proposes that the SOT parameters be monitored by a mix of contractor and AFTC personnel. By definition, incorrect/inadequate monitoring of the SOT parameters could reasonably be causal in a mishap, meaning AFTC (or a unit therein) could be found at-fault during a post-mishap investigation. The program office (Chief Developmental Tester) uses their authority to direct the contractor to be responsible for risk to their own assets during testing. The AFTC TEA maintains authority over which test points the AFTC control room personnel can join in executing, in consideration of the SUT design, the test point conditions, and the control room personnel training requirements. There may be test points for which the TEA will not authorize AFTC participation, meaning the contractor would bear 100 percent of the risk for those points. This effort would not be a candidate for the NRR process, given the complexity of the safety review and the risk associated with the types of tests involved.

1.3.1.4 The TEA will be in the ETO's chain of command. If multiple AFTC Wings/Complex are involved, the Wing/Complex with the designated ETO may transfer the TEA role to the other Wing/Complex if the Wing/Complex commanders of both organizations agree. Control of most of the assets at risk is not a criterion for TEA designation.[18] However, teams may include the commander/director responsible for the majority of assets at risk as a Form 5001 Section III coordination signature.

1.3.1.5 For multi-service, complex test events where the AFTC unit is the ETO, teams should determine whether test and safety planning from participating organizations meets the intent of DODI5000.89_DAFI99-103.

1.3.2 If appropriate, the risk may be assessed separately for AFTC and non-AFTC assets, for different phases of the test projects, or for individual test events.[19]

1.3.3 The 412 TW may conduct a broader scope of review if requested by the customer. Sufficient detail must be included in the package for the 412 TW to make a risk assessment. In all cases, the scope of the risk assessment should be clear in the test package.

[18] AFTCI 91-202, 6.1.1
[19] AFTCI 91-202, 4.6.2.2

1.4 Waivers and Variations to Test Safety Instructions. Waivers to test safety instructions should be routed IAW the requirements of that instruction.

1.4.1. The 412 TW/SET recommends coordinating waivers to Test Safety instruction through 412 TW/SET prior to sending to the appropriate waiver authority. Coordination is also recommended for other regulations that interact with the Test Safety Process, such as EDWARDSAFBI 99-101 and EDWARDSAFBI 99-105.

1.4.2 Minor variations are minor exceptions to an Instruction that meet the intent of the Test Safety Process and the instruction. Minor variations are approved by an authority designated in the publication. This mechanism exists in AFTCI 91-202 and AFTCI 91-202_412 TW SUP.

1.4.2.1 The AFTC/SE may approve minor variations to AFTCI 91-202. If a minor variation to AFTCI 91-202 is requested, contact 412 TW/SET, which will route the request to the AFTC Safety Office (AFTC/SE), Edwards AFB.[20]

1.4.2.2 The 412 TW Safety Office (412 TW/SE), Edwards AFB, may approve minor variations to AFTCI 91-202_412 TW SUP.[21/22] If a minor variation to AFTCI 91-202_412 TW SUP is requested, route the request to 412 TW/SET.[23]

1.5 Unit-Specific Guidance. Units are encouraged to develop local supplements/implementations to meet their individual needs. Units will coordinate locally developed supplements/implementations with the 412 TW/SET to ensure they do not conflict with existing guidance[24] (e.g., unit Operating Instructions). Workload permitting, the 412 TW/SET may provide courtesy review of unofficial test safety guides or documents upon request (e.g., unit templates, unit test safety philosophy).

2.0 TEST SAFETY PROCESS

2.1 Overview. The goal of any Test Safety Process is to prevent mishaps during test activities.[25] Risk management must be integrated and documented into all stages of Test and Evaluation (T&E) activities to identify test hazards, mitigating measures and acceptance/rejection of the residual risk by an appropriate TEA.[26] The safety plan records due diligence in risk management and acceptance, and also communicates (e.g., provides a written copy of) hazards and mitigating measures to test personnel. Safety plan requirements take precedence over those specified in the test plan. The test package (i.e., test plan and safety plan) is a contract between the test team and the TEA.[27]

2.1.1 Risk Management is the systematic application of management, engineering principles, criteria and tools to optimize all aspects of safety within the constraints of mission/activity effectiveness, time, and cost throughout all mission/activity phases. Risk Management is the main tool used to prevent mishaps and is the essence of any test safety review process within AFTC. While each test may be unique, the test safety review process for each test will follow a predictable, consistent process.[28]

[20] AFTCI 91-202, 1.7 and 2.1.3.3
[21] AFTCI 91-202_412 TW SUP, front matter
[22] AFTCI 91-202, 2.1.5
[23] AFTCI 91-202_412 TW SUP, front matter
[24] AFTCI 91-202_412 TW SUP, front matter
[25] AFTCI 91-202, 1.3
[26] DAFI 91-202_AFMC SUP, 16.2.1 / AFTCI 91-202, 1.3
[27] AFTCI 91-202, 1.3 and 7.1
[28] AFTCI 91-202, 1.4.1

2.1.2 The 412 TW Test Safety Process should produce a robust and high-quality safety plan that identifies all the test unique hazards with sufficient controls to prevent mishaps. This process begins as early as test plan generation and ends with closure of the test package and documentation of lessons learned. Safety planning and test planning are integral and iterative processes, and as such, both should be interwoven to ensure the test methods incorporate safety controls where possible. This process is primarily governed by Department of the Air Force instruction (DAFI) 91-202_AFMCSUP, AFTCI 91-202, and AFTCI 91-202_412TWSUP.

2.2 Phases of the Test Safety Process. The Test Safety Process typically comprises the phases shown in Figure 1.

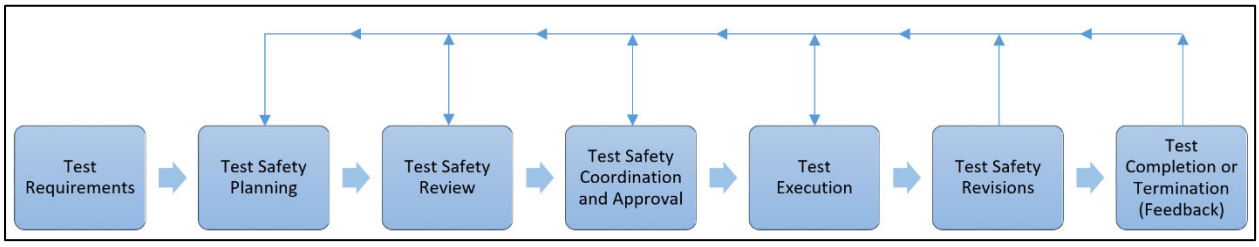

Figure 1 Test Safety Process[29]

2.2.1 The "test package" is an all-encompassing package of documents consisting of a test plan, safety plan, and any other appendices or documentation that support the test planning.

2.2.2 Defining the Test Requirements is accomplished in writing and reviewing the test plan; detailed test plan development involves three general steps: planning tests, technical reviews of test plans, and submitting test plans for approval. During the formal review of the test plan, technical adequacy of the test plan is determined.[30] Technical reviews are covered in 99-series guidance. For complex elevated risk tests, teams may consider inviting a representative from 412 TW/SET to attend the technical review as an observer to make the safety review more efficient.

2.2.3 During the Test Safety Planning Phase, the test unit conducts a preliminary risk assessment and writes a safety plan that identifies hazards, applies controls to mitigate risk, and proposes a residual risk level of the test effort.

2.2.4 The Test Safety Review Phase consists of a formal review of the test unit-finalized test safety plan by a panel of independent operations and technical experts to recommend improvements to the safety plan, assess the overall residual risk of the test, and provide recommendations to the TEA. For a subset of low-risk activities, the review may be streamlined via the NRR process.

2.2.5 During the Test Safety Coordination and Approval Phase, the test package will be routed to the appropriate TEA for approval.

2.2.6 During Test Execution, test packages may require changes for a variety of reasons (e.g., changes to test requirements, new information that comes to light, unexpected test events [UTEs], an ineffective and/or overly restrictive safety plan, etc.). All test package changes should be reviewed for safety implications as part of an overall risk management strategy using the test safety review amendment process.

[29] DAFI 91-202_AFMC SUP, Figure 16.1
[30] DAFI 91-202_AFMC SUP, 16.6.1

2.2.7 When the test program is complete, the test team will close the test package. In addition to removing the test from the TEAs portfolio of risk acceptance, package closure ensures archiving of lessons learned for other test programs to consider with the goal of preventing mishaps.

2.3 Independence. Independent review is a foundational tenet of the Test Safety Review Phase and requires personnel independent of the test project. Independence from a test project is described in the definition of the term Independent Review.[31] An independent review is defined as a review by an individual or group that does not have a vested interest in the successful accomplishment of the test objectives and was not directly responsible for the development of the test package. A vested interest is defined as having a personal stake or involvement in the test such that the person's finances, professional standing, or reputation are expected to be directly affected.[32]

2.3.1 Test safety officers (TSO) performing certain functions (see section 3.6.2 of this handbook) and independent reviewers must be independent of the test project (e.g., not a project engineer or project aircrew for the test), not have been involved (or had limited involvement) in preparing the test plan or safety plan, and not the TEA.[33]

2.3.1.1 Assisting in the development of the safety plan does not, of itself, eliminate an individual from being an independent reviewer.

2.3.1.2 Participating in test execution (planned or actual) does not, of itself, eliminate an individual from being an independent reviewer.

2.3.1.3 Independent government review of safety planning is expected;[34] generally, prime contractors are not recommended as independent reviewers, given their parent company's financial interests in the test and evaluation of the system under test.

2.3.1.4 The 412 TW/SET TSOs always satisfy the requirements for independence.

3.0 ROLES AND RESPONSIBILITIES

3.1 412th Test Wing Test Safety Office (412 TW/SET). The role of 412 TW/SET is to assist in preventing mishaps by developing 412 TW test safety policy, maintaining the integrity of the Test Safety Process, training personnel, assisting safety plan authors, facilitating in independent and effective government review of safety planning documentation, and ensuring information sharing through test package archives and lessons learned captures.[35]

3.1.1 The following TSO functions will be performed by 412 TW/SET:

- Designate or act as the Safety Review Board (SRB) Chairperson to lead Formal SRBs, Electronic Safety Reviews (ESRs), and the SRB portion of Combined Technical Review Board (TRB)/SRBs[36]
- Review the Request of Safety Review (RSR), approve or assign the SRB Chairperson, verify the participants eligibility and training status, approve the venue, and provide a control number for the test package[37]

[31] AFTCI 91-202, 2.1.7.5
[32] AFTCI 91-202, Terms
[33] AFTCI 91-202, 2.3.1
[34] AFTCI 91-202, 2.1.6.2
[35] AFTCI 91-202, 2.1.6.2
[36] DAFI 91-202_AFMC SUP, 16.3.5.4 / AFTCI 91-202_412 TW SUP, A3.4
[37] AFTCI 91-202_412 TW SUP, A5.3.2

- Make a preliminary determination on whether the NRR qualification criteria are likely to be met and approve NRR independent reviewers[38]
- Determine whether additional safety review is required for acceptance of safety planning across AFTC or assign another TSO to that task[39]
- Assemble the final test package and perform the Info Cycle specified by AFTCI 91-202, Table 6.1, or the unit may perform these tasks[40]
- Inform Center safety of high-risk test prior to the test event[41]
- Review and approve closure amendments in writing to the unit test safety officer (UTSO)[42]
- Determine the level of documentation required for a UTE[43]
- Determine the appropriateness of a major or minor amendment (this may also be the SRB Chairperson)[44]
- Conduct reviews of each 412 TW test unit's test safety program IAW DAFI 91-202[45]
- Track training dates for personnel acting as project safety lead (PSL), UTSO, independent safety reviewer (ISR), SRB Chairperson, and TEA[46]

3.1.2 Because 412 TW/SET TSOs always satisfy the requirements for independence, they may also perform the functions of an independent TSO listed in section 3.6.2 of this handbook.

3.1.3 The 412 TW/SET may modify test package documentation processes (e.g. test package layout, read-ahead pre-requisites, info cycle responsibility, etc.) on a case-by-case basis so long as those process modifications do not negatively impact the effectiveness of the safety review and approval process.[47]

3.1.4 The 412 TW/SET will provide updated information on safety documentation preparation, recent unexpected test events, identified hazards, lessons learned, or other information deemed appropriate by the Chief of Test Safety for distribution to all UTSOs.

3.1.5 The 412 TW/SET will provide the latest information on the 412 TW/SET SharePoint (https://usaf.dps.mil/teams/22774/SE/SETwebsite/default.aspx).

[38] AFTCI 91-202_412 TW SUP, A9.1.2 and A9.2.3
[39] AFTCI 91-202_412 TW SUP, A10.1.2
[40] AFTCI 91-202_412 TW SUP, A11.8.2
[41] DAFI 91-202_AFMC SUP, 16.3.5.5
[42] AFTCI 91-202_412 TW SUP, A12.10.5 and A12.10.6
[43] AFTCI 91-202_412 TW SUP, A12.13.2
[44] AFTCI 91-202_412 TW SUP, A12.3
[45] AFTCI 91-202_412 TW SUP, A13.4.1 / DAFI 91-202, Table 3.1, 3.4.1
[46] AFTCI 91-202_412 TW SUP, A14.10
[47] AFTCI 91-202_412 TW SUP, A3.5

3.2 Test Unit Commander (Squadron Commander, Combined Test Force [CTF] Director, or Equivalent).

3.2.1 AFTCI 91-202, section 2.2.2 (Test Unit Safety Planning Responsibilities, Squadron Commanders) contains additional guidance for Test Unit Commanders not mentioned in this handbook.

3.2.2 Test Unit Commanders are additionally encouraged to familiarize themselves with the information in this section, section 11.0, and section 12.0 of this handbook.

3.2.3 The Combined Test Force (CTF) Director is equivalent to a Test Unit Commander for the purposes of determining the low-risk TEA.[48] The CTF Deputy Director can approve low-risk tests when the TEA is unavailable.[49]

3.2.3.1 Whether the test unit is a Squadron or a CTF, the following conditions must be met by the Commander/Director or the Deputy Commander/Director to be a low-risk TEA:[50]

- Grade must be a Lieutenant Colonel, GS-14 or NH-4 at a minimum, and
- The Commander/Director owns the mission, has responsibility for success and can direct resources. In other words, the Commander/Director's unit is the ETO or PTO, as applicable.

3.2.3.1.1 The criteria established for low-risk TEAs cited above was derived from the following: The standard for risk management is leadership at the appropriate level of authority making an informed decision to control hazards and to accept safety and occupational health (SOH) risks. Making risk decisions is a commander's determination of which risks are acceptable and unacceptable from the standpoint of balancing the benefit against the potential for losses or harm (severity and likelihood of occurrence).[51]

3.2.3.1.2 The AFMC's communicated intent is that low-risk test programs have access to a TEA plus a backup.

3.2.3.2 The CTFs may include multiple smaller test organizations (colloquially called a "platform CTF", as distinguished from the "overall" CTF). One such organization is the Air Dominance (AD) CTF, which currently has a named director, but no named deputy director.

3.2.3.2.1 Philosophy: For a given low risk program, the TEA and backup are determined based on the platform CTF that owns the given program test mission and is responsible for its success. When the overall CTF director is unavailable, low-risk tests would be approved by the overall CTF deputy director. If an overall CTF deputy director has not been named, the approval decision falls to the appropriate platform CTF director; however, if the overall CTF director and the platform CTF director are the same person (as is currently the case at AD CTF), then the overall CTF director could delegate test approval to the appropriate platform CTF deputy director.

[48] Email sent on 21 October 2024 from AFTC/SET to 412 TW/SET with the subject "CTF Directors as TEAs"
[49] AFTCI 91-202, Table 6.1 Note 1
[50] Email sent on 21 October 2024 from AFTC/SET to 412 TW/SET with the subject "CTF Directors as TEAs"
[51] DODI 6055.01, 8.a.(2)

3.2.3.2.2 Specific example, as of October 2024: if the AD CTF director is unavailable, then the low-risk test may be approved by the:[52]

1. AD CTF deputy director if that position exists, otherwise

2.a. For projects associated with the F-22 platform and the F-22 CTF director is not the same person as the AD CTF director:

i. F-22 CTF director, otherwise
ii. F-22 CTF deputy director.

2.b. For projects associated with the Next Generation Air Dominance (NGAD) family of systems (FoS) and the NGAD FoS CTF director is not the same person as the AD CTF director:

i. NGAD FoS CTF director, otherwise
ii. NGAD FoS CTF deputy director.

3.2.3 Test Unit Commanders are responsible for ensuring all unit personnel involved in safety planning and review are familiar and comply with AFTCI 91-202 and AFTCI 91-202_412 TW SUP and receive training.[53]

3.2.4 Test Unit Commanders are responsible for designating UTSOs that meet the eligibility requirements summarized in Appendix B of this handbook in writing and maintaining this list.[54]

3.2.5 Commanders/Directors are responsible for the final signature on Section I (e.g., internal review) and Section III (e.g., TEA approval) of the 412 TW Form 5001/5002 (or equivalent). However, they may delegate their signature authorities.

3.2.5.1 The intent of the delegation for Section I and III signatures is not to give deputies more responsibility; rather, it's to prevent mission failure for when the Commander/Director is unavailable.[55] As such, the commander should be presented with the opportunity to exercise their authority, and delegate only when they are unavailable. AFTC/SET has clarified that "unavailability" is defined by the commander, and it can include being on leave, flying a mission, or being in an important meeting. Delegation of commander/director authority:

- is never automatic.
- needs to be stated. Delegation can be granted verbally or in any other method chosen by the commander/director. Delegation does not have to be stated in-writing.
- is the prerogative of each individual commander/director and can vary commander-to-commander (which is why it's not automatic). New commander/directors are expected to decide whether they want to delegate their authority, and to whom (within certain limits).

3.2.5.2 See section 4.2.2.3.3 of this handbook for more information on delegating final Section I signature; and section 11.1 of this handbook for more information on delegation Section III signature (i.e., delegation of TEA approval).

[52] Email sent on 21 October 2024 from AFTC/SET to 412 TW/SET with the subject "CTF Directors as TEAs"
[53] AFTCI 91-202, 2.2.2.2
[54] AFTCI 91-202, 2.2.2.4 and 2.2.2.5
[55] Interpretation from AFTC/SET

3.2.6 TEA training is required for new commanders/directors and any delegate who will act as TEA;[56] this training is offered as a part of 412 TW/SE new commander in-briefs. Commanders/directors that have not received this training should contact 412 TW/SET to coordinate it for their unit.

3.2.7 When a new risk acceptance authority (e.g., unit commander/director) assumes their assignment, that person is immediately responsible for all safety risks in their portfolio and must be notified of safety risks that were accepted by their predecessors.[57] Test Unit Commanders should review open unit test packages upon assuming command.

3.3 Test Team. Test teams are integral to the Test Safety Process and are involved through all its phases. Test and safety plans should be integrated; teamwork and communication are essential to building an effective and efficient test package.

3.3.1 AFTCI 91-202, section 2.2.4 (Test Unit Safety Planning Responsibilities, Test Team) contains additional guidance for test teams not mentioned in this handbook.

3.3.2 Test teams are responsible for:

- Ensuring all appropriate test techniques were considered and choosing the lowest risk technique which efficiently meets test/data objectives[58]
- Ensuring appropriate test unique hazards related to test methods and system(s) operation are identified and sufficiently controlled (eliminated, mitigated, or residual risk believed to be acceptable)[59]
- Performing a review of the safety plan for their test projects every three years IAW AFTCI 91-202 and AFTCI 91-202_412 TW SUP[60]

3.3.3 Test Team responsibilities regarding temporary-2 (T-2) modifications

3.3.3.1 The T-2 Modifications undergo a Design Review Board (DRB) to ensure stakeholders understand the scope and risk involved in the modification. Test team attendance allows upfront and early insight into the modifications and airworthiness assessments.

3.3.3.1.1 Members of the DRB will include representatives from: at least one test project team member from the CTF with a working knowledge of the aircraft and test (e.g., squadron-assigned flight safety officer [SAFSO], UTSO, PSL, Project Pilot, Project Flight Test Engineer [FTE], etc.), Contact Administration Service (CAS) Quality Assurance (QA) Branch (AFTC/PZDB), Instrumentation Squadron (MXI/ENI) and 412 MXG QA.[61]

3.3.3.2 The safety plan author will review the applicable T-2 modification documents and use these to address hazards that should be included in the test safety plan.[62] Some units do not document T-2 modifications using the AFTC Form 6239, *T-2 Modification Airworthiness Compliance*, but the overarching requirement to review and understand the test-unique safety impact of aircraft modifications remains; when it is used, the PSL or UTSO will sign the AFTC Form 6239.[63]

[56] AFTCI 91-202, 2.1.6.3 / AFTCI 91-202_412 TW SUP, A14.9.4.
[57] DAFI 91-202_AFMC SUP, 11.3.2.1.1
[58] AFTCI 91-202, 2.2.4.2
[59] AFTCI 91-202, 2.2.4.3
[60] AFTCI 91-202, 2.2.4.7
[61] EDWARDSAFBI 21-126, 3.1.1
[62] AFTCI 91-20,2 2.2.3.4
[63] EDWARDSAFBI 21-126, 3.2.2.4.4

3.4 Project Engineer (Test Director). At 412 TW, the Test Director mentioned in AFTCI 91-202 and DAFI 91-202_AFMCSUP is more typically referred to as the "Project Engineer" (or similar). While specific tasks delineated by those regulations may be assigned to other individuals, the Test Director/Project Engineer is ultimately responsible for the safety plan development, for approval by the TEA, and for ensuring the test is executed per the restrictions and mitigations in the approved safety plan. See section 3.5 of this handbook for test safety task assignments and see AFTCI 99-110 and EDWARDSAFBI 99-105 for control and supervision of test execution task assignments.[64]

3.5 Safety Plan Author (Project Safety Lead (PSL]). Within the 412 TW, the primary safety plan author is referred to as the PSL and is the focal point for all safety plan development for that test. However, the safety plan is co-authored by the PSL, UTSO assisting the team, and project operator, as typically indicated on Section 1 of the 412 TW Form 5001/5002 (or equivalent). Coordination of the development, approval, and implementation of the Safety Plan with the Project Engineer/Test Director is required if the PSL and the Project Engineer/Test Director are not the same person.[65] Safety plan authors must ensure safety plans clearly and adequately provide enough information to support an approval decision.[66]

3.5.1 AFTCI 91-202, section 2.2.3 (Test Unit Safety Planning Responsibilities, Safety Plan Author) and the duties listed in DAFI 91-202_AFMCSUP, paragraphs 16.3.4.1 through 16.3.4.5, constitute additional guidance for PSLs not mentioned in this handbook.

3.5.2 The PSLs are expected to initially consult with their UTSOs when in need of assistance during the Test Safety Process.[67] If the UTSO is unable to provide assistance, PSLs are encouraged to contact 412 TW/SET.

3.5.3 The PSLs are responsible for:

- Reviewing lessons learned and test hazard analyses (THAs) from similar and/or applicable tests to determine if there are any applicable hazards to consider in the safety plan[68]
- Developing the safety plan (with assistance from the test team)[69]
- Identifying a proposed risk and including the rationale of the proposed risk level to the SRB members[70]
- Proposing and coordinating a venue for SRBs (e.g., time, date, location, duration, etc.) and ensuring all ISRs are available and informed of the venue[71]
- Facilitating the safety review venue at the appropriate information protection level and security accreditation[72]
- Providing readahead copies of the test package documentation to all SRB members prior to the SRB and all TAB invitees prior to the TAB[73]
- Coordinating changes in ISRs with the SRB Chairperson prior to the SRB to ensure document readahead requirements are met and ISR's eligibility/training status can be verified[74]

[64] AFTCI 91-202_412 TW SUP, Terms
[65] AFTCI 91-202_412 TW SUP, Terms and A3.1
[66] AFTCI 91-202, 2.2.3.5
[67] AFTCI 91-202_412 TW SUP, A3.1.1
[68] AFTCI 91-202, 2.2.3.7
[69] AFTCI 91-202, 2.2.3.3 / AFTCI 91-202_412 TW SUP, A3.1.2
[70] AFTCI 91-202, 2.2.3.6
[71] AFTCI 91-202_412 TW SUP, A6.3
[72] AFTCI 91-202_412 TW SUP, A6.5.2
[73] AFTCI 91-202_412 TW SUP, A11.6.2
[74] AFTCI 91-202_412 TW SUP, A5.5

- Coordinating Action Item responses and requests for closure with SRB members (as appropriate)[75]
- Updating the safety plan documentation as identified and agreed upon during the independent safety review[76]
- Routing the test package for approval[77]
- Ensuring subordinate commanders are invited to attend the test approval brief (TAB)[78]

3.5.4 PSL qualification and designation guidance can be found in Appendix B of this handbook.

3.5.5 PSLs may wish to obtain a LiveLink account for the purpose of researching prior tests and locating lessons learned. Contact your unit's Primary UTSO or 412 TW/SET for assistance in obtaining an account; for mass enrollment, Primary UTSOs should collect names and send the list to 412 TW/SET.

3.6 Unit Test Safety Officer (UTSO). An UTSO must possess a solid working knowledge of AFI 91-202_AFMC SUP, AFTCI 91-202, and AFTCI 91-202_412 TW SUP to ensure process adherence, and effectively influence/guide decision-making during the Test Safety Process. The UTSO must be experienced in test planning and test conduct to assist in test hazard identification and mitigation development.[79]

3.6.1 General UTSO Responsibilities. The UTSO is primarily responsible for mentoring PSLs, especially those with less experience, and facilitating the Test Safety Process from the initiation of safety planning to test package closure, regardless of the test package risk level. The UTSO is a key liaison between the test organization and 412 TW/SET. The UTSOs should maintain an active LiveLink account for the purpose of researching prior tests and locating lessons learned. Contact your unit's Primary UTSO or 412 TW/SET for assistance in obtaining an account. The UTSO signature on the 412 TW Form 5001 or equivalent indicates the test package documentation complies with Test Safety instructions and is stable and mature for independent review (see section 4.2.2.3.1 of this handbook for more information on UTSO signature).

3.6.1.1 UTSOs should mentor PSLs in the following ways:

- Review RSR emails before sending to 412 TW/SET
- Lead internal safety reviews prior to SRB document release
- Review safety plans and amendment memorandums before release to the reviewers
- Ensure reviewer availability and location confirmed prior to SRB
- Ensure SRB prerequisites are complete before documentation release
- Review SRB and TAB slides with PSL before they are presented
- Ensure the scribe notes are complete
- Review action item responses before sending to the SRB members

[75] AFTCI 91-202_412 TW SUP, A6.10
[76] AFTCI 91-202_412 TW SUP, A6.10.2
[77] AFTCI 91-202_412 TW SUP, A6.14
[78] AFTCI 91-202_412 TW SUP, A11.6.2
[79] AFTCI 91-202_412 TW SUP, A3.2

3.6.1.2 Appendix A of this handbook contains additional requirements and best practices for UTSOs. Appendix B of this handbook contains UTSO qualification and designation guidance.

3.6.2 Independent Test Safety Officer (TSO) Functions that May be Performed by UTSOs. AFTCI 91-202, section 2.1.7 (Test Unit Safety Planning Responsibilities, Local Test Safety Officers), contains additional guidance for TSOs not mentioned in this handbook. An UTSO is eligible to perform any of the functions of a TSO that are permitted by AFTCI 91-202 unless otherwise specified by the 412 TW SUP; see section 3.1 of this handbook for TSO functions which must be performed by the 412 TW/SET.

3.6.2.1 A TSO must be independent of a test project[80] to perform the following functions. In cases where teams are uncertain if TSO independence is required, they should consult with 412 TW/SET.

- Leading an NRR safety review[81] (see section 9.0 of this handbook).
- Concurring on pre-approved minor safety plan changes[82] (see section 12.6.2 of this handbook).
- Determining whether UTEs have occurred and determining which unrelated test points can continue[83] (see section 12.11.2 of this handbook).
- Validate no changes are needed for a review amendment with administrative or no proposed safety plan changes[84] (see section 12.7.2 of this handbook).
- Approval authority of administrative changes.[85]

3.6.3 Primary UTSO Responsibilities. Each squadron-level commander/director who acts as TEA will designate one UTSO as the test unit Primary UTSO. The Primary UTSO is primarily responsible for mentoring other UTSOs in their unit (especially those with less experience), maintaining the unit's library of active test packages, developing unit-level test safety processes, and facilitating test safety inspections.[86]

3.6.3.1 Test unit Primary UTSOs will:

- Ensure PSLs and UTSOs have met the training and observation requirements to perform in their roles[87]; see Appendix B of this handbook.
- Inform the squadron commander/director when there is a need to update the UTSO appointment letter and ensure the latest UTSO appointment letter is provided to 412 TW/SET;[88] see section B.2.2 of this handbook.
- Ensure the appropriate personnel are given access rights to squadron-specific portions of the 412 TW/SET SharePoint[89], including eSafety Packages in Review and the test package archive sub-sites.

[80] AFTCI 91-202, 2.1.7.5
[81] AFTCI 91-202_412 TW SUP, A9.1.3.
[82] AFTCI 91-202_412 TW SUP, A12.6.
[83] AFTCI 91-202, 7.4.2
[84] AFTCI 91-202_412 TW SUP, A12.9.3.3
[85] AFTCI 91-202_412 TW SUP, Table A12.1
[86] AFTCI 91-202_412 TW SUP, A3.3
[87] AFTCI 91-202_412 TW SUP, A3.3.1.1
[88] AFTCI 91-202_412 TW SUP, A3.3.1.2
[89] AFTCI 91-202_412 TW SUP, A3.3.1.3

- Ensure the PSL and UTSO unit associations listed on the 412 TW/SET training currency tracker are updated.[90]
- Maintain the unit's library of active test packages; see section A.2 of this handbook.

3.6.7.2. Test unit Primary UTSOs should (as best practices):

- Facilitate unit test safety inspections; see section A.4 of this handbook.
- Develop and maintain an UTSO Continuity Book to ensure their organization's unique test safety information is available for reference by test unit personnel; see section A.5.3 of this handbook.
- Develop and maintain a Test Package Log for tracking the status and location of each test package for tests conducted within their organization; see section A.5.2 of this handbook.
- Develop and maintain a tailored list or database of lessons learned applicable to the test unit; see section A.5.4 of this handbook.
- Be cognizant of the active test packages at their unit, including upcoming package expirations.[91]
    - For packages to which the Primary UTSO does not have access (usually for security reasons), 412 TW/SET recommends identifying an individual to whom this task can be delegated for the purposes of facilitating inspections (e.g., a "Lead UTSO" for a given project/program).
- Lead internal coordination meetings as required to ensure unit personnel follow unit-level test safety processes.[92]
- Ensure that non- Air Force Network (AFNET) networks used by the unit are regularly updated with the latest test safety information (such as templates) if test safety planning is done on those networks.

[90] AFTCI 91-202_412 TW SUP, A3.3.1.4
[91] AFTCI 91-202_412 TW SUP, A3.3.2.1
[92] AFTCI 91-202_412 TW SUP, A3.3.2.2

3.7 Independent Safety Reviewer.

3.7.1 General Independent Safety Reviewer Requirements.

3.7.1.1 The ISRs will review and provide recommendations on all THAs and general minimizing procedures (GMPs) as part of the SRB process.[93]

3.7.1.2 The 412 TW/SET Training Currency Tracker on the 412 TW/SET SharePoint lists all ISRs, along with their discipline(s) or area(s) of expertise. Teams can choose ISRs from this list, or propose a new ISR. Similarly, the tracker lists all SRB Chairpersons. Teams may only choose from the available SRB Chairperson list. To the maximum extent possible, ISRs should be the same individuals that served as independent reviewers for the technical review (if applicable).[94] The technical review authority (TRA) makes the final determination of TRB membership.[95]

3.7.1.3. The ISRs may be from inside or outside the test unit but must always be independent of the test project, as outlined in section 2.3 of this handbook.

3.7.1.3.1 Elevated risk tests warrant a greater degree of reviewer independence than lower risk activities.[96] If the SRB includes ISRs from within the test unit and the SRB risk assessment is higher than the test team's proposed risk level, the SRB chair should determine if another safety review composed of a different set of ISRs is required.[97]

3.7.1.4 AFTCI 91-202, section 2.3 (Independent Safety Reviewer Responsibilities), contains specific guidance for ISRs. Appendix B of this handbook contains ISR qualification and designation guidance.

3.7.2 Safety Review Board (SRB) Chairperson. The SRB Chairperson is responsible for the overall conduct of the SRB process and has many responsibilities covered in DAFI 91-202_AFMC SUP, AFTCI 91-202, and AFTCI 91-202_412TW SUP. The SRB Chairperson will ensure independent government review and approval of safety planning documentation is upheld.[98] The proposed SRB Chairperson must not be under the control or influence of the organization responsible for operations and execution of the test and have direct lines of communication with the commander.[99]

[93] AFTCI 91-202, 2.3.1
[94] AFTCI 91-202, 2 2.3.1
[95] EDWARDS AFBI 99-101, 3.3.3.1.2
[96] AFTCI 91-202, 2.3.1
[97] AFTCI 91-202, 2.3.2.8
[98] AFTCI 91-202_412 TW SUP, A6.1
[99] AFTCI 91-202, 2.3.2.5

3.7.3 Technical Reviewer.

3.7.3.1 Technical Reviewers will:

1. Ensure safety hazards are identified and appropriately controlled (eliminated, mitigated, or residual risk believed to be acceptable)[100]
2. Have applicable knowledge and sufficient expertise in the test activity to be reviewed[101]

3.7.4 Operations Reviewer.

3.7.4.1 Operations Reviewers will:

1. Be experienced in the type of SUT such as aircraft (i.e., fighter, bomber, cargo), ground test facility (i.e., wind tunnel, sled track, propulsion stand, climatic lab), and the types of tests being conducted. Exceptions can be approved by the SRB Chairperson.[102] Notional examples include (not all-inclusive):
   - Aircrew qualified in the aircraft type
   - Aircrew not qualified in the aircraft type, but with experience conducting similar testing
   - A boom operator for aerial refueling (AR) testing
   - A tug operator for tow testing
   - A test parachutist for personnel parachute testing
2. Ensure tests are executable, all test techniques were considered, and the lowest risk technique which efficiently meets test/data objectives was selected.[103]
3. Ensure hazards related to operating the system are identified and appropriately controlled (eliminated, mitigated, or residual risk believed to be acceptable).[104]
4. For AR testing, teams should ensure there are knowledgeable system operators from both the tanker and receiver perspectives present.

[100] AFTCI 91-202, 2.3.3.1
[101] AFTCI 91-202, 2.3.3.2
[102] AFTCI 91-202, 2.3.4.1
[103] AFTCI 91-202, 2.3.4.2
[104] AFTCI 91-202, 2.3.4.3

3.7.5 Other Reviewers. Additional expertise may and should be called upon when required. Examples include, but are not limited to:[105]

1. Test Engineer
    - for tests requiring an expert on control room operations/instruction
2. System Safety Engineer (e.g., personnel that produce airworthiness paperwork such as system safety risk assessments [SSRA])
3. Occupational/Ground Safety Representative
    - for ground tests, especially those inside a building/hangar
    - for any test where Occupational Safety and Health Administration (OSHA) types of rules might apply to workers
4. Explosive Ordnance Disposal Representative
    - for tests involving explosive disposition or render-safe procedures, contact Weapons Safety Office (412 TW/SEW)
5. Airspace Representative
    - for tests with unique requirements from Air Traffic Control
    - for tests with unique airspace use requirements, such as those requiring modifications to existing areas (e.g., extending the floor of a spin area to a lower altitude)
6. Logistics Representative
    - for maintenance logistics test programs
    - for verifying draft T.O.s
    - for ground tests with complex support equipment requirements
7. Weapons Safety Office Representative (412 TW/SEW)
    - for tests where a wing/fuselage mounted munition is being loaded without procedures documented in an approved T.O. 412 TW/SEW involvement is not required for tests involving loading new sensor pods or fuel tanks.
    - teams should include a load crew member when recommended by 412 TW/SEW.
8. Fire Department Representative
    - for any test that involves an intentional fire (e.g., hot brakes)
    - for any test that involves flammable fluid servicing (e.g., hot pit refueling test)
    - for any test where there is a test-unique risk, either in probability or severity, to crash fire rescue personnel (e.g., hydrazine releases)
9. Bioenvironmental Engineer[106]
    - for any test that poses a unique risk to the environment (e.g., fuel/chemical spills)
    - for any non-eye-safe lasing activities off an approved range

[105] AFTCI 91-202, 2.3.10
[106] AFMAN 13-212V1, 4.16.3.1

10. Medical Representative (including Aerospace Physiology)
    - for tests that use life support systems which are not yet approved.
    - for tests which could credibly cause hypoxia/decompression sickness (e.g., high-altitude airdrop or on-board oxygen generation system [OBOGS] testing).
    - for tests including aircrew-mounted instrumentation that could create hazards during ejection/crew escape.
11. Environmental Management Office Representative
    - not applicable to 412 TW test activities, unless special direction is provided following completion of the Environmental Impact Checklist during test planning
12. Range Operations & Maintenance (O&M) Representative
    - for test that uses non-standard procedures for range targets (such as exceeding an automobile speed limit on paved roads, or using an off-road vehicle above the speed limit)
13. Laser or Directed Energy Safety Representative[107]
    - consult the 412 TW Range Safety Office (412 TW/SER) or 412th Range Squadron (412 RANS) for any tests including lasers or directed energy weapons (DEWs) for guidance on who should attend the SRB.
    - include 412 TW/SEW any time
        - a non-certified DEW is tested
        - any DEW is tested off an approved range
        - a laser is used to cause an intentional detonation
    - the Installation Laser Safety Office (ILSO) has delegated authority to test laser safety officers (TLSOs) to address the following cases:
        - a non-eye-safe laser is used off an approved range
        - a non-certified laser is used
14. Flight Termination System Analyst
    - for any tests using a flight termination system, consult 412 TW/SER.
15. Maintenance Personnel
    - for any time aerospace ground equipment (AGE) is the SUT.
    - for any test that does not follow approved maintenance T.O.s.
16. Range Safety Office (412 TW/SER)
    - for any 412 TW operations involving an unmanned air vehicle which establish/modify the maturity of the command and control (C2) systems critical to sustaining flight
    - for any vehicle with a flight termination system even if the test will not use R-2508
    - for any item released (e.g., fuel tanks, munitions, expendables) over R-2515

[107] AFMAN 13-212V1, 4.16.3.1

17. Airfield Management

- Typically, Airfield Management is not required to attend SRBs. In the safety plan, test teams should state that they will coordinate with airfield management prior to conducting tests including:
    - ground tests with unique test location requirements.
    - aircraft arresting system testing.
    - anytime people or equipment will be placed in airfield safety areas such as within the runway primary surface (1,000 feet laterally from the runway centerline) and the clear zones, and taxiway safety areas (within 200 feet of a taxiway centerline).
    - tests which could credibly generate foreign object damage (FOD) on the airfield.
    - whenever something is going to be dropped or jettisoned on the runway or lakebed.
    - anytime air traffic or airfield operations would be different from normal operations.

18. Test Conduct

- for tests that involve accomplishing safety-critical parameter monitoring in a new way (e.g., new use of Distributed Test Operations [DTO])
- for tests that involve conducting safety-critical parameter monitoring where personnel are not assigned to 412 TW (e.g., a contractor team seeking equivalence to AFTCI 99-110 standards)
- for UTEs where test conduct or test essential personnel (TEP) training was found to be a root cause or major contributing factor

4.0 TEST SAFETY PLANNING AND PRELIMINARY RISK ASSESSMENT PHASE

4.1 Overview. During the Test Safety Planning and Preliminary Risk Assessment Phase, the test unit conducts a preliminary risk assessment and writes a safety plan that identifies hazards, applies controls to mitigate risk, and proposes the overall residual risk of the test effort. AFTCI 91-202, Chapters 3 and 4, include extensive guidance on Test Safety Planning and Risk Assessment. Additional thorough guidance may be found in DAFI 91-202_AFMC SUP, paragraphs 16.4 through 16.6.

4.1.1 The test team will identify all test unique hazards and routine hazards that are exacerbated by the test.[108] A hazard associated with the normal operations of the aircraft, vehicle, SUT, or facility is not a test unique hazard. A hazard ordinarily encountered in a typical activity is also not a test unique hazard. But some test activities may elevate the risk associated with normal operational hazards. For example, midair collision with non-participating aircraft and bird strikes are not generally considered test unique hazards. However, should the very nature of the test increase the exposure to these hazards above that of normal operations, they should be addressed as test-unique hazards. Hazards associated with the initial testing of a new system should also be addressed as test unique hazards since normal operations for this system have not been established.[109]

4.1.1.1 Many of the organizations listed in this section will assign a risk level using their own unique risk assessment matrix. See section 4.3.3 of this handbook for guidance on how these risk assessments may contribute to the 412 TW SRB risk assessment.

[108] DAFI 91-202_AFMC SUP, 16.5.2
[109] AFTCI 91-202, 3.3.1.1

4.1.1.2 The team should use all available resources to aid this process of identifying test hazards, including, but not limited to:

- System safety hazard analyses of the test article, test facility, or any article that may affect the test event
    - The Program Manager shall provide a safety release for the system prior to each developmental and operational test involving personnel.[110]
- Non-nuclear Munitions Safety Board (NNMSB) review and approval of all newly developed live, uncertified munitions, fuses and initiating devices prior to airborne testing/release
- Directed Energy Weapon Safety Board (DEWSB) review and proximity restrictions are required when the testing of DEW may involve/impact nuclear and conventional munitions
- Analysis of risk assessments (required) for all new or modified explosives, explosives operations, equipment and facilities to identify design and operations criteria (e.g., shielding, protective clothing). See DESR 6055.09_DAFMAN 91- 201 for details.
- Lessons learned from similar tests
    - 412 TW/SET recommends reviewing historical safety plans contained on the 412 TW/SET SharePoint as well as LiveLink.
- Inputs from other experienced or expert individuals, such as other test program managers, engineers, operations personnel, and test safety personnel
- Contractor supplied technical data and hazard analysis
- Air Force SEEK EAGLE Program reviews (internal/external stores)
- Human subject Independent Review Board (IRB) reviews performed by the 711th Human Performance Wing (711 HPW).
- Identification and analysis of operational hazards with operational personnel when employing Rapid Acquisition/Improvement Programs to operational environments.
- T-2 Modification documentation and risk hazard analysis paperwork, including the AFTC Form 6239 (or similar)[111]
    - See section 3.4 of this handbook for more details.
- Airworthiness assessments/SSRAs
    - The team should consider baseline hazards identified through the airworthiness process. Depending on the anticipated impact of airworthiness assessments, teams should consider delaying the safety review until airworthiness assessments are available.

4.1.2 After identifying test hazards, the test team shall attempt to eliminate or control them using appropriate measures.[112] Teams should consider:

- Use of telemetry or other remote monitoring test instrumentation.
- Use modeling and simulation prior to or in lieu of hazardous test points.

[110] DAFI 91-202, 13.10.1.1
[111] AFTCI 91-202, 2.2.3.4
[112] DAFI 91-202_AFMC SUP, 16.5.3 / AFTCI 91-202, 3.3.2

- Design the test to eliminate the probability of the hazard occurring. This could include a decision to not perform the test if the risk is unacceptable. A system redesign is another option.
- Change the test methodology to reduce the probability, severity, or exposure to the hazard (building up to the test condition can be a strong control method).
- Incorporate safety devices (e.g., spin recovery parachute or additional power sources).
- Provide caution and warning devices to detect an unsafe condition or trend or install instrumentation and data displays with active monitoring.
- Develop procedures and training when it is impractical to change the design or test methodology.

4.1.2.1 Teams should ensure their mitigations are as effective as possible within the realm of practicality. The Hierarchy of Hazard Control model can assist with visualizing this concept (Figure 2).

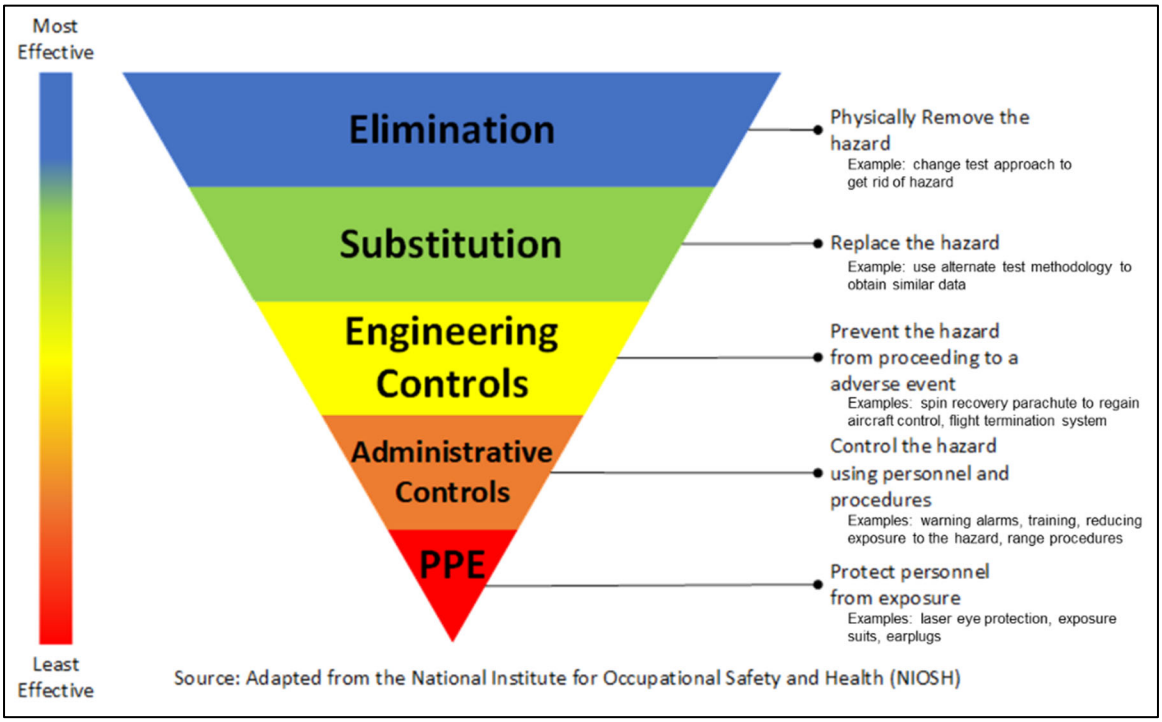

Figure 2 Hierarchy of Hazard Control

4.1.3 After establishing the hazard controls, the test team identifies the residual hazards for consideration during the Test Safety Review Phase. Test teams will document residual hazards. Although the goal is to minimize risk through good test and safety planning/review processes, the test may result in residual risk that must be directly accepted by the TEA.[113]

4.1.4 Safety planning and test planning are integral and iterative processes, and as such, both should be interwoven to ensure the test methods incorporate safety controls where possible. Well planned tests that consider and incorporate risk control measures to eliminate or mitigate test unique hazards are inherently safer than test plans without this safety emphasis.[114]

[113] AFTCI 91-202, 4.1
[114] AFTCI 91-202, 3.1

4.1.4.1 Test team should think about safety considerations during test planning. The teams should consider, but not limited to, the following:

- Test Approach or Build-up. During test plan development, the test team will carefully consider the test approach or build-up. The way the test approaches a hazardous or unknown condition must be clearly defined. If predictive analysis does not exist, or has questionable validity, the test methodology may require a more refined buildup approach to offset the risk. Criteria to continue, or more importantly when to stop, can provide good risk control by providing a clearly defined roadmap into the test team's decision making. This decision-making process is extremely important and should be documented.[115]
- Test Plan Size and Complexity. The test team must consider the size and complexity of the test plan and assess whether a review of a large, complex safety plan is more or less advantageous than several smaller reviews. If feasible, teams may conduct test safety planning for large, complex test plans in smaller, less complex safety plans matched to progressive phases of the test project.[116]
- Integration. If the planned testing utilizes more than one test plan, method of test, test information sheet (TIS), or procedure, it is incumbent upon the team to provide a clear test progression description. Without a clear path, the ability to identify hazards appropriately and develop a risk assessment is difficult. The test team should be aware of this basic issue to avoid significant and unplanned schedule delays caused by action items or cancelled SRBs.[117]

4.2 Safety Plan.

4.2.1 Overview. The safety plan is documentation that details the specific safety criteria and parameters to allow safe conduct of a test. The safety plan can identify targets, munitions, aircraft, and other equipment to be used; defines danger areas; identifies the potential hazards associated with the test; and establishes the specific safety requirements necessary to conduct the test.[118]

4.2.1.1 The safety plan, at a minimum, is comprised of (if applicable): summary of lessons learned (or lack thereof)[119], THAs, GMPs, the SRB summary (SRBS), mishap accountability, and waivers/deviations from instructions, T.O.s, and flight manuals.[120]

4.2.1.2 The safety plan should also document qualification and training requirements which are not documented elsewhere (i.e., test-unique requirements).

4.2.1.2.1 Test organizations through the maintenance group will ensure that maintainers and instrumentation technicians are qualified to perform their required duties through appropriate training prior to working on test articles and conducting ground or logistics tests. The test organization is responsible for any test-unique training or qualifications on equipment or capabilities not currently fielded.[121]

[115] AFTCI 91-202, 3.2.1
[116] AFTCI 91-202, 3.2.2
[117] AFTCI 91-202, 3.2.3
[118] AFTCI 91-202, Terms
[119] AFTCI 91-202_412 TW SUP, A4.1.1
[120] AFTCI 91-202, 3.4.2
[121] EDWARDSAFBI 99-105, 2.1.3

4.2.1.3 If test assets are preplanned to be damaged or destroyed to obtain data, the safety plan should clearly identify the intent and manner of the destruction of an asset (planned time an anticipated reason).[122]

4.2.1.4 No specific format is required for the safety plan as long as the above minimum elements are included. A safety plan template is included on the 412 TW/SET SharePoint. This template includes all the minimum requirements specified above; it was developed to enable the SRB to assess risk and to ensure TEAs understand the risk they are being asked to accept.

4.2.1.4.1 Generally, the main body of the safety plan is divided into two parts, with supplemental information being attached in Tab 5. The content of these sections contribute to the overall risk assessment:

1. **Project Description.** This section is descriptive in nature and presents relevant test project information for consideration during the safety review. Essentially, this section establishes the set of risks/hazards to mitigate or accept.
2. **Risk Management.** This section is directive in nature and states the team actions to mitigate hazards, effects, and respond to a mishap, should one occur. This section is generally the directive part of the safety plan.
3. **Supplemental Information.** Tab 5 of the test package should be used to attach documents which are non-directive, but highly relevant to the package, such as (but not limited to) SSRAs, contractor-produced operating limitations, waiver/deviation concurrences, and TAB slides.

4.2.1.5 Accuracy, completeness, clarity, and conciseness are essential elements of a well-written safety plan, regardless of the format chosen.

4.2.1.5.1 Summarize only the pertinent parts of the test from a safety perspective. In all cases, the proposed activity and safety considerations must be clear to all reviewers. The safety plan should add unique value to the test package; safety plan authors should focus on hazard identification, mitigation, and mishap responsibility rather than repeating technical details contained in the test plan.[123]

4.2.1.5.2 The 412 TW/SET recommends having the final supporting safety/airworthiness assessments from other organizations (such as SSRAs) available prior to the SRB. The PSLs should update the SRB with any supporting assessment information as it becomes available. If the final version of these supporting assessments become available after the SRB, the SRB Chairperson may elect to reconvene the board; this is especially likely if the assessments identify additional hazards (beyond what was provided to the SRB) or assess higher than anticipated risk levels.

[122] DAFI 91-202_AFMC SUP, 16.11.6
[123] AFTCI 91-202_412 TW SUP, A4.1

4.2.1.5.3 Many test packages will contain parameter monitoring requirements, generally characterized as required-for-data (RFD), SOT, and safety-of-flight (SOF).[124] If a test package has unique definitions for parameter monitoring besides or in conflict with the following, the definitions should be stated in the test package.

4.2.1.5.3.1 The RFD parameters will typically be verified as operable before each test mission. Usually, RFD parameters need not be telemetered and monitored in real time unless they are also SOT or SOF parameters. Generally, the failure of any non-SOT/SOF RFD parameter would cause a pause until the responsible engineer or test team can determine whether testing may proceed without the parameter.

4.2.1.5.3.2 The SOT/SOF parameters are those essential for ensuring the safety of a test or flight. The SOT parameters must be monitored in real time against established limits during the execution of test points. The SOF parameters must be monitored during the entire flight including between test points. Generally, the test/flight will not proceed if any SOT/SOF parameters are unavailable.

4.2.1.5.4 The list of required parameters may be listed in the safety plan or the test plan. However, if the SOT/SOF parameter lists are contained in the test plan, the safety plan should include a "pointer" to where that list may be found.

4.2.1.5.5 Certain supplemental information may be subject to revision during execution, such as contractor-produced operating limitations. If teams attach versions of those documents to Tab 5 to indicate scope or expected wording, the team may wish to specify in the test package that the most current version of the document will always be used; should the supporting documents be revised, that language may render a test package amendment unnecessary. See section 12.1.4 in this handbook for additional insight.

4.2.1.6 Safety planning for activities that qualify for NRRs may be included wholly within the NRR concurrence and approval document (412 TW Form 5002 or equivalent)[125] and do not require a separate safety plan. See Section 9 of this handbook for more information.

4.2.2 412th Test Wing (412 TW) Form 5001/5002 (or Equivalent).

4.2.2.1 The 412 TW/SET recommends (but does not require) the use of the 412 TW Form 5001. The 412 TW Form 5001 is a locally tailored version of the AFTC Form 5001 and is available on the 412 TW/SET SharePoint. The 412 TW Form 5002 is intended to document NRRs and has no AFTC-issued parent document. The test team should coordinate with 412 TW/SET if they choose to create a unique form to capture test package coordination signatures (e.g., program unique Form 5001/5002).

4.2.2.2 As part of the review process, units will ensure that the appropriate safety plan authors, reviewers and approvers can sign the safety planning documents during the safety review process. These signatures can be documented on the 412 TW Form 5001/5002, workflow process, or other electronic review.[126]

[124] 412TW-TIH-22-01, 1.4.4
[125] AFTCI 91-202_412 TW SUP, A4.2
[126] AFTCI 91-202, 1.2.1

4.2.2.2.1 The 412 TW Form 5001/5002 (or equivalent) is used to document general project information, signatures of the personnel performing the test unit level safety review, signatures of ISRs who perform the safety review, and signatures of officials who approve or are informed of the test package.

4.2.2.2.2 If the 412 TW Form 5001/5002 is not used, units will provide a section for coordination comments to be recorded along with responses to those comments.[127]

4.2.2.2.3 The test team is responsible for the completion of the 412 TW Form 5001/5002 (or equivalent) and Safety Plan. The UTSO shall ensure that the most current 412 TW Form 5001/5002 (or equivalent) is used prior to submission.[128]

4.2.2.3 **Form 5001 Section I Signatures.** To ensure mature and stable test and safety plans are released for safety review, a thorough test team internal review shall be completed.[129] Section I signatories on the 412 TW Form 5001 (or equivalent) indicate in the test unit's judgment that the test package is ready for safety review. The following signatures are required on the 412 TW Form 5001 (or equivalent) prior to releasing the test package to the ISRs:[130]

- Safety Plan Author/PSL
- UTSO
- Project Operator or Project Test Engineer
- Test Unit Senior-Level leader

4.2.2.3.1 UTSO Signature.

- The UTSO signature on the 412 TW Form 5001 (or equivalent) indicates safety-related documentation complies with content and format standards contained in AFTCI 91-202 and AFTCI 91-202_412 TW SUP.[131] The UTSO is a liaison of the 412 TW/SET office[132] and although schedule pressure from within a unit can exist, UTSOs should not sign 412 TW Form 5001 (or equivalent) until the documentation is of sufficient stability and maturity to be ready for independent review.
- The UTSO who signs Section I must be capable of assisting[133] and advising[134] the team, which generally requires knowledge of the types of test and the SUT. While the UTSO is typically from the same unit as the PSL, they may be from another 412 TW unit, so long as the above requirements are met (in addition to UTSO qualification requirements). The UTSO is not required to be from the same unit as the low-risk TEA.

[127] AFTCI 91-202_412 TW SUP, A4.3
[128] AFTCI 91-202_412 TW SUP, A4.4
[129] AFTCI 91-202_412 TW SUP, A4.5
[130] AFTCI 91-202, 1.2.1
[131] AFTCI 91-202, 2.1.7.2
[132] AFTCI 91-202_412TWSUP, A3.2
[133] AFTCI 91-202, 2.1.7.1
[134] AFTCI 91-202, 2.1.7.4

4.2.2.3.2 Project Pilot or Project Test Engineer Signature.

- A system operator (or an operator of a similar vehicle/system) will sign Section I as the Project Pilot or Project Test Engineer. For flight tests, this person will be rated aircrew (or equivalently qualified for their aircraft and crew position).[135]
- If there is no project pilot or squadron associated with a test package and 412 TW is a PTO, it may be appropriate to annotate the Project Pilot or Project Test Engineer signature as "N/A." Units should contact 412 TW/SET to verify whether this is an appropriate option.

4.2.2.3.3 Final Section I Signature.

- Generally, the final signature on Section I should be from the same unit as the team who prepared the package, regardless of what unit commander is signing Section III.
- The final internal review signature on the 412 TW Form 5001 is completed by the squadron commander/director (or equivalent) who may delegate this to the deputy director, director of operations (DO), director of projects (DOP), or chief engineer. The unit commander/director (or equivalent) may authorize other test unit senior level leaders to sign this line via a memorandum to 412 TW/SET.[136]

4.2.2.4 **Internal SRBs.** Experience has repeatedly shown the highest-quality document reviews result from in-person meetings rather than virtual or serial reviews; these meetings are often called internal SRBs. Whether in-person or virtual, these meetings mimic a Formal SRB but should be chaired by the UTSO (as a process expert/facilitator) and should include all Section I signatories and stakeholders. Internal SRBs are intended to ensure test team agreement (as indicated via Section I Signatures), yielding a mature and stable plan which efficiently moves through independent review.

4.2.3 General Minimizing Procedure (GMP)/Test Hazard Analysis (THA) Best Practices.

4.2.3.1 Compliance with regulations, flight manuals, or documented standard practices is always expected; these are not test-unique and generally should not be written as GMPs/THAs. They should only be included if the test team determines they add value.

4.2.3.2 The PSLs should consult with their UTSO to determine whether a GMP or THA is the most appropriate method to mitigate a given hazard. Simple cases and one-off cases may lend themselves to being mitigated through GMPs. A THA is generally appropriate for more complex cases, such as hazards with multiple causes, numerous mitigation or corrective action steps, multi-step decision trees, or cases that benefit from a highly structured analysis. Often, THA-worthy hazards are encountered in multiple similar test programs with some customization.

4.2.3.3 If a minimizing procedure applies to multiple THAs, it may be best written as a GMP.

4.2.3.4 Be directive and unambiguous. Use "shall" statements;

- "will" can be ambiguous: it can be interpreted as future-tense and sometimes directive
- "may" is ambiguous: it can be interpreted as permissive or optional

[135] AFTCI 91-202_412 TW SUP, A4.5.1
[136] AFTCI 91-202_412 TW SUP, A4.5.2

- "should" is non-directive
- qualifying phrases like "if able" or "to the maximum extent possible" do not levy reliable requirements and should not be used

4.2.3.5 Be specific: state who will perform an action, when, and how often. Avoid GMPs/THAs which vaguely state "XX shall be monitored" but do not describe who accomplishes the action.

4.2.3.6 Place conditional statements at the beginning of GMP/THA statements, rather than the end; this helps expedite the pre-test brief.

- Good example: "For taxi test points with 99% (or more) worn brakes, fire department vehicles shall chase the test aircraft."
- Bad example: "Fire department vehicles shall chase the test aircraft during taxi test points only if the brakes are 99% worn (or more)."

4.2.4 GMPs.

4.2.4.1 The GMPs are stand-alone phrases/statements and are used to address SUT restrictions, test build-up, critical parameter monitoring, go/no-go criteria, weather or environmental criteria, and flight test chase requirements among other items of test safety concern.[137] The GMPs should be directive, targeted, and actionable statements.

- Good example: "The Aircraft Commander shall verify that the Weapons Master Power Switch is in the OFF position prior to turning on the Battery Power Switch."
- Bad example: "The Weapons Master Power Switch will be checked prior to turning on the Battery Power Switch."

4.2.4.2 The GMPs will be clearly identified in the safety plan. No specific format is required.

4.2.4.3 If appropriate for the mission, test teams may divide GMPs into categories based on general mission phases. Examples: planning GMPs / night GMPs / low-altitude GMPs / over-water GMPs.

4.2.5 THAs.

4.2.5.1 The THAs are used to document and identify test hazards and the actions necessary to minimize or control them.[138] Each THA captures a test unique hazard.[139] A hazard is any real or potential conditional that can cause injury, illness, or death to personnel; damage to or loss of a system, equipment or property; or damage to the environment. A hazard is condition that has the potential of causing a mishap.[140] Test teams should confirm that the hazard is not a hazard associated with the basic operation of the aircraft, vehicle, SUT, or facility. Generally, if the hazard is not unique to the series of tests, no THA is required.

Example: Midair collision with non-participating aircraft and bird strikes are not generally considered test unique hazards. However, should the very nature of the test increase the

[137] AFTCI 91-202, 3.4.2.2
[138] DAFI 91-202_AFMC SUP, 16.6.5.1
[139] AFTCI 91-202, 3.4.2.1
[140] AFTCI 91-202, Terms

probability of these hazards above that of normal operations, they should be addressed as test unique hazards.

4.2.5.2 The THAs will be documented on a *Test Hazard Analysis* document. The 412 TW/SET recommends use of the AFTC Form 5000 for THAs. A template is available on the 412 TW/SET SharePoint. The *Test Hazard Analysis* document will include the following:[141]

- Mishap severity and probability of the hazard
- Causes: anything that could lead to the presence of the hazard
- Effects: the outcome if the hazard is not controlled
- Controls or Minimizing Procedure: an action or procedure tied to a specific cause, causes, or effect it is trying to control
- Corrective Actions or Emergency Procedures: the list of actions taken to prevent or mitigate a mishap (the effect) if the hazard occurs
- Comments: optional information that helps support the THA risk analysis but are not directive in nature

4.2.5.3 Further guidance on THAs can be found in AFTCI 91-202, section 3.4.2.1.

4.2.5.4 The mishap severity and probability of the test unique hazard is plotted on a THA Risk Assessment Matrix (see Table 4.1 in AFTCI 91-202) to determine the hazard's overall risk level. Additionally, the specific definitions of each severity and/or probability level are critical for ensuring comparison between rating scales provided by other non-AFTC organization (e.g., Program Offices, contractors, etc.) who might use the same descriptive wording, but not the same associated quantitative values (or vice versa).

4.2.5.4.1 **Mishap Severity.** The mishap severity category is a qualitative assessment of the most reasonable credible mishap consequence that could occur with all mitigations in place. The severity is assigned based on the system level consequence of total direct mishap cost and severity of injury/occupational illness or equipment loss or damage.[142]

4.2.5.4.1.1 The direct cost of mishap does not equate to programmatic cost. The direct cost of a mishap is calculated by adding all the cost of damaged or destroyed assets, including resultant costs such as decontamination, environmental restoration, and restitution. The direct cost of damage to DoD or non-DoD property shall be computed using the actual cost of repair or replacement (including work hours for repair) or the best official estimate available.[143] For example, if a mission costs $5 million due to the cost of all the resources involved, then the severity of the hazard causing return-to-base (and incomplete mission) is not automatically catastrophic, despite the major programmatic impact.

4.2.5.4.1.2 The ISRs should focus on using the descriptive definitions as the primary criteria for assessing mishap severity. See Table 4.1 in AFTCI 91-202 for the AFTC mishap severity definitions.

[141] AFTCI 91-202, 3.4.2.1
[142] AFTCI 91-202, 4.2
[143] DoDI 6055.07, 9a

4.2.5.4.2 **Mishap Probability.** The mishap probability category is a qualitative and/or quantitative measure of the likelihood of the mishap occurring with all mitigations in place.

4.2.5.4.2.1 The ISRs should focus on using the descriptive probability definitions for assessing mishap probability. Test programs can rarely compute meaningful quantitative probability predictions with confidence since the test activities typically involve new, complex, and unproven systems. See Table 4.2 AFTCI 91-202 for the AFTC mishap probability definitions.[144]

4.2.5.4.3 When a hazard has multiple credible outcomes of different severity/probability combinations, the risk level assessed for the THA will be the highest risk assessed among those outcomes.[145]

4.2.5.4.4 When a hazard has potential to result in multiple consequences of different severities, assess the probability for each and include the consequence with the most severe net losses for an exposure period along with other consequences that produce losses within an order of magnitude of those losses during the exposure period.[146]

4.2.5.4.5 If the resultant risk level is the same across all the credible outcomes, the THA should be marked with the probability associated with the highest severity. Additional credible outcomes should be documented in the THA comments/remarks.[147]

4.2.5.5 Overall, the 412 TW/SET recommends focusing on test-unique concepts for causes, effects, controls/minimizing procedures, and corrective actions/emergency procedures. However, if adherence to standard procedures or regulations are realistic and credible factors that play into determining the risk level, then they should be acknowledged.

4.2.6 Mishap Accountability.

4.2.6.1 Detailed information on mishap accountability and investigating responsibility must be provided by the test team in the safety plan when deviating from DAFI 91-204, or if multiple major commands (MAJCOMs) are involved, or if non-Air Force assets are involved, to include pre-mishap planning. A memorandum of agreement is the preferred method when multiple agencies are involved. For tests that include non-AFTC resources, the AFTC assets that are at risk for the test should be explicitly identified.[148]

4.2.6.2 Test teams should avoid rephrasing or elaborating on guidance specified in DAFI 91-204 unless deviating from that guidance.

4.2.6.3 When a test project involves multiple Commands, teams should be aware of DAFI 91-204, paragraphs 5.2 and 5.3 and DAFI 91-204_AFMC SUP, paragraph 5.3.1. Teams are required to define and coordinate mishap investigative responsibility prior to operations, and that the transfer of convening authority, either to or from AFMC, shall be implemented through a Memorandum of Agreement/Understanding that must be reviewed by AFMC/SE;[149] a copy of this memorandum should be attached to Tab 5 of the test package.

[144] AFTCI 91-202, 4.3
[145] AFTCI 91-202_412 TW SUP, A6.8.4.1
[146] DAFI 91-202_AFMC SUP, 11.9.2
[147] AFTCI 91-202_412 TW SUP, A6.8.4.1
[148] AFTCI 91-202, 3.4.2.4
[149] DAFI 91-204_AFMC SUP, 5.3.1

4.2.6.4 For mishap planning in preparation for complicated tests (e.g., testing involving both Civil and Military aircraft), teams may find additional useful guidance in Department of Defense instruction (DoDI) 6055.07.

4.2.6.5 Planned or anticipated damage or destruction should be clearly stated in the test package where appropriate; these events are generally not mishaps.[150] See DAFI 91-202_AFMC SUP, paragraph 16.11.6, for more information.

4.2.6.5.1 Exceptions to mishap reporting apply only if destruction/damage was documented in the test plan as an expected or desired outcome of the test, it occurred at the planned time, for anticipated reasons. Follow the procedures for intentional or expected damage to DoD equipment or property incurred during authorized testing in DAFI 91-204 and the Reportable Mishap Flow Chart in Air Force Manual (AFMAN) 91-221.[151]

4.2.7 Waivers/Deviations.

4.2.7.1 When a test activity must deviate from an Instruction or other command directive, units will comply with the applicable waivers/deviations process outlined in the applicable document. If the waiver authority is within the local Wing/Complex chain of command, the waiver may be obtained during the approval cycle and documented as a coordination comment within the safety plan.[152] Residual risk associated with the test point(s) requiring the waiver should be specifically assessed by the SRB and clearly communicated.[153]

4.2.7.1.1 If the waiver approval authority rests within the 412 TW chain of command, the waiver can be obtained either with an AFMC Form 73 (standard process) or via coordination comment in the test package. Teams are encouraged to use whichever method meets their needs. When using the coordination comment method, teams should be very explicit in their requests.

Example 1: A test team elects to pursue an AFI waiver with an AFMC Form 73. The team routes this waiver through normal processes and provides the waiver for review at the SRB. The risk assessment and TEA approval to conduct testing are contingent on approval of the waiver. The team receives an approved waiver prior to conducting testing, and this approved waiver is added to the test package. The team proceeds with testing.

Example 2: A test team elects to pursue an AFI waiver from the TW/CC via a test package coordination comment. The assessed overall risk of the test package is medium (contingent on approval of the waiver). The team routes the test package to the OG/CC for approval, and then further routes the test package to the TW for a Coordination signature by the TW/CC, indicating TW/CC approval of the waiver. The team proceeds with testing.

4.2.7.1.2 Waivers to Air Force instructions (AFIs) or other command directives must be filed with the safety office or test unit.[154] The 412 TW/SET recommends attaching a copy of the approved waiver in Tab 5 of the test package.

[150] DAFI 91-202_AFMC SUP, 16.11.6
[151] DAFI 91-202_AFMC SUP, 16.11.6.1.
[152] AFTCI 91-202, 1.8.1
[153] DAFI 91-202_AFMC SUP, 16.6.5.5.2
[154] AFTCI 91-202, 1.8.1

4.2.7.2 Waivers/deviations from AFIs, T.O.s, and/or flight manuals shall be evaluated as part of the safety review process and incorporated into the safety plan. Test managers must coordinate early with test safety and the applicable program office engineering staff/Delegated Technical Authority (e.g., Flight Manual Manager) to assess the anticipated hazards and test risk levels. Comply with the applicable waiver/deviation process. Final waiver approval must be obtained prior to test execution.[155]

4.2.7.2.1 For AFTC units conducting tests approved IAW AFTCI 91-202, the AFTC TEA may authorize deviation from flight manual direction and limitations during the test approval process without additional waiver requests. Test teams will document flight manual deviations in the test safety planning process. For any flight manual waiver/deviation required outside an approved test, Air Force Materiel Command – Operations Division (AFMC/A3), Wright-Patterson AFB, Ohio, remains the waiver authority.[156] Approval authority rests with the TEA identified during the risk assessment.

4.2.7.2.2 Waivers to T.O.s that are not flight manuals should be approved through the waiver authority for that T.O. using standard processes. Draft copies of waivers to T.O.s or flight manuals may be provided at the SRB, but the final approved waiver must be included in the test package.[157] The 412 TW/SET recommends attaching a copy of the approved waiver in Tab 5 of the test package.

4.2.7.2.3 If the test is beyond the scope of the current flight manual (such as a new store), or if the flight manual does not yet exist, contractor-produced documents (e.g., aircraft operating limitations [AOLs], flight operations limit documents [FOLDs], test operating limits [TOLs]) may contain unique limits. If the contractor-produced documents allow actions that are prohibited by the current flight manual limits (such as flight with a store not listed in the TO-1-1-34), then they are considered flight manual deviations; Chief Engineer/Delegated Technical Authority concurrence on these contractor-produced documents is required.

4.2.7.2.4 The team will obtain Chief Engineer/Delegated Technical Authority written concurrence prior to approval by the TEA.[158] It is strongly desired that it be obtained prior to the SRB to be factored into the risk assessment.

4.2.7.2.4.1 Generally, for T.O. waivers, if the waiver is obtained through standard processes, it will have been coordinated through the applicable Office of Primary Responsibility (OPR)/Chief Engineer/Delegated Technical Authority by AFMC/A3. Test teams are responsible for ensuring this coordination has occurred before TEA approval.

4.2.7.2.4.2 If the Chief Engineer/Delegated Technical Authority is already an approver of a contractor-produced limitations document (e.g., AOLs, FOLDs, TOLs), a second approval is not required; teams should explicitly state in the test package that the Chief Engineer/Delegated Technical Authority is in the approval chain for those documents.

[155] DAFI 91-202_AFMC SUP, 16.6.5.5.1
[156] AFI 11-215_AFMC SUP, 1.3.2
[157] AFTCI 91-202, 1.8.2
[158] DAFI 91-202_AFMC SUP, 16.6.5.5.2.

4.2.7.2.5 The waiver concurrence must come from someone who has the authority to provide it. By definition, the Delegated Technical Authority is that person and may be someone on the engineering staff. Teams should contact the Program Office staff to determine who the Delegated Technical Authority is for a T.O. The program office Chief Engineer is included as they should always have that authority.

4.2.7.2.6 An email signed by the appropriate official is sufficient. The intent is to show and document coordination. This could also be accomplished through memorandum, signature on an AF Form, or something similar.

4.2.7.3 Any test/training activity contingent on any waivers requires discussion at the SRB and will be included in any hazard risk assessment and documented in the SRBS. Any waiver not approved by the TEA, or appropriate approval authority, after the SRB will require a reassessment by the SRB.[159]

4.2.7.4 If a waiver/deviation is not approved at the time the TEA approves the test package, the team will wait to utilize the waiver during execution (e.g., deferring or modifying test points) until it is approved.

4.2.7.4.1 If the draft copy of the waiver/deviation was provided to the SRB, and the waiver was approved as-is, the waiver may be added to Tab 5 via an Administrative Change. The 412 TW/SET will be notified of all administrative changes.[160]

4.2.7.4.2 If the draft copy of the waiver/deviation reviewed at the SRB is approved with additional restrictions or changes, the team should consult the 412 TW/SET to determine the path forward.

4.2.7.4.3 If a flight manual waiver/deviation requires updates during execution (i.e., after TEA approval), then a test package amendment and TEA re-approval may be required based on the scope of the changes. The test team should consult the 412 TW/SET on path forward.

[159] AFTCI 91-202, 3.4.2.5.5
[160] AFTCI 91-202_412 TW SUP, A12.12.4

4.3 Special Subjects for Test Team Awareness.

4.3.1 Contractor-provided Procedures or Limitations.

4.3.1.1 Contractor-provided procedures or limitations are frequently used during testing. Sometimes, changes to these procedures or limitations are necessary after test package approval. These changes may or may not require additional safety review. Test teams should present the process by which changes to contractor-provided procedures or limitations will be approved and whether government personnel will be involved. The safety plan should specify the circumstances under which additional safety review would be required. See section 4.2.7.2 of this handbook for additional details regarding cases where contractor-provided procedures constitute a flight manual deviation.

Example 1: A test team plans to utilize contractor procedures for fuel system testing during a ground test. Upon reviewing the procedures, the team feels comfortable that changes to the procedures would not appreciably affect the risk assessment, with a few exceptions. The team will document those exceptions in their safety planning and presents this to the independent reviewers. Changes to contractor procedures outside of the listed exceptions would not require additional safety review. Certain changes may constitute a test plan change, even though safety planning is unchanged. Consult with 412 TW/CT and 412 TW/SET if uncertain.

Example 2: A test team plans to abide by contractor-provided AOLs during the test program. The safety review should include the use of contractor AOLs and consider the least conservative cases in the risk assessment. The safety review should address the AOL change process and what criteria would trigger the SRB to reconvene.

4.3.2 Aircrew on Inter-fly Agreements and Elevated Risk Tests Conducted by Non-Test Pilot School (TPS) Graduates.

4.3.2.1 Non-412 TW aircrew flying under an approved inter-fly agreement may fly on training sorties and test missions, if it is specifically allowed under the provisions of the Test Package.[161]

4.3.2.2 Medium- and high-risk events in manned aircraft crewed entirely by individuals other than graduates of a TPS will be permitted only if documented in the approved safety package. Individuals other than TPS graduates may crew with TPS graduates in elevated-risk missions at the discretion of the CTF director, USAF TPS Commandant or squadron commander.[162] Teams should acknowledge this intent and rationale in the Qualifications & Training section of the safety plan or may request the TEA document it in a coordination comment.

[161] DAFMAN 11-401_AFMC SUP_EDWARDS AFB SUP, 4.1.18.5
[162] EDWARDSAFBI 99-105, 2.1.1

4.3.3 Safety Assessments Contributing to the SRB Risk Assessment.

4.3.3.1 The AFTCI 91-202, section 3.3.1.1, recommends multiple sources to identify test-unique hazards, such as system safety hazard analyses and safety reviews from other organizations.

4.3.3.2 If the AFTC is the ETO (and is therefore responsible for the overall safe execution of the test), these contributing safety reviews (including SSRAs) should be completed before the AFTC safety review occurs. Risk assessments that are not yet complete should be treated as "unknowns" at the SRB and have the potential to drive the SRB to reconvene.

4.3.3.3 Teams and board members should be cognizant of differences in risk matrices when documenting the results of safety assessments by other organizations.

4.3.3.3.1 Outside organization risk assessments (including SSRAs) are often completed using a different risk matrix than what AFTC uses. Risk matrices with phrasing similar to those in the overall risk level or THA probability/severity definitions may not be comparable if quantitative measures are not specified (e.g., if a contractor safety plan states a hazard probability is "Improbable," but does define it as less than 10^{-6}, the contractor-derived risk level should not be assumed to equate to an AFTC-derived risk level).

4.3.3.3.2 Some organizations assess risk pre-mitigation, whereas the AFTC risk assessment is conducted after mitigations are considered.

4.3.3.4 An SSRA is intended to cover the life of the system, not necessarily the test-unique risk. Test safety risk manages the risk for a test event while system safety hazard risk focuses on defined hazards that are managed over the system's life cycle.[163] However, if the vehicle was designed exclusively for a given test, the vehicle life and the test program duration may be identical. The SRB should consider how the hazards identified by the SSRA interrelate with the test-unique events, such that a higher-than-normal risk could exist.

- For example, an SSRA with an elevated risk for structural fatigue might mean the vehicle is life-limited, but if the test will occur within the first few hours of vehicle life, this risk may not directly impact the SRB's risk assessment.
- Conversely, an SSRA rated elevated risk for concerns about the crew escape system might directly contribute to the severity assessment on a THA where ejection is normally considered a test-unique mitigation against aircrew death (e.g., Aircraft Out of Control THA).
- If an SSRA is updated during test execution that increases the safety risk assessment originally presented to the SRB, then test teams should consider how the updated hazards in the SSRA could impact the test safety risk assessment. For example, if an SSRA with an original elevated risk for concerns about the crew escape system identified additional findings that further increase injury to aircrew, then any test activity where ejection was a test unique mitigation against aircrew death needs to be re-assessed.

[163] DAFI 91-202_AFMC SUP, 11.3.1.4.2

4.3.4 Joint Safety Reviews. If another organization conducts its own safety review, teams should consider planning a joint safety review attended by reviewers from both the 412 TW (including 412 TW/SET) and the other organization. Each SRB Chairperson should ensure their organization conducts its own risk assessment, in consideration of the factors identified by the joint board. The 412 TW SRB Chairperson must ensure that any personnel participating in the 412 TW risk assessment have been trained as ISRs and the AFTC risk assessment matrix and definitions are utilized for the 412 TW risk assessment. If a joint safety review is not practical, teams should ensure safety planning documentation configuration control is maintained across from one board to the next. Ideally, a single safety plan would govern the entire test effort. See section 10.0 of this handbook for how to conduct acceptance of other organization's safety plans.

4.3.5 Loading and Handling of New Stores/Items.

4.3.5.1 Activities affected include the loading and handling of munitions, munitions alternate mission equipment (AME) and nonstandard equipment in support of maintenance or test programs.[164]

4.3.5.2 Locally developed technical data are mandatory for SUTs when their use with AFTC test capabilities are not covered by Standard Air Force (SAF) publications. Under no circumstances will any munitions, sub-munitions or maintenance operations be conducted unless appropriate DoD technical data or approved local technical data are made available and used. Local technical data will be developed by the Joint Checklist Working Group (JCWG) as required to support test, development and integration programs for AFTC units.[165]

4.3.5.3 The technical data must be reviewed and approved IAW AFTCI 63-101_20-101 and AFI 21-101_AFMCSUP_EDWARDSAFBSUP.[166]

4.3.5.3.1 Test Engineer/Project Officer will review test requirements with aircraft configuration manager (ACM)/munitions configuration manager (MCM) (or designated representative) to determine technical data requirements. If local procedures are required, provide a standard/source data package (SDP) and associated support data to the ACM/MCM (or designated representative). The ACM/MCM (or designated representative) will notify the JCWG and draft local technical data.[167]

4.3.5.3.2 The ACM (or designated representative) will serve as the test agency liaison for all weapons flightline operations,[168] review all weapons system local technical data to verify compliance with existing/approved flight clearances, and coordinate with test agencies/Air Force Seek Eagle Office (AFSEO) to resolve local/SAF technical data/flight clearance conflicts.[169]

4.3.5.3.2.1 The Wing weapons manager (WWM) (412 MXG/MXL) is the head of all weapons flight operations.

[164] AFI 21-101_AFMCSUP_EDWARDSAFBSUP, 1.6.2.2
[165] AFTCI 63-101_20-101, 1.1
[166] AFI 21-101_AFMCSUP_EDWARDSAFBSUP, 1.6.2.2
[167] AFTCI 63-101_20-101, 2.2.1
[168] AFTCI 63-101_20-101, 2.3.1
[169] AFTCI 63-101_20-101, 2.3.2

4.3.5.3.3 Test teams will ensure deviations from applicable weapons configurations or loading technical data in test plans and modified flight clearances are reviewed by the WWM (412 MXG/MXL).[170]

4.3.5.3.3.1 The WWM (412 MXG/MXL) will review SRB reports, test plans, and flight clearance through the applicable Program Office/Seek Eagle office for any deviations from applicable weapons configurations or loading technical data.[171]

4.3.5.3.4 Weapon standardization will perform or supervise all initial fit checks of weapons, authenticate all loading checklist verification procedures, and provide weapons load training for project support. Additionally, they will provide technical advice and input so the loading technical data will most resemble SAF publications.[172]

4.3.5.3.5 The 412 TW/SEW will review and provide safety recommendations for draft technical data and provide safety support for verifying technical data when necessary.[173]

4.3.5.4 Teams shall consult with the WWM (412 MXG/MXL), Weapons Standardization (412 MXG/MXW) and 412 TW/SEW, as applicable, to determine exact requirements for development or use of local technical data.[174] Concurrence from these offices is typically a requirement before a test event occurs and should be written as such in the safety plan. Approximately 5 working days prior to the event should be considered the minimum timeline to obtain concurrence to ensure any off-station waivers (such as through AFMC) can be obtained.

4.3.6 Heat-Producing Devices in Explosives Areas at Edwards AFB.

4.3.6.1 If teams require the use of heat-producing devices (e.g., solid rocket motor heating blankets) in explosives areas on Edwards AFB, early communication with 412 TW/SEW is essential. DESR6055.09_DAFMAN91-201_DAFGM2024-01 requires that:

4.3.6.1.1 In any explosives area, use devices that produce temperatures higher than 228 degrees Fahrenheit (°F) (109 degrees Celsius [°C]) temporarily and only when essential. Develop written safety procedures for these devices and include details on the location, purpose, and duration of use. Coordinate the procedures through the base safety office and the Fire Department for approval. Properly installed, approved furnaces and electrical space heaters are exempt. Heat-producing devices are not allowed where exposed explosives are present. Ensure personnel are qualified on the equipment prior to use. A hot work permit is required to use any equipment exceeding 228°F in a building containing explosives.[175]

4.3.6.2 Test teams that require the use of heat-producing devices should contact 412 TW/SEW for instructions. Expect to complete a memorandum and route the memorandum through 412 TW/SEW to the Fire Department for approval. This memorandum must be reviewed annually and will be maintained on the 412 TW/SET SharePoint.

[170] AFTCI 91-202_412 TW SUP, A4.6
[171] AFI 21-101_AFMCSUP_EDWARDSAFBSUP, 1.6.2.3
[172] AFTCI 63-101_20-101, 2.6
[173] AFTCI 63-101_20-101, 2.7
[174] AFTCI 91-202_412 TW SUP, A4.7
[175] DESR6055.09_DAFMAN91-201_AFMCSUP_AFMCGM2024-01, V1.E10.6.7

4.3.7 Range Safety Considerations.

4.3.7.1 Range Safety Operational Plan (RSOP).

4.3.7.1.1 A range safety operational plan (RSOP) is required for testing that involves an unmanned aircraft system (UAS), any type of item release/separations (e.g., fuel tank, munition, chaff/flare/decoy, or anything else that would require a footprint analysis), or laser operations when they involve non-certified laser or non-eye-safe off-range employment.

4.3.7.1.2 The RSOPs will be generated IAW EWR 127-1, *Eastern and Western Range Safety Requirement*s. When these operations are inside R-2508, 412 TW/SER will coordinate with PSLs to generate the RSOP; when operations are outside of R-2508, other ranges will lead RSOP development.

4.3.7.1.2.1 Test teams may elect to document range safety requirements in the safety plan or work with 412 TW/SER to create a separate document. Typically, the RSOP will be attached to Tab 5.

4.3.7.1.3 The RSOP may be updated prior to and during execution, in coordination with the applicable range safety office. A change to a Tab 5 document does not automatically require a test package amendment; however, teams should describe in the safety plan whether a test package amendment would be required to change specific restrictions or concept of operations (CONOPS) in the RSOP.

4.3.7.1.4 The DoD Ranges generally conduct their own safety risk assessment (usually conducted separate from the 412 TW SRB). If a 412 TW unit is the ETO and the range assesses risk as higher than what the 412 TW SRB assesses, teams need to notify the SRB and TEA. This may result in an SRB reconvene.

4.3.7.2 Unmanned Aircraft System (UAS) Considerations.

4.3.7.2.1 The UAS groups are generally divided by maximum gross takeoff weight, operating altitude, and operating airspeed.[176] The 412 TW SRB will assign a type designation to each UAS. Traffic avoidance capability is an important consideration for type designation and may be accomplished via on-board or off-board systems. Capability must be tested for suitability before it can be considered for categorizing the UAS.[177]

4.3.7.2.2 Lost link mitigation procedures will be evaluated by the SRB for the specific aircraft.[178]

4.3.7.2.3 The THA severity assessment for loss of a Group 1, 2, or 3 UAS should be based on the dollar cost of the UAS.[179] Therefore, loss of a Group 1, 2, or 3 UAS may not automatically qualify as catastrophic severity (i.e., Class A mishap) unless the direct mishap cost exceeds the quantitative value of greater than or equal to $2.5 million.[180]

[176] DoDI 6055.07, Definitions: UAS
[177] EDWARDSAFBI13-204, 9.4
[178] EDWARDSAFBI13-204, 9.2.3
[179] DoDI 6055.07, Figure 2
[180] AFTCI 91-202, Table 4.1

4.3.7.3 Laser Operations.

4.3.7.3.1 Operation of Certified (Fielded) Laser Systems IAW Published Procedures

4.3.7.3.1.1 Certified (i.e., fielded) laser systems (such as fielded targeting pods) can often be operated IAW the requirements of AFMAN 11-214; this includes air-to-air and/or air-to-ground employment in training (eye-safe) and/or combat (non-eye-safe) modes.[181] Similarly, some systems (such as large aircraft infrared countermeasures [LAIRCM]) may be well-documented in T.O.s. Use of these published procedures may greatly reduce the complexity of safety planning. Teams wishing to leverage this guidance should reference the appropriate AFMAN 11-214 paragraph numbers or T. O. sections in the safety plan.

4.3.7.3.2.2 The Optical Radiation Safety office (DSN: 389-2375) publishes updated tables for both U.S. Air Force and U.S. Navy certified lasers for each range certification (Attachment 1 of every range certification report). Their published tables may be used in place of applicable Mission Design series (MDS) T.O. guidance. Visit https://usaf.dps.mil/teams/acc_weapons_tactics/AFI11214/Forms/AllItems.aspx to access the most updated table, or email 711HPW.RHDO.USAFLaserSafety@us.af.mil.[182]

4.3.7.3.2.3 Teams are reminded that laser systems are generally only certified in their fielded configurations. A previously fielded system that is subsequently modified (e.g., new hardware, new operational flight plan [OFP], etc.) may no longer be certified, depending on the modifications. Consult 775 TS/ENVDE technical experts for assistance determining whether a given configuration should be considered certified.

4.3.7.3.2 Laser Operations in R-2515

4.3.7.3.2.1. Teams wishing to conduct lasing operations in R-2515 should familiarize themselves with the Precision Impact Range Area (PIRA) procedures in AFMAN 13-212V1_EDWARDSAFB SUP. It is not necessary to re-print sections of the regulation in the safety plan because compliance with all regulations is assumed. However, if teams wish to highlight obscure or unfamiliar portions of the guidance, that is left to the team's discretion. If teams plan to deviate from this guidance, the normal waiver process should be followed.

4.3.7.3.2.2 R-2515 laser operations guidelines and attack restrictions are provided in the latest 711th Human Performance Wing – Bioeffects Division Optical Radiation Bioeffects Branch (711 HPW/RHDO), Wright-Patterson AFB, document (see AFRL-RHDO-SR-2015-0011, *Special Report: Edwards PIRA Certification for the Safe Use of Lasers, Edwards AFB, CA*). Contact the 412 RANS Range Operations Officer (412 RANS/ROO), 412 RANS/DO, or 412 TW/SER for a copy of the latest 711 HPW/RHDO document. Any laser system that is not identified in the 711 HPW/RHDO document must be reviewed and approved by 412 TW Range Safety Office prior to laser operations on the PIRA.[183]

[181] AFMAN 11-214, Chapters 4 and 5
[182] AFMAN 11-214, 5.6.3
[183] AFMAN 13-212V1_EDWARDSAFB SUP, 4.16

4.3.7.3.3 Laser Operations in R-2508

4.3.7.3.3.1 Teams should be aware that laser operations in R-2508 require approval from the R-2508 complex control board (CCB) and may be subject to restrictions. Teams must provide confirmed compliance from Federal Aircraft Administration (FAA) Laser Clearance House.[184] Test teams must coordinate with the CCB with sufficient time to obtain approval prior to testing.

4.3.7.3.4 Non-Eye-Safe Laser Operations in Uncertified Areas or Uncertified Laser Use

4.3.7.3.4.1 Test teams requiring non-eye-safe lasing in uncertified areas (for example, off of the PIRA) should consult DAFI 91-202_AFMC SUP, paragraph 2.8.5.3, laser and directed energy systems, for approval guidance.[185] If certification is not possible/practical, research, development, test and evaluation (RDT&E) activities may utilize the SRB process on a case-by-case basis for events. In these instances, the installation laser safety officer (LSO) or a TLSO[186] must be a member of the SRB.

4.3.7.3.4.2 The Range Operating Authority (ROA) is the approval authority on a range, or installation commander if not on a range, regardless of the test package risk level.[187] [188] The deputy installation commander or vice commander could act as ROA during a temporary absence.[189] Test teams should have the TEA sign the 412 TW Form 5001 (or equivalent) at the appropriate risk level, and then route the Form 5001 to the ROA (i.e., 412 TW/CC) for approval to conduct laser testing on a non-certified range. ROA approval on low and medium risk test packages may be documented via a coordination comment and a Coordination signature on the 412 TW Form 5001 (or equivalent). For high-risk packages, the TEA and ROA are likely the same individual (412 TW/CC).

4.3.7.3.4.3 The ROA approval requirements apply to cases where containment cannot be assured (such as outdoors). For lasing where containment can be assured (such as an indoor facility where specular reflections cannot escape), ROA approval is not required.[190] The ILSO must be a part of the SRB to assess the indoor laser hazards (e.g., specular reflectivity).[191]

4.3.7.3.4.4 For any use of an uncertified laser or non-eye-safe lasing outside of a certified range, 412 TW/SET recommends test teams coordinate with 412 TW/SER, 412TW/SEW, the ILSO, and the 711 HPW early in the test planning phase to determine if additional coordination/ approvals are required (e.g., Laser Clearing House approval for lasing above the horizon).

[184] R-2508 User's Handbook, 5.5
[185] DAFI 91-202_AFMC SUP, 2.8.5.3
[186] AFTCI 91-202 412 TW SUP, 3.7.5
[187] DAFI 91-202_AFMC SUP, 2.8.5.3
[188] AFMAN 13-212V1, 4.16.3.2
[189] Email sent on 14 December 2021 from AFMC/SE to 412 TW/SET with the subject: "RE: Laser Question."
[190] AFMAN 13-212V1, 4.16
[191] AFMAN 13-212V1, 4.16.3.1

4.3.7.4 Risk to the Safety of the General Public.

4.3.7.4.1 The 412 TW Commander, as Major Range and Test Facility Base (MRTFB) Commander, accepts the risks to the general public for the facilities and airspace they control. If an aircraft is outside MRTFB-controlled airspace (such as being in the national airspace system [NAS]), the risk to the general public for activities conducted during that time must be specifically considered; the risk acceptance authority in those cases depends on whether the 412 TW unit is considered an ETO or PTO.

4.3.7.4.1.1 If the aircraft is conducting normal operations in appropriate military airspace, on a range as normally required, then the risk to public safety is not test-unique and requires no special acknowledgement. The safety plan should acknowledge the risk to public safety if the aircraft will be operating in the NAS, or if the activity inside an approved range is outside of that range's normal types of operations, such that it could put public safety at risk.

Example: An aircraft performing a test out of Edwards AFB that must transit through public airspace to Point Mugu airspace.

- If an AFTC unit is ETO, the AFTC TEA accepts risks to AFTC assets as well as that of the general public until the aircraft is in Point Mugu airspace, at which point, the Point Mugu MRTFB commander accepts risks to public safety. The AFTC TEA would be responsible for the safety of the general public even after departing R-2508.
- If an AFTC unit is a PTO (e.g., a contractor is doing their own test and just using Edwards AFB as a base of operations), the AFTC TEA would accept risk to public safety within R-2508 but would not accept risk to public safety after the aircraft departs R-2508. Some other authority accepts the risk to the general public outside R-2508.

4.3.7.5 Remotely Operated Aircraft (ROAs) without Flight Termination Systems (FTS). The ROAs with a hazard footprint that can always be contained within R-2515 airspace land boundaries without endangering range assets, populated areas, or sensitive areas may not require flight termination systems (FTS). This determination shall be made as part of the 412 TW or Armstrong Flight Research Center (AFRC) safety review process.[192]

4.3.8 Space Positioning Optical Radar Tracking (SPORT) Services. Space positioning optical radar tracking (SPORT) C2 services include coordinating special operating requirements established by SRB.[193]

[192] EDWARDSAFBI13-204, Table 9.1 Note
[193] EDWARDSAFBI13-204, 2.28.1

4.3.9 Dive Planning and Time Safety Margin (TSM).

4.3.9.1 For test points involving descents/dives that are not conducted IAW AFMAN 11-2FTV3, AFTTP 3-series publications, or AFMAN 11-214, dive planning must be accomplished.[194] Teams should review AFMAN 11-2FTV3 3.8.10 for additional guidance.

4.3.9.2 Test teams may use multiple methods for dive planning and maneuver development, as long as the method is approved by the TRB, SRB, and the TEA.[195]

4.3.9.3 Time safety margin (TSM) and the time-rate-of-change of TSM (for dynamic maneuvers) are accepted metrics to quantify risk of ground collision during descending/diving test maneuvers. SRBs and test teams should not rely solely on the TSM number, but understand what assumptions and planning went into generating the number. During the SRB, test cards and dive planning may not be complete, but it is incumbent on the test team to present to the members of the SRB what dive planning efforts need to be accomplished to complete the test safely. These tools may include modeling, simulators with varying fidelity, or CTF dive planning programs.[196]

4.3.9.3.1 Generally, 412 TW Flying Qualities technical experts (e.g., 773 TS/ENFAB) will provide a formal technical review of the unit's TSM tool to determine the technical adequacy of the tool prior to implementation. The technical review and verification process is typically documented via a memorandum.

4.3.9.4 When assessing overall risk, SRB members should understand the test team approach and weigh not only the TSM and dive planning, but also the types of maneuvers that are being executed.[197] The maneuver complexity and time to correct dive angles vary widely and should be considered when assigning an overall risk level.

4.3.9.5 The test team will brief the SRB on all available modeling and simulation (M&S) tools, and which was used for TSM planning. The SRB will validate both the dive planning M&S and the planned recovery procedure.[198] Test teams will brief the SRB on how dive planning factors/TSM contributed to the test point buildup plan.[199]

[194] AFMAN 11-2FTV3, 3.8.10.1
[195] AFMAN 11-2FTV3, 3.8.10.2.1.1.
[196] AFMAN 11-2FTV3, 3.8.10.2.6
[197] AFMAN 11-2FTV3, 3.8.10.2.7
[198] AFMAN 11-2FTV3, Table 3.3 Note 2
[199] AFMAN 11-2FTV3, Table 3.3 Note 6

4.3.10 Training Packages.

4.3.10.1 Training activities are in-scope of AFTCI 91-202 when the AFTC commander or subordinate commander has responsibility for the safety of the general public[200] or they include activities utilizing AFTC assets that present hazards not covered by U.S. Military approved procedures or management directives.[201] Therefore, training safety plans (and independent safety review) may be required.

4.3.10.2 Training activities are generally not in-scope of DODI5000.89_DAFI99-103_AFMC SUP because they do not involve test and evaluation of systems in support of Integrated Life Cycle Management.[202] However, the Test Safety Process is structured with the fundamental assumption that requirements for the activity are technically adequate and that they will achieve the desired objectives, thereby justifying the safety risk of performing the activity.[203] These requirements, whether for the purposes of T&E or training, should be vetted before safety planning is conducted.

4.3.10.3. Training requirements should be documented and included in Tab 3 of the test package.

4.3.10.3.1 The training requirements should be separate from the safety plan, such that the requirements are differentiable; the proposed activity and safety considerations must be clear to all reviewers.[204]

4.3.10.3.2 The form of training plan documentation can vary widely, but should contain the following elements, at a minimum:

- Objective(s)
- Resource requirements (including instrumentation)
- Buildup/progression requirements
- Technique or maneuver descriptions
- Specific conditions/scenarios (akin to test points)
- Course/event completion criteria (i.e., grade sheets)

[200] AFTCI 91-202, 1.6.2
[201] AFTCI 91-202, 1.6.3
[202] DODI5000.89_DAFI99-103_AFMC SUP, 1.1
[203] DAFI91-202_AFMC SUP, Figure 16.1
[204] AFTCI 91-202_412 TW SUP, A4.1

4.3.10.4 Vetting of training plans should be documented and included in Tab 2 of the training package.

4.3.10.4.1 At a minimum, units should have evidence that an official with authority to expend materiel resources (including manpower for planning) endorses the proposed training plan. This evidence can be in the form of a Reasonable Use of Government Resources (RUGR) statement, organizational approval of a training plan (e.g., AFMC/A3V training plan approval, 412 OG training plan approval in Center Operations Online [COOL], etc.). USAF TPS curriculum events are inherently a responsible use of government resources; a separate RUGR is not required for USAF TPS curriculum events.

4.3.10.4.2 Units may desire 412 TW conducts a technical review of the training materials to ensure robust and effective training. 412 TW/CT may designate a training plan reviewer, akin to a TRA.

4.3.10.5 Some training documentation provides background academics, history, or examples of how the topics may be applied. These details, while they may explain the training plan structure, do not constitute training requirements and are typically considered supporting documentation. Supporting documentation is best organized into a training plan appendix, cited in a references section, or added to Tab 5 of the training package.

4.3.10.6 The process for changing a training package, particularly regarding changes to the training plan, should be discussed with 412 TW/SET. If no TRA-equivalent has been established, the unit should use the chief engineer, DO, or chief FTE as appropriate to the training plan, to determine whether training plan changes are major, minor, or administrative.

4.3.11 Envelope Expansion with a 412 TW Unit as a PTO.

4.3.11.1 When a unit is designated or acting in the capacity of a PTO, wherein the unit is not responsible for damage to an air vehicle that is undergoing traditional envelope expansion testing on an AFTC range, the TEA accepts risk to AFTC assets and the general public, wherein there are significant risk(s) to the vehicle. In that case, the test team should consider including a single THA (Figure 3) constructed as follows:

- Hazard: collision with AFTC assets, personnel, or non-participating parties.
- Causes: The causes listed for this THA would generally be failure modes of a new airframe where AFTC would accept risk to the air vehicle, typically documented as individual THAs (e.g., loss of control, structural capability exceedance, landing gear failure, hydraulic fire, fuel starvation, engine stall, etc.).
- Controls/mitigating procedures (C/MPs): Include only the C/MPs which directly protect the AFTC assets at risk. The C/MPs to protect the air vehicle itself are the responsibility of the ETO.
- Corrective actions/emergency procedures (CA/EPs): Include only the CA/EPs which would be performed as a result of the identified hazard occurrence, not damage to the vehicle itself.

PROJECT TEST TITLE Contractor Developmental Test Vehicle Flight Test				RISK LEVEL ASSESSMENT Mishap Severity Category			
				Catastrophic – 1	Critical – 2	Marginal – 3	Negligible – 4
JON XXXXXXXX	**SRB DATE** DD Month YYYY	**Probability of Mishap**	Level A	☐ HIGH	☐	☐	☐
TEST SERIES All testing			Level B	☐	☐	☐	☐
			Level C	☒	☐ MED	☐ LOW	☐
			Level D	☐	☐	☐	☐
			Level E	☐	☐	☐	☐ NEGLIGIBLE

HAZARD
Collision with AFTC Assets, personnel, or non-participating third parties

CAUSES
1. Loss of communication link
2. Pilot error
3. Procedure error (Remark 1)
4. Prediction error (Remark 2)
5. Flight deck system failure
6. Aircraft system/structural failure (Remark 3)
7. Loss of control

EFFECTS
Loss of life and/or facility

CONTROLS/MINIMIZING PROCEDURES
1. (1) A valid uplink and downlink are required for all test operations.
2. (1,5) The command & control link shall successfully complete functional checks during preflight. Additionally, all ground control station antenna pointing systems shall successfully complete all preflight functional checks.
3. (1) Link loss analysis shall be performed prior to flight to understand signal strength over the expected flight path. The flight path shall be planned to avoid low signal strength areas.
4. (2,3) All first event test points shall be rehearsed in the simulator prior to execution.
5. (2,5) Any degraded navigation/position information shall be reported and acknowledged by the PIC and RSO.
6. (3) Both the pilot monitoring and a test conductor shall verify test procedures and checklists are executed correctly.
7. (3,4,6) Wind limits shall be briefed prior to flight. Aircraft flight envelope will be adjusted to encompass the wind limit.
8. (3,4,6) If the tower is closed, the test team shall monitor winds directly via base weather stations.
9. (3,5) If main base paved runways are used, no other aircraft are permitted in the hammerhead or on intersecting taxiways during takeoff
10. (1,5,7) In the event of a ground control station backup generator failure, testing shall be halted and RTB shall be initiated
11. (6,7) All flight testing shall be conducted only within the test envelope. (Remark 4)
12. (Effect) The FTS shall be activated based on the following criteria IAW the Range Safety Operations Plan:
    a. Protected area violation
    b. Position Unknown
    c. Unsatisfactory performance
    d. RSO judgement
13. (Effect) Once the FTS is activated, the PIC will only make inputs with the intent to avoid assets and personnel

Figure 3 Example THA for Envelope Expansion with a 412 TW Unit as a PTO

CORRECTIVE ACTIONS/EMERGENCY PROCEDURES

1. If the aircraft is on the ground and command & control link is active, conduct emergency shutdown procedures to safe the fuel and power systems; if command & control link is lost, initiate the FTS.
2. If the aircraft is airborne,
   a. Declare an IFE and RTB.
   b. Request a chase (if available) to inspect or mark the location of the impacted asset.
3. Activate the Mishap Response Plan.

COMMENTS/REMARKS

1. Procedure error includes (but not limited to): incorrect route planning, incorrect execution of checklist steps, RSO/FTS procedure error
2. Prediction error includes (but not limited to): inaccurate braking performance modeling, inaccurate stability modeling, inaccurate link modeling
3. Aircraft system/structural failure includes but is not limited to: Hydraulic failure, electrical failure, control surface structural failure, unrecoverable propulsion failure
4. Test envelope:
   a. Nz: 0.0g to 4.0 g Nz
   b. AoA (alpha): -5 to +20 deg
   c. AoSS (beta): -5 to +5 deg
   d. AoB (Roll attitude): ±45 deg
   e. Airspeed: 100 to 200 KIAS
   f. Pitch Rate (Q): 20 deg/s
   g. Roll Rate (P) : 30 deg/s
   h. Yaw Rate (R): 10 deg/s
5. The contractor has developed a safety plan (Tab 5) that focuses more on the vehicle specific mitigations more consistent with traditional envelope expansion safety plans where the test asset is held as a liability.

SUBMITTED BY	ORGANIZATION	DATE
PSL Name	XXX	DD Month YYYY

Figure 3 Example THA for Envelope Expansion with 412 TW Unit as a PTO (Concluded)

4.3.11.2 The SRB would typically consist of an SRB Chairperson, Operations Representative, and Range Safety.

4.3.11.2.1 The 773/TS ENF technical reviewers typically involved in envelope expansion safety reviews would not necessarily need to be SRB members.

4.3.11.2.2 An Operations Representative with formal TPS training or envelope expansion test experience can adequately validate that the causes identified are test-unique, credible, and complete. For this type of SRB, the ISR's primary role is to validate that adequate failure modes have be identified by the test team. Then these failure modes would be used by Range Safety in their risk assessment.

4.3.11.3 This approach requires the experienced Operations Representative and contractor/ETO to demonstrate critical thinking to identify all hazards, causes, failure modes, etc., regardless of the engineering discipline typically responsible for the issue in question.

5.0 TEST SAFETY REVIEW PHASE

5.1 Overview. The Test Safety Review Phase consists of a formal review of the test unit-finalized test safety plan by a panel of independent reviewers to ensure that all test unique hazards have been identified and sufficiently mitigated, affirm or modify the residual risk, determine the overall risk of the test, and provide recommendations to the TEA. The documentation from this phase should reflect a suitable level of clarity and maturity for the TEA to make an informed decision on whether to proceed with test execution.[205]

Note: DAFI 91-202_AFMC SUP uses the term "Final Safety Review" in referring to the Test Safety Review Phase. This terminology has been slightly modified within this handbook to encourage continual risk management and a safety mindset at all levels throughout a test program's lifetime.

5.2 Technical Adequacy.

5.2.1 The Test Safety Review Phase takes place after the technical adequacy of the test plan is determined[206] to ensure all hazards are identified per planned execution.[207] A document from the TRA or appropriate delegate that verifies the technical adequacy of the test is referred to as a technical review memorandum (TRM). The TRM documents the outcome of a technical review IAW EDWARDSAFBI 99-101. The expectation is that the test plan has been reviewed for technical adequacy while the team is finalizing their draft safety plan, such that both finalized pieces can be assembled into the test package.

5.2.1.1 When the 412 TW is the ETO, the TRM will indicate whether a test plan is considered technically adequate to meet the stated objective and whether there are any significant technical risks.

5.2.1.2 When the 412 TW is a PTO or does not have technical analysis and reporting responsibilities, the TRM will indicate whether a test plan is a reasonable use of 412 TW resources and whether there are any significant technical risks.[208] A determination that a test plan is a reasonable use of 412 TW resources is commonly referred to as a RUGR; the RUGR is a form of TRM.

5.2.1.3 Reference section 4.3.10 of this handbook for guidance on technical adequacy for training package.

5.2.2 The 412 TW/CT typically delegates the RUGR authority for certain types of test packages to the CTF Chief Engineer under the 412 TW. Currently, 412 TW/CT has delegated NRR RUGR authority to the CTF Chief Engineer.[209] The delegation memorandum can be located on the 412 TW/SET SharePoint. Test teams should consult EDWARDSAFBI 99-101 and 412 TW/CT for latest guidance concerning technical adequacy.

5.2.3 Test plan changes that occur after the TRM/RUGR is issued but before TEA approval of the test package should be coordinated with the TRA and CTF Chief Engineer, who will determine whether additional technical reviews and/or TRM/RUGR reissuance are required. Until the original test package is approved, test plan changes are not considered test package amendments.

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[205] AFTCI 91-202, 5.2
[206] DAFI 91-202 AFMC SUP, 16.6.1
[207] DAFI 91-202 AFMC SUP, 16.2.2
[208] EDWARDSAFBI 99-101, 3.4.1
[209] *Delegation of RUGR Authority for NRRs Memorandum*, Daniel W. Osburn, 412th Test Wing, Edwards AFB, California, 27 April 2021.

5.3 Review Prerequisites.

5.3.1 Overview. The Test Safety Review Phase begins when the test and safety documentation is completed by the test unit and released to the ISRs. To ensure the test package is ready for their review, all review prerequisites will be completed before the final draft of the readahead documentation can be released to the ISRs.[210] The review prerequisites are:[211]

- Test package internal review with 412 TW Form 5001 Section I (or equivalent) signatures completed (see Section 4.2.2 of this handbook)
- Signed TRM/RUGR
    - Exception: In the case of a combined TRB/SRB, TRM is not required at the time of the document release and may be obtained after the TRB; the TRA must affirm the technical adequacy and that the test plan is sufficiently mature prior to commencing the SRB
- A "request for safety review (RSR)" email

5.3.2 Request for Safety Review (RSR).

5.3.2.1 Teams will notify the 412 TW/SET in writing (via email to the 412 TW/SET Workflow [412.TW.SET@us.af.mil] or appropriate channels) of their desire to begin the safety review process for all initial and major amendment safety reviews.[212]

5.3.2.2 At a minimum, an RSR will contain information sufficient to approve the documentation format, type of safety review, and venue (if required); determine the appropriate reviewers; verify the participants eligibility/training status; and facilitate test package metric tracking.[213] Teams are strongly encouraged to utilize the latest RSR templates on the 412 TW/SET SharePoint.

5.3.2.3 The team should send the RSR to 412 TW/SET sufficiently far in advance of the planned test start date to accommodate the timeline for a thorough review and approval. Normally, the RSR should be sent at least 3-5 business days prior to readahead documentation release.[214] Neither finalized safety plan language nor Form 5001 Section 1 signatures are prerequisites to sending out the RSR.

5.3.2.4 The 412 TW/SET will review the RSR, approve or assign the SRB Chairperson, and provide a control number for the test package.[215]

5.3.2.4.1 The 412 TW/SET control number scheme is defined as "YYYYNNNAA", where:

- "YYYY" is the calendar year of the RSR for the original amendment,
- "NNN" is the test package control number (assigned by 412 TW/SET sequentially), and
- "AA" is the amendment number (00 is used for the original amendment).

[210] AFTCI 91-202_412 TW SUP, A5.1
[211] AFTCI 91-202_412 TW SUP, A5.2
[212] AFTCI 91-202_412 TW SUP, A5.3
[213] AFTCI 91-202_412 TW SUP, A5.2.4
[214] AFTCI 91-202_412 TW SUP, A5.3.1
[215] AFTCI 91-202_412 TW SUP, A5.3.2

5.3.2.5 The 412 TW/SET will also approve the proposed ISRs at this time or discuss any additional reviewer requirement with the test team. To the maximum extent possible, ISRs chosen for the safety review should be the same individuals that served as independent reviewers for the technical review.[216]

5.3.2.5.1 Minimal membership of the SRB include independent technical, operations, and SRB Chairperson.[217] The PSL may propose a specific SRB Chairperson as part of the RSR. If the PSL does not propose an SRB Chairperson, the 412 TW/SET will select one.[218]

5.3.2.5.2 Under rare circumstances involving specialized activities, technical and operations reviewers can be the same individual, or the technical or operations reviewer can be the SRB Chairperson. Coordinate with the 412 TW/SET to determine if this is appropriate.

5.3.3 Release of Documentation to Reviewers.

5.3.3.1 Draft documents may (and should) be socialized early with ISRs. The independent reviewers can provide comments/questions to the PSL and UTSO prior to the meeting so they can find/prepare for the answers during the safety review meeting. These "early-looks" can be especially valuable for highly technical THAs (e.g., engine stall/flameout, structural capability exceedance, loss of control, etc.). If the draft sent for SRB readahead is the first time ISRs see THAs, there may be significant time spent at/after the SRB rewording each one. Teams can dramatically increase the efficiency of their reviews with early socialization. This socialization does not necessarily render a reviewer non-independent.

5.3.3.2 After all safety review prerequisites are completed and ISRs are approved by the SRB Chairperson, the PSL may release the test package documentation to the Section II ISRs, which includes the SRB Chairperson via the 412 TW/SET Workflow (412.TW.SET@us.af.mil).[219] The unit's eSafety Packages in Review folder on the 412 TW/SET SharePoint is the preferred location for unclassified test package documents.

5.3.3.3 For Combined TRBs/SRBs, there may be differences in member composition for each board. Test teams should ensure all board members receive the complete test package documentation release.

5.3.3.4 The release of documentation begins the Test Safety Review Phase, which will be conducted based upon the type of independent safety review.

5.4 Types of Independent Safety Reviews. There are four types of independent safety reviews that may be used to complete the Test Safety Review Phase. These include:

- Formal SRB (in-person, virtual, or hybrid)
- ESR
- Combined TRB/SRB
- NRR

[216] AFTCI 91-202, 5.2.2.1
[217] DAFI 91-202_AFMC SUP, 16.6.2.1.1
[218] AFTCI 91-202_412 TW SUP, A3.4 and A5.3.2
[219] AFTCI 91-202_412 TW SUP, A5.6

5.4.1 The decision to conduct a Formal SRB versus an ESR or Combined TRB/SRB is based primarily on the test plan size, complexity, maturity of test item/methodology, and expected risk level and is determined by the SRB Chairperson.[220]

5.5 Roles of the SRB, Test Team, and Test Execution Authority (TEA).

5.5.1 The SRB serves two main purposes:

- Recommend safety plan clarifications/improvements to the test team such that the team's proposal is clear. In all cases, the proposed activity and safety considerations must be clear to all reviewers[221] and the documentation should reflect a suitable level of clarity and maturity for the TEA to make an informed decision.[222]
- Assess the residual risk level(s) and ensure the TEA is informed of all risks they are being asked to accept.[223]

5.5.2 The test team directly controls the content of the test package and responses to any action items[224] or coordination comments (as applicable).[225] The content and quality of the test package submitted to the TEA is the responsibility of the test team. As experienced testers, the SRB members may recommend ways to make the safety plan more effective or efficient; additionally, the SRB members may share lessons learned from other programs. The team may accept the SRB members suggestions as "go-do's."

5.5.3 The SRB Chairperson directly controls action item designation[226] and closure[227], and makes the final risk level determinations with heavy reliance on SRB members' input. Each SRB member directly controls the content of their coordination comments. While SRB Chairpersons and members may call the team's attention to safety concerns or specific requirements in AFIs/regulations, the SRB members cannot force specific content into the test package.

5.5.4 Signature of the TEA on AFTC Form 5001, or equivalent, is required prior to test execution to indicate acceptance of the risk and approval to begin activities. During approval, the TEA may set conditions for execution.[228]

5.5.4.1 The TEA will be informed of any significant discussions or disagreements via the SRBS.[229]

5.5.4.2 When written by the TEA, coordination comments may constitute (but are not limited to) direction to the test team, conditional approval of the test package, or approval/disapproval of a waiver request within that commander/director's authority.[230]

5.5.4.3 The SRB, not the TEA, determines and documents the overall risk level of the test.[231]

[220] AFTCI 91-202, 5.2.2.1
[221] AFTCI 91-202_412 TW SUP, A4.1
[222] AFTCI 91-202, 5.2
[223] AFTCI 91-202, 5.2.1.3 & 5.2.1.4
[224] AFTCI 91-202_412 TW SUP, A6.10.3
[225] AFTCI 91-202_412 TW SUP, A6.12.4
[226] AFTCI 91-202_412 TW SUP, A6.8.4
[227] AFTCI 91-202_412 TW SUP, A6.10.3
[228] AFTCI 91-202, 6.1
[229] AFTCI 91-202, 3.4.2.3.6
[230] AFTCI 91-202_412 TW SUP, Terms 'Coordination Comment'
[231] DAFI 91-202_AFMC SUP, 16.6.2.1.2

6.0 FORMAL SRB

6.1 Overview. The formal SRB is a meeting attended by ISRs and project personnel and is chaired by a 412 TW/SE-designated SRB Chairperson.[232]

6.2 Planning.

6.2.1 The formal SRB will occur after the SRB Chairperson ensures the safety review prerequisites have been completed. The SRB Chairperson will exercise his or her discretion throughout this process to ensure independent government review of safety planning documentation is upheld.[233]

6.2.2 The test team will provide the readahead copies of the test package to the SRB Chairperson and all ISRs at least 3 working days prior to the meeting unless otherwise approved by the SRB Chairperson. Five working days are recommended. In all cases, all reviewers must have adequate time to review the test package documents before the start of the safety review.[234]

6.2.3 An ideal timeline for completing the safety review with an SRB is shown in Table 1. Additional safety reviewer preparation time is usually required for large and/or complex test packages. The test team should schedule additional time as required to account for programmatic and administrative roadblocks. The test team will coordinate with the SRB Chairperson and the safety reviewers to ensure their planned timeline is realistic and attainable. The SRB Chairperson, in consultation with the other independent reviewers, will determine if the amount of review time is sufficient.[235]

Table 1 Ideal SRB Timeline for Form 5001 Test Package

Calendar Days Prior to Test Start	Task or Event
40	PSL submits RSR
39	SRB Chairperson responds to RSR
33 Test Safety Review Phase	PSL obtains Form 5001 Section 1 signatures PSL releases documentation to all reviewers
28	SRB meeting
26	Scribe sends SRB minutes to SRB Chairperson SRB Chairperson finalizes action item list with PSL
25	SRB Chairperson drafts SRB Summary memorandum
21	PSL sends action item responses to SRB members PSL releases revised test package documentation
20	ISRs concur with action item responses SRB Chairperson closes action items SRB Chairperson finalizes SRB Summary memorandum SRB Chairperson and SRB members (as required) sign Form 5001 SRB Chairperson assembles test package and notifies team
19 Approval Phase	PSL provides readahead documents to TEA
14-3	Test package approval

Note: This timeline varies greatly depending on test size and complexity, risk level, test team effort/preparation, scale of post-SRB test package changes, and personnel availability.

[232] AFTCI 91-202, 5.2.2.1
[233] AFTCI 91-202_412 TW SUP, A6.1
[234] AFTCI 91-202_412 TW SUP, A6.2
[235] AFTCI 91-202_412 TW SUP, A6.2

6.2.4 The duration of an SRB is primarily dependent upon test team and reviewer preparedness, quality of the documentation under review, and the complexity of the proposed plan. Especially for complex or potentially controversial SRBs, PSLs should consult their UTSO to ensure the schedule allows for adequate discussion time. Teams may schedule large/complex SRBs across two days. The SRB Chairperson may elect to pause an SRB and reconvene at a different date/time if required to ensure an adequate review.[236]

6.2.5 The default venue for a formal SRB is a conference room for in-person meetings, but formal SRBs may be accomplished virtually or hybrid (i.e., in-person and/or virtually). For in-person SRBs, the SRB Chairperson will permit specific required attendees to join virtually. Virtual attendance is most appropriate for lower risk test packages that have little expectation of complex or contentious discussions. The virtual option will include the capability for voice communication and should include the capability for screen-sharing during the project briefing and document review.[237]

6.3 Preparation.

6.3.1 The test team will:

- Coordinate with the approved safety reviewers and the SRB Chairperson to ensure all participants are available and informed of the time, date, location, and estimated duration of the formal SRB.[238]
- Arrange availability of a suitable meeting location. Whether the SRB is virtual or in-person, the PSL is responsible for facilitating the venue at the appropriate information protection level and security accreditation.[239]
- Prepare a project briefing that adequately describes pertinent aspects of the test project to the safety reviewers and SRB Chairperson.[240] It is best practice to structure this concise briefing such that high-level aspects of the system under test and test methodologies are conveyed to the ISRs. A verbatim reiteration of the team's plan is not recommended.
    - Ensure that slides, if used, are available for all SRB participants to review.[241] The 412 TW/SET briefing slides are recommended; this slide template is available on the 412 TW/SET SharePoint.

[236] AFTCI 91-202_412 TW SUP, A6.4
[237] AFTCI 91-202_412 TW SUP, A6.3
[238] AFTCI 91-202_412 TW SUP, A6.5.1
[239] AFTCI 91-202_412 TW SUP, A6.5.2
[240] AFTCI 91-202_412 TW SUP, A6.5.3
[241] AFTCI 91-202_412 TW SUP, A6.5.4

6.4 Attendance.

6.4.1 Personnel tasked to attend a formal SRB will ensure they are available for the planned duration of the meeting unless approved by the SRB Chairperson. If required personnel are absent without prior notification and approval from the SRB Chairperson, the SRB Chairperson may postpone or pause the SRB.[242]

6.4.1.1 In the event that the ISRs need to be changed after the RSR has been sent (e.g., due to unavailability of the originally proposed reviewer), the PSL will coordinate this change with the SRB Chairperson sufficiently in advance of the start of the SRB, such that the new ISR has adequate time to review the documents prior to the start of the meeting and eligibility/training status can be verified.[243] If changes are proposed without sufficient notice to the SRB Chairperson, the SRB may be postponed or paused.

6.4.2 Test project personnel must be present to answer test package questions that may be asked by the ISRs. At a minimum, a knowledgeable system operator (e.g., aircrew, loader, etc.), the PSL, test/project engineer(s), and a scribe must be in attendance. The scribe will take meeting minutes and document action items, as necessary. If required to conduct a thorough review, contractor system design specialists and/or cognizant engineers must be present or available to answer questions.[244]

6.4.2.1 For projects with substantial involvement of multiple aircraft types (e.g., AR pairings, complex chase requirements, etc.), knowledgeable system operators from each aircraft type will attend.[245]

6.4.3 The anticipated TEA should not attend the formal SRB as attendance may unduly influence risk management, risk assessment or undermine the SRB Chairperson. Although attendance is not expressly prohibited, it should be limited to extraordinary circumstances where expedited understanding of complex safety concerns is required. The anticipated TEA would attend only as a non-participant and a non-voting member.[246]

6.4.4 For projects where a 412 TW unit is the ETO and non-412 TW PTO(s) are involved, which the test team expects will conduct their own safety review(s), representatives from the PTO Test Safety Office(s) (or equivalent) will be invited to attend the 412 TW SRB. For efficiency, teams may wish to coordinate with both Test Safety Offices for a joint safety review attended by reviewers from both the 412 TW (including 412 TW/SET) and those identified by the PTO Test Safety Office(s) (or equivalent).[247]

[242] AFTCI 91-202_412 TW SUP, A6.6
[243] AFTCI 91-202_412 TW SUP, A5.5
[244] AFTCI 91-202_412 TW SUP, A6.7
[245] AFTCI 91-202_412 TW SUP, A6.7.1
[246] AFTCI 91-202, 5.2.2.1
[247] AFTCI 91-202_412 TW SUP, A5.4

6.5 Typical Meeting Flow.

6.5.1 The following items characterize the flow of the safety plan review and risk assessment proceedings. The SRB Chairperson is responsible for conduct of the formal SRB and has the discretion to alter the components, order and flow of the review.[248]

1. **Opening Remarks, Introductions and Expectations.** The meeting will be opened by the SRB Chairperson.[249]
2. **Project Briefing.** The test team is responsible for providing a project briefing. It is expected that safety reviewers will ask questions in an attempt to clearly understand the intent of the test team and to uncover any potential hazards or safety issues that were not previously identified.[250]
3. **Test Plan Review.** The review will focus on understanding the test methodology from a safety perspective and refrain from questioning the technical adequacy of the test plan.[251]
4. **Safety Plan Review.** The safety documentation released to the safety reviewers will be thoroughly reviewed. The safety plan must be clear and understandable. The safety reviewers will review the GMPs and THAs with the test team, make recommendations to change, add, or remove GMPs and THAs as appropriate, make comments to the GMPs and THAs, and determine the appropriate hazard severity and probability for each THA. The SRB Chairperson may assign action items to the test team for significant test safety planning issues that cannot be resolved during the formal SRB. These issues warrant further research for resolution and may involve other personnel or agencies not present at the formal SRB. Some changes agreed upon by the test team at the formal SRB do not necessarily warrant the assignment of an action item. This may be colloquially referred to as a "go-do." If significant changes are made to the safety plan, the SRB Chairperson has the discretion to reconvene the SRB to resolve any outstanding issues.[252]
5. **Additional Test Related Documentation Review**. Any additional test-related documentation will be reviewed by the SRB as necessary (including modeling data, airworthiness documents, waivers, etc.).[253]
6. **Risk Assessment.** After the safety plan review is complete and all test unique hazards have been identified and mitigations are clearly defined, the SRB will deliberate and assess the residual test risk. The SRB may ask the test team additional questions.
    a. The SRB will weigh the control measures in place (mitigation steps), the team's experience with the types of test, the SUT, the complexity of the test, and the potential for safety-related "unknown unknowns" to assess the overall residual risk. The cumulative risk may exceed the assessed risks for all THAs individually. However, the overall risk cannot be lower than the risk associated with any individual THA. See Table 4.3 in AFTCI 91-202 for a description of each overall risk level.[254]
    b. If appropriate, the risk may be assessed separately for: assets that require AFTC TEA risk acceptance and assets that do not require AFTC TEA risk acceptance, different phases of the test program, individual test events, or overall residual risk.[255] See section 1.2 of this handbook for more information on the scope of the risk assessment.

[248] AFTCI 91-202_412 TW SUP, A6.8
[249] AFTCI 91-202_412 TW SUP, A6.8.1
[250] AFTCI 91-202_412 TW SUP, A6.8.2
[251] AFTCI 91-202_412 TW SUP, A6.8.3
[252] AFTCI 91-202_412 TW SUP, A6.8.4
[253] AFTCI 91-202_412 TW SUP, A6.8.5
[254] AFTCI 91-202, 4.6.2
[255] AFTCI 91-202_412 TW SUP, A6.8.6

c. The overall risk for the test project is still based on the highest level of risk assessed for any of the tests, but the project can have split risk assessments. For example, an overall high risk may be assigned for a test project which includes flight envelope expansion, but a subset of that testing may be assessed as medium or even low. If this is the case, the test points in each risk category will be clearly identified in the safety plan.[256]

d. In some situations, sufficient information may not be available to complete a risk assessment. The SRB Chairperson will determine a course of action to develop resolution and may reconvene the safety reviewers to perform the assessment at a later date.[257]

7. **ISR Risk Assessment Poll.** The SRB Chairperson will poll the reviewers for their risk assessment for each specific THA and the overall risk level and tally the results for consensus determination.[258]

   a. Disagreements. In cases where ISRs disagree on risk levels for specific THAs or the overall risk level, the SRB Chairperson will attempt to bring all reviewers to a consensus. In cases where ISRs cannot come to a consensus, the SRB Chairperson will make the final determination of the risk level. Reviewers that disagree or non-concurs should provide a coordination comment with their reasoning to inform the TEA. The lack of consensus and justification for the dissenting risk assessment will be documented in the risk assessment paragraph in the SRBS memorandum.[259]

8. **Recommendation to Execute Test.** The SRB Chairperson will make recommendation to the TEA on whether to execute the test based on the SRB results.[260] This recommendation is particularly important for tests which are not technically adequate, exceptionally high risk, or otherwise do not represent an acceptable "risk versus reward" balance.

9. **Review of SRB Proceedings and Assignment of Action Items.** The scribe will review all action items assigned during the formal SRB. The SRB Chairperson should consult the board members to verify the action items documented by the scribe were captured correctly. A responsible individual other than the PSL may be tasked to answer each action item.[261]

6.6 Post-SRB Activity.

6.6.1 Overview.

6.6.1.1 Depending on personnel availability, the magnitude of the issues to be addressed, and test priority, the length of the post-SRB period can vary substantially. Close and persistent coordination between the PSL, the safety reviewers, and the SRB Chairperson is necessary.

6.6.1.2 The scribe will provide the formal SRB minutes and identified action items to the SRB Chairperson within two working days of the formal SRB or as negotiated with the SRB Chairperson.[262]

6.6.1.3 The PSL (with assistance from the UTSO), Reviewers, and SRB Chairperson will ensure the following are performed after the review:

- Coordinate the wording of action items with PSL and SRB members, as appropriate.[263]

[256] AFTCI 91-202, 4.6.2.2
[257] AFTCI 91-202, 4.6.2.1
[258] AFTCI 91-202_412 TW SUP, A6.8.7
[259] AFTCI 91-202, 4.6.3
[260] AFTCI 91-202, 4.1
[261] AFTCI 91-202_412 TW SUP, A6.8.8
[262] AFTCI 91-202_412 TW SUP, A6.9
[263] AFTCI 91-202_412 TW SUP, A6.10.1

- Change or update the safety plan as identified and agreed upon at the formal SRB.[264]
- Resolve and Close Action Items. Test team personnel will coordinate all action item responses and requests for closure with the safety reviewers and the SRB Chairperson. The SRB Chairperson, in coordination with the respective safety reviewer(s), is the final authority for determination of action item closure and will respond to the test team indicating whether each action item response is acceptable and that the action item can be closed. Action items left open may alter a risk assessment and may prevent test points from being approved for execution.[265]

6.6.1.4 Once all actions items are closed, the SRB Chairperson will:

6.6.1.4.1 Ensure the final test package documentation is distributed electronically (if applicable) to all safety reviewers. The distribution task may be performed by the SRB Chairperson unless otherwise agreed-to by the test team.[266]

6.6.1.4.2 Write the SRBS memorandum.[267]

- The SRBS documents the results of the SRB meeting and is used to help the TEA make an informed decision.[268]
- At a minimum, the SRBS will contain the date of the SRB meeting, the SRB attendees, the SRB action items and responses, coordination comments and responses, the overall risk assessment with justification, any test/training activity contingent on any waivers, and any significant discussions and disagreements.[269]

6.6.1.4.3 Solicit coordination comments and responses, as appropriate[270] (see section 6.7 of this handbook).

6.6.1.4.4 Assemble the Test Package for approval unless otherwise agreed-to by the test team.[271]

6.6.1.4.5 Request safety reviewer concurrence with proceeding to the Approval Phase.[272]

- With concurrence from the other ISRs, the SRB Chairperson's signature on the 412 TW Form 5001 (or equivalent) may represent all SRB members.[273] By delegating their signature to the SRB Chairperson, ISRs may expedite the post-SRB timeline, but should refrain from using this option if they have coordination comments. The SRB Chairperson will typically ask the other ISRs at the end of the SRB if they wish to delegate their signature.

[264] AFTCI 91-202_412 TW SUP, A6.10.2
[265] AFTCI 91-202_412 TW SUP, A6.10.3
[266] AFTCI 91-202_412 TW SUP, A6.11.1
[267] AFTCI 91-202_412 TW SUP, A6.11.2
[268] AFTCI 91-202, 3.4.2.3
[269] AFTCI 91-202, 3.4.2.3
[270] AFTCI 91-202_412 TW SUP, A6.11.3
[271] AFTCI 91-202_412 TW SUP, A6.11.4
[272] AFTCI 91-202_412 TW SUP, A6.11.5
[273] AFTCI 91-202, 1.2.2

- For low-risk packages, the SRB Chairperson is the only required signature on the 412 TW Form 5001 (or equivalent) Section II. For medium- and high-risk test packages, unless they delegate their signature authority to the SRB Chairperson, reviewers will sign Section II indicating their concurrence that the package is ready for the Approval phase.[274] The SRB Chairperson will sign after all action items are closed and coordination comments are responded to, indicating that the independent review has been completed IAW governing regulations (e.g., AFTCI 91-202 and AFTCI 91-202_412 TW SUP) and the reviewers have concurred the test package is ready for the Approval phase.

6.6.2 Last-minute Changes (After Section II is Signed).

6.6.2.1 For a given test package amendment (including original packages), if any portion of a test package is changed after the independent safety review signature has been completed but before TEA approval (i.e., after the SRB Chairperson signs Section II of the 412 TW Form 5001 [or after the TSO leading the safety review signs the 412 TW Form 5002] but before the TEA signs Section III), teams should contact the SRB Chairperson/TSO leading the safety review at a minimum.

6.6.2.2 The TRA should determine the extent to which test plan changes require additional review unless they are obviously administrative in nature.

6.6.2.3 The SRB Chairperson/TSO leading the safety review should determine the extent to which the changes require additional review. Generally, the SRB Chairperson/TSO leading the safety review should follow the test package amendment guidelines regarding the extent of review of test package changes, including whether additional reviewers are required.

6.6.2.3.1 In cases which the SRB Chairperson/TSO leading the safety review determines the changes are corrections or clarifications to the existing plan (akin to an administrative change), no additional reviewers may be required. On the other extreme, if the SRB Chairperson determines the change has the potential to change the SRB risk assessment (akin to a major change), they may elect to rescind the Section II signature and reconvene the SRB.

6.6.2.4 The SRB Chairperson/TSO leading the safety review will determine whether the changes need to be specifically highlighted to the TEA (typically via the SRBS). If changes are made after the TAB, the team should inform the TEA of non-administrative changes.

6.6.2.5 Until the TEA has approved the given amendment or original package, the control number should not be incremented as a result of last-minute changes, nor should amendment documentation (i.e., memoranda) be created.

6.6.3 Final Steps Before Approval.

6.6.3.1 When the test package proceeds into the Approval phase, the PSL should notify the final Section I signatory of any significant changes to safety planning generated by the safety review, or of any significant coordination comments to the test package.[275]

6.6.3.2 The PSL will route the safety package for approval.[276] See section 11.0 of this handbook.

[274] AFTCI 91-202_412 TW SUP, A6.11.5
[275] AFTCI 91-202_412 TW SUP, A6.13
[276] AFTCI 91-202_412 TW SUP, A6.14

6.7 Coordination Comments.

6.7.1 Safety reviewer coordination comments are used to communicate pertinent safety related concerns to the TEA or to document a dissenting risk assessment. These comments by the safety reviewers will be documented in a coordination comments section of the test package, such as on the 412 TW Form 5001.[277]

6.7.2 The test team and safety reviewers should attempt to resolve issues before resorting to the use of a coordination comment.[278]

6.7.3 Coordination comments are typically initiated by individuals whose names appear as reviewers or approvers on the 412 TW Form 5001/5002 (or equivalent). However, the SRB Chairperson (or in the case of NRR, the TSO leading the safety review) may permit anyone with a pertinent technical or safety concern to initiate a coordination comment; in this case, the SRB Chairperson will alert the TEA to the coordination comment.[279]

6.7.4 The test team will provide written responses for all coordination comments unless the commenting official indicates no response is necessary.[280]

6.7.5 The SRB Chairperson will make a final determination of the actions necessary, if any, to substantiate points of disagreement for TEA decision. The SRB Chairperson should confirm the original commenter has reviewed the response; lack of additional responses will be taken to indicate a resolved coordination comment. If the original commenter disagrees with the response, the commenter will add to their original comment, documenting the continued disagreement.[281]

6.7.6 The reviewers' signature on the 412 TW Form 5001/5002 (or equivalent) indicates participation in the safety review, not necessarily concurrence with the determination of the SRB Chairperson and/or the test team as to the contents of the test package. The reviewers shall not withhold their signatures to indicate disagreement or non-occurrence, and instead should provide a coordination comment to inform the TEA.[282]

[277] AFTCI 91-202_412 TW SUP, A6.12.1
[278] AFTCI 91-202_412 TW SUP, A6.12.2
[279] AFTCI 91-202_412 TW SUP, A6.12.3
[280] AFTCI 91-202_412 TW SUP, A6.12.4
[281] AFTCI 91-202_412 TW SUP, A6.12.5
[282] AFTCI 91-202, 4.6.3

7.0 ELECTRONIC SAFETY REVIEW (ESR)

7.1 Overview. The ESR is a formal safety review of test packages by the SRB that occurs without a meeting. The test package is distributed electronically and reviewed in parallel by the safety reviewers. An ESR is appropriate when test activities are readily understood by reviewers, tend to be less complex, initially assessed to be lower in risk,[283] and have little expectation for contentious discussions.

7.2 Planning.

7.2.1 A recommended ESR timeline for planning purposes is included in Table 2. An electronically reviewed test package timeline should begin at the same point as a test package with a formal SRB in the event the formal SRB becomes necessary.

Table 2 Ideal ESR Timeline

Calendar Days Prior to First Test Event	Task or Event
40	PSL Submits RSR
39	412 TW/SET responds to RSR
33 Test Safety Review Phase	PSL obtains Form 5001 Section 1 signatures PSL releases documentation to all reviewers
28	PSL receives all comments from all reviewers
23	PSL resolves comments and releases revised test package documentation
21	ISRs concur with documentation SRB Chairperson finalized SRBS memorandum SRB Chairperson and ISRs (as required) sign Form 5001 SRB Chairperson assembles test package and notifies team
17 Approval Phase	PSL provides readahead documents to TEA
14-3	Test package approval

7.2.2 All ESR discussions must be visible to all ESR participants. The 412 TW/SET recommends use of a collaborative discussion forum (e.g., Microsoft Teams channel or chat room) for this purpose, provided all participants can access the system in use. The PSL is responsible for facilitating the venue at the appropriate information protection level and security accreditation. A scribe is not required.[284]

7.3 ESR Process.

7.3.1 Within 5 working days after release of the test package documentation, each safety reviewer will complete the review of the test package in parallel and provide comments or recommended changes. Additional safety reviewer time may be necessary. In such situations, the test team will coordinate with the SRB Chairperson and the safety reviewers to ensure their planned timeline is realistic and attainable.[285]

[283] AFTCI 91-202, 5.2.2.3
[284] AFTCI 91-202_412 TW SUP, A7.1
[285] AFTCI 91-202_412 TW SUP, A7.2

7.3.2 The safety reviewers will thoroughly review the test package. Safety reviewers will refrain from questioning the technical adequacy of the test plan.[286] Close and persistent communication between the PSL (with assistance from the UTSO), safety reviewers, and SRB Chairperson is necessary to complete the following:

1. **Test Package Comments and Corrections.** The safety reviewers will provide comments and recommended changes to the PSL, other safety reviewers and SRB Chairperson. The PSL will ensure test team personnel provide requested information to the safety reviewers and address any safety plan changes recommended by the safety reviewers. In addition, the PSL is responsible for ensuring each safety reviewer is aware of comments and changes recommended by any other reviewer along with the test team responses.[287]
2. **Issue Resolution.** Unlike a Formal SRB, action items normally are not appropriate for an ESR since issues are generally resolved during the review and coordination process before concluding the review. Unresolved issues may alter a risk assessment and may prevent test points from being approved for execution.[288]
3. **Risk Assessment.** The risk assessment will be performed as described in the Formal SRB, only done so electronically.[289]
4. **Coordination Meeting.** If a disagreement arises concerning recommended corrections to the test package, or if the safety reviewers have differing risk assessments, the SRB Chairperson may require a coordination meeting between the test team and the safety reviewers to resolve the issue(s). Any remaining disputes will be handled utilizing the same process as detailed above for Formal SRBs.[290]

7.4 Post-ESR Activity. The post-safety review PSL actions, coordination comment process, and SRB Chairperson actions are the same process as detailed under Formal SRB[291] (see sections 6.6 and 6.7 of this handbook).

[286] AFTCI 91-202_412 TW SUP, A7.3
[287] AFTCI 91-202_412 TW SUP, A7.3.1
[288] AFTCI 91-202_412 TW SUP, A7.3.2
[289] AFTCI 91-202_412 TW SUP, A7.3.3
[290] AFTCI 91-202_412 TW SUP, A7.3.4
[291] AFTCI 91-202_412 TW SUP, A7.4

8.0 COMBINED TECHNICAL REVIEW BOARD (TRB)/SRB

8.1 For those tests that are easily understood, less complex, or lower in risk, the test team may request a combined TRB/SRB in lieu of separate technical and safety reviews to minimize impact to resources and shorten the timeline. Teams will ensure that the test plan is sufficiently mature for safety review prior to the combined TRB/SRB. The SRB Chairperson will make the final determination on the appropriateness of a combined TRB/SRB.[292]

8.2 Prior to the combined TRB/SRB, the TRA must concur that a TRB/SRB is appropriate. This should be obtained prior to planning a combined TRB/SRB.[293] Email is acceptable for this.

8.2.1 If the TRA changes prior to the TRB/SRB, the team should confirm that the new TRA still concurs a combined TRB/SRB is appropriate.

8.2.2 Early coordination with the TRA and SRB Chairperson is recommended to help streamline the review by reducing lengthy discussion.

8.3 The SRB portion occurs per the discretion of the SRB Chairperson and is held in a manner consistent with a Formal SRB.[294]

8.4 Test teams will ensure enough time is scheduled for both a thorough technical and safety review. Teams will work with both the TRA and the SRB Chairperson to schedule the meeting.[295] As a best practice, the 412 TW/SET recommends teams schedule a break (such as lunch) between the TRB and SRB portions to ensure the reviewers approach the SRB with a fresh mindset.

8.5 If the combined TRB/SRB cannot be completed in one working day, then a combined TRB/SRB is generally not appropriate.

[292] AFTCI 91-202, 5.2.2.2
[293] AFTCI 91-202_412 TW SUP, A8.1
[294] AFTCI 91-202_412 TW SUP, A8.2
[295] AFTCI 91-202_412 TW SUP, A8.3

9.0 NEGLIGIBLE RISK REVIEW (NRR)

9.1 Overview. An NRR is a streamlined technical and safety review process applicable to a subset of low-risk tests as indicated in Figure 4.1, Risk Assessment Matrix, in AFTCI 91-202. Test activities that either are, or are equivalent to, normal or routine operations (e.g., incidental to another routine flight activity or test) are excellent candidates for an NRR process since the risk is effectively the same as the operational risk.[296]

9.1.1 Major differences between the NRR and other types of safety reviews include the following:

- The 412 TW NRR process is generally electronic and follows a unique template for safety planning and review (e.g., Form 5002 or equivalent).[297]
- The test team will propose the test project's qualification for NRR and the names of the independent TSO and at least one other independent reviewer to 412 TW/SET.[298/299]
- The independent safety review is led by an independent TSO,[300] and will include at least one ISR.
- The control number will have similar format as test packages under other types of safety review (see section 5.3.2.4.1 of this handbook), with the exception of the letters NRR appended to the end. Should a package be amended such that it no longer qualifies for NRR, these letters will be removed, but the control number will remain.[301]
- For NRRs that were previously approved without a control number, documentation will continue to be managed at the test unit level (see section A.2 of this handbook for NRR library guidance).[302]

9.2 NRR Qualification Criteria.

9.2.1 In order for an activity to qualify as an NRR, the independent TSO and all independent reviewers must unanimously assess the overall risk to be negligible.[303]

9.2.1.1 Negligible risk assessment reflects a subset of low risk applicable to activities that either are or are equivalent to normal or routine operations, and to activities that have risk levels comparable to those operations.[304]

[296] AFTCI 91-202, 5.2.2.4
[297] AFTCI 91-202_412 TW SUP, A9.1.1
[298] AFTCI 91-202, 5.2.2.4.1
[299] AFTCI 91-202_412 TW SUP, A9.1.2
[300] AFTCI 91-202_412 TW SUP, A9.1.3
[301] AFTCI 91-202_412 TW SUP, A9.1.4
[302] AFTCI 91-202_412 TW SUP, A9.1.5
[303] AFTCI 91-202, 5.2.2.4.1
[304] AFTCI 91-202, 4.5 and Table 4.3

9.2.1.2 The first AFTC Test Safety Review Policy published in 2014 defined the maximum equivalent cost risk for negligible risk as 600 (the product of 60,000 and 0.01); where maximum equivalent cost risk is a qualitative measure of risk that can be defined as the product of direct mishap cost and mishap probability. The Negligible/Level C block in Figure 4.1, Risk Assessment Matrix, in AFTCI 91-202, corresponds to an equivalent cost risk value of 600. Starting from that basis, the negligible-risk category is further expanded to include the Marginal/Level D, Marginal/Level E and Critical/Level E blocks in the matrix all of which have equivalent cost risk values equal to or less than 600. Due to the subjective nature of any risk assessment, an overall assessment greater than negligible for these blocks could still be appropriate.[305]

9.2.2 Examples of activities that could warrant an NRR include: ride-along data collection points, special instrumentation checkouts, form-fit-function checkouts of non-critical hardware/software, sensor or system tests, or logistics testing activities that do not directly affect the airworthiness of an aircraft or performance of a test facility nor are they required for hazard avoidance.

9.2.3 **NRR disqualification/disapproval.** At any point during the NRR proposal, independent safety review, or approval, if the PSL, a reviewer, or the TEA determines the NRR qualification criteria are no longer met or the NRR is disapproved, the individual making that determination will notify the other stakeholders in the planning and review process (e.g., test team, independent reviewers [if identified], and 412 TW/SET). In that case, a non-NRR safety review must be conducted before the test activity may execute.[306]

9.3 NRR Proposals.

9.3.1 The NRR proposals will be made in writing. Teams will send an "NRR Proposal" to the 412 TW/SET Workflow (412.TW.SET@us.af.mil) or via appropriate channels.[307] Teams are strongly encouraged to utilize the latest NRR Proposal template on the 412 TW/SET SharePoint.

9.3.2 The NRR proposal will contain information sufficient to approve the documentation format, preliminarily assess overall risk level, determine the appropriate independent reviewers, verify the participants eligibility/training status, and facilitate test package metric tracking.[308]

9.3.3. The team will provide justification as to how the overall risk of the proposed test activities are or are equivalent to normal or routine operations from the following perspectives:[309]

- Maturity of the test procedure and risk control measures.[310]
- Operator training, qualification, and proficiency requirements.[311]
- Whether test procedures involve the use of abnormal or emergency procedures, checklists, or configurations.[312]
- Potential for a failure or malfunction of the SUT to cause the use of abnormal or emergency procedures to safely recover the aircraft.[313]

[305] AFTCI 91-202, 4.5
[306] AFTCI 91-202_412 TW SUP, A9.7
[307] AFTCI 91-202_412 TW SUP, A9.2.1
[308] AFTCI 91-202_412 TW SUP, A9.2.2
[309] AFTCI 91-202_412 TW SUP, A9.2.2.1
[310] AFTCI 91-202_412 TW SUP, A9.2.2.1.1
[311] AFTCI 91-202_412 TW SUP, A9.2.2.1.2
[312] AFTCI 91-202_412 TW SUP, A9.2.2.1.3
[313] AFTCI 91-202_412 TW SUP, A9.2.2.1.4

9.3.4 Notwithstanding the above, if the proposed test involves in-flight aircraft envelope expansion testing (i.e., flight at a condition or in a stores configuration which has not been previously flown and cleared) and the 412 TW TEA will accept risk to the aircraft, the NRR process is not appropriate.

9.3.5 Based on the NRR proposal, the 412 TW/SET will make a preliminary determination whether the NRR qualification criteria are likely to be met and approve the proposed independent reviewers.[314] Preliminary concurrence from the 412 TW/SET is required to start the NRR process and obtaining criteria concurrence is often the hardest part of the NRR process.

9.3.6 The 412 TW/SET may request additional information from the test team.[315]

9.4 NRR Independent Review.

9.4.1 If the NRR criteria are preliminarily met, one independent TSO and at least one other independent reviewer must review the test package documentation.[316/317]

9.4.1.1 The independent reviewers will have completed ISR training or SRB Chairperson training IAW Section A14.9 in AFTCI 91-202_412 TW SUP.[318]

9.4.1.2 If the test team desires, a member of 412 TW/SET may serve as the independent TSO.[319]

9.4.1.3 The other independent reviewer(s) will have relevant experience in the area(s) being assessed. If the independent TSO determines additional reviewers not identified in the NRR proposal are required, they will notify the 412 TW/SET.[320] If the test team cannot locate independent reviewer(s) with relevant experience in the area(s) being assessed, the test team will consult with the 412 TW/SET to determine a path forward.[321]

9.4.1.4 The names of the PSL, independent TSO, and other reviewers will be documented on the 412 TW Form 5002 (or equivalent).[322] The assisting UTSO and project operator should also be documented on the 412 TW Form 5002 (or equivalent).

9.5 NRR Test Package Requirements.

9.5.1 The following must be completed before the NRR test package is approved:

1. The activity will be adequately defined and documented (e.g., test plan, test procedures, test information sheets, etc.).[323]
2. Technical reviews will be complete and TRM/RUGR obtained from 412 TW/CT or designee. Teams should consult EDWARDSAFBI 99-101 and 412 TW/CT for the latest guidance concerning technical adequacy.[324]

[314] AFTCI 91-202_412 TW SUP, A9.2.3
[315] AFTCI 91-202_412 TW SUP, A9.2.4
[316] AFTCI 91-202_412 TW SUP, A9.3
[317] AFTCI 91-202, 5.2.2.4.1
[318] AFTCI 91-202_412 TW SUP, A9.3
[319] AFTCI 91-202_412 TW SUP, A9.3.2
[320] AFTCI 91-202_412 TW SUP, A9.3.1
[321] AFTCI 91-202_412 TW SUP, A9.3.3
[322] AFTCI 91-202_412 TW SUP, A9.3.4
[323] AFTCI 91-202_412 TW SUP, A9.4.1
[324] AFTCI 91-202_412 TW SUP, A9.4.2

a. 412 TW/CT has delegated NRR RUGR authority to the CTF Chief Engineer.[325] The delegation memorandum may be found on the 412 TW/SET SharePoint.

9.6 Document Preparation – 412 TW Form 5002.

9.6.1 The NRR will be prepared using the 412 TW Form 5002, or equivalent. The current 412 TW Form 5002 ("Negligible Risk Review") is available on the 412 TW/SET SharePoint. An UTSO from the appropriate unit should assist the test team by ensuring that the most current version is used prior to submission. If units develop their own documentation that captures required approvals, the documentation will be coordinated with the 412 TW/SET.[326]

9.6.1.1 Project personnel will complete all sections of the 412 TW Form 5002 (or equivalent) except as specified on the form.[327]

9.6.1.2 The NRR will provide enough information to support an approval decision. Test teams will affirm that TRM/RUGR has been obtained on the 412 TW Form 5002 (or equivalent).[328]

9.7 Review, Concurrence, Approval, and Info Cycle.

9.7.1 Review.

9.7.1.1 Unless otherwise agreed-to by the independent TSO, test teams will provide the readahead copies at least 3 working days prior to the need-date. In all cases, all reviewers must have had adequate time to review the relevant documents (i.e., 412 TW Form 5002 [or equivalent], test plan/procedures, and other supporting documents). The test team will coordinate with the independent TSO and the other reviewers to ensure their planned timeline is realistic and attainable. The independent TSO, in consultation with the other independent reviewer(s), will determine if the amount of review time is sufficient.[329]

9.7.1.2 The test team should work with the independent reviewers to resolve questions/concerns.[330]

9.7.2 Concurrence. The independent TSO leading the safety review will:

1. Solicit coordination comments and responses, as appropriate.[331]
2. Request other independent reviewer concurrence with proceeding to the Approval phase.[332]
3. Document the Risk Level Justification.
   a. The independent TSO should summarize why the test activity is considered normal, routine, and operationally representative after mitigations are in place; justify why the test activity falls within Negligible blocks in the Risk Assessment Matrix (see AFTCI 91-202, Figure 4.1); and for any test hazards identified (including THAs), describe why they are negligible based on the severity and probability of a mishap.

[325] *Delegation of RUGR Authority for NRRs Memorandum*, Daniel W. Osburn, 412th Test Wing, Edwards AFB, California, 27 April 2021.
[326] AFTCI 91-202_412 TW SUP, A9.5.1
[327] AFTCI 91-202_412 TW SUP, A9.5.1.1
[328] AFTCI 91-202_412 TW SUP, A9.5.1.2
[329] AFTCI 91-202_412 TW SUP, A9.6.1
[330] AFTCI 91-202_412 TW SUP, A9.6.2
[331] AFTCI 91-202_412 TW SUP, A9.6.3.1
[332] AFTCI 91-202_412 TW SUP, A9.6.3.3

4. Sign the 412 TW Form 5002 (or equivalent) indicating that the independent review has been completed IAW governing regulations (e.g., AFTCI 91-202 and AFTCI 91-202_412 TW SUP) and the reviewers have concurred the test package is ready for the Approval phase. The independent TSO leading the safety review is the only required review signature.[333]
    a. After the TSO leading the safety review has signed the test package, it will enter the Approval phase.

9.7.3 Approval and Info Cycle.

9.7.3.1 Test teams will provide the constituent documents listed in this section for TEA approval. In the assembled test package, these documents should appear in the following order:[334]

1. 412 TW Form 5002 (or equivalent)
2. Previously approved 412 TW Form 5002 (or equivalent)
3. TRM/RUGR
4. Test plan, test procedures, test information sheets, and other supporting documentation

9.7.3.2 The independent TSO will compile the test package unless otherwise agreed-to by the test team;[335] the 412 TW/SET may assist with test package compilation upon request. The recommended layout of the NRR test package can be found in Appendix C of this handbook.

9.7.3.3 See section 11.0 of this handbook for more information on approval and info cycle.

10.0 ACCEPTANCE OF OTHER ORGANIZATION'S SAFETY PLAN

10.1 General. The acceptance of another organization's safety plan can be advantageous when another organization has already created or is planning to create robust safety plan documentation.

10.1.1 Tests planned and reviewed by other government safety organizations may be accepted by the AFMC TEA. Acceptance requires the participation of AFMC safety personnel in that review process to ensure adequate SRB rigor and hazard management for AFMC assets.[336]

10.1.2 The supporting/participating test unit will need to notify the 412 TW/SET via an RSR of their desire to begin the safety review process.[337] A test unit needs to take responsibility of these packages for the purposes of amendment(s), lessons learned capture, and eventual closure. These packages are considered eligible for annual test safety inspections.

10.1.3 See section 4.3.4 of this handbook for recommendations on coordinating safety reviews with other organizations.

[333] AFTCI 91-202_412 TW SUP, A9.6.3.4
[334] AFTCI 91-202_412 TW SUP, A9.5.2
[335] AFTCI 91-202_412 TW SUP, A9.6.3.2
[336] DAFI 91-202_AFMC SUP, 16.2.3
[337] AFTCI 91-202_412 TW SUP, A5.3

10.2 Air Force Test Center (AFTC) Safety Plan.

10.2.1. An AFTC test project which has been approved through an AFTC Wing/Complex's technical and safety review processes may be executed by a different, supporting, AFTC test wing/complex.[338]

10.2.2 The originating test wing/complex will notify the supporting wing/complex when the technical and safety review processes are complete, and the test project is approved for execution by the originating test wing/complex TEA.[339]

10.2.3 The originating test wing/complex or supporting/participating agency will provide the test package in the originating wing/complex's format to the supporting wing/complex.[340]

10.2.4 The supporting wing/complex responsible independent TSO will review the documentation and may accept it as written or require additional safety review.[341] A member of the 412 TW/SET will act as the responsible independent TSO or assign one. The responsible independent TSO may request the originating wing/complex provide a cover letter memorandum to supplement the original package explaining the degree of 412 TW involvement in the effort and risk. Variations of this memorandum format requirement can be authorized by the 412 TW/SET.[342]

10.2.4.1 If the responsible independent TSO determines the originating wing/complex's documentation is sufficient to describe 412 TW involvement and risk, the independent TSO will document their review in a memorandum which will be Info Cycled to the appropriate equivalent 412 TW TEA. No additional ISRs are required.[343]

10.2.4.2 If the responsible independent TSO determines the originating wing/complex's documentation is not sufficient to describe 412 TW involvement and risk, a 412 TW PSL will be assigned to accomplish the 412 TW safety process, which may require a 412 TW independent safety review.[344]

10.2.4.2.1 The responsible independent TSO will assist the test team in determining how to accomplish the 412 TW safety process (i.e., type of safety review, required ISRs, documentation type, etc.).

[338] AFTCI 91-202, 6.5.1
[339] AFTCI 91-202, 6.5.2
[340] AFTCI 91-202_412 TW SUP, A10.1.1
[341] AFTCI 91-202, 6.5.2
[342] AFTCI 91-202_412 TW SUP, A10.1.2
[343] AFTCI 91-202_412 TW SUP, A10.1.2.1
[344] AFTCI 91-202_412 TW SUP, A10.1.2.2

10.2.4.2.2 If a 412 TW independent safety review is required, then in most cases it can be documented via memorandum for record (MFR) and coordinated serially. The MFR should describe the 412 TW participation in the effort, the scope of the risk assessment, and whether the originating wing/complex documents adequately describe the 412 TW involvement and risk. If the originating wing/complex documentation is not adequate, then the MFR will clearly identify the missing elements to adequately explain the degree of 412 TW involvement and risk (i.e., additional GMPs, THAs, lessons learned, etc.) and rationale for the additions.[345] Additionally, the MFR should identify who was involved in the independent safety review and document their concurrence. Depending on the scope of the 412 TW involvement and assessed risk, the independent TSO may request the appropriate 412 TW TEA(s) signature on the MFR for approval. The supporting wing/complex will notify the originating test wing/complex of any changes made by the supporting wing/complex.

10.2.4.3 A memorandum documenting acceptance of AFTC safety planning may be avoided if Test Safety offices from both the originating and supporting wing/complexes are included in the independent reviews for the original package and each amendment and documented as board members.

10.1.4 The local Range Operating Authority may require a local test safety review and approval as specified in the local wing-level supplement to AFMAN 13-212V1.[346]

10.1.5 Upon acceptance of an approved test package, participating/supporting 412 TW units may execute any assigned portion of a test project.[347]

10.1.6 The 412 TW/SET will maintain a record of the accepted test package, which will expire after 3 years from originating wing/complex approval unless closed,[348]or a review amendment is accomplished. If the originating package exceeds its time limit without review IAW AFTCI 91-202 section 8.4, the acceptance may not be used.

10.1.7 The local supporting/participating agency will notify the originating wing/complex that a responsible independent TSO has accepted the test package.[349]

10.1.8 If the safety plan amendments are required by either the originating wing/complex or the supporting wing/complex, then the wing/complex responsible for the amendment will notify the other agency and provide a copy of the amendment.[350/351]

10.1.9 Teams may gain efficiency by inviting both ETO and PTO approvers to the same TAB. For example, in a medium risk test involving assets from a 412 TW unit and a 96 TW unit, both the 412 OG/CC and 96 OG/CC may be invited to the TAB, with the PTO chain of command signing the 412 TW Form 5001 Section III as "Coordination" and the ETO chain of command signing as "Approve." These signatures may be accomplished in either order.

[345] AFTCI 91-202, 6.5.2.1
[346] AFTCI 91-202, 6.5.2
[347] AFTCI 91-202_412 TW SUP, A10.1.3
[348] AFTCI 91-202_412 TW SUP, A10.1.5
[349] AFTCI 91-202_412 TW SUP, A10.1.6
[350] AFTCI 91-202, 6.5.2.1
[351] AFTCI 91-202_412 TW SUP, A10.1.4

10.3 Non-AFTC Safety Plan.

10.3.1 Safety plans created and reviewed organizations outside of AFTC may be accepted by the AFTC TEA. Acceptance requires the participation of AFTC Wing/Complex Test Safety Office personnel in that review process to ensure adequate SRB rigor and hazard management for AFTC assets.[352]

10.3.1.1 An independent safety review IAW AFTCI 91-202 must be conducted if AFTC units wish to utilize non-AFTC safety planning.[353] Safety planning documentation and review will follow the processes required for a formal SRB, ESR, or NRR. Test team may gain efficiency by conducting a joint SRB that includes SRB members and Chairpersons from both the non-AFTC organization and 412 TW.

10.3.2 **Content:** Safety plans written by organizations outside of AFTC must meet all requirements specified in AFTCI 91-202 (see section 4.2.1.1 of this handbook).[354] Sufficient detail must be included in the package for the 412 TW to make a risk assessment. The 412 TW test unit involved will identify a 412 TW PSL to assist the customer as required to meet the requirements specified in AFTCI 91-202 and AFTCI 91-202_412 TW SUP. If necessary, the PSL may supplement the non-AFTC safety plan with a cover letter memorandum, often referred to as a PSL memorandum, explaining the degree of 412 TW involvement in the effort, the scope of the risk assessment, and pertinent details from the non-AFTC safety planning that should be considered in the government review.[355] Non-AFTC organization may use different definitions of risk levels, probability levels, or severity levels. These must be translated into those described in AFTCI 91-202, Chapter 4.

10.3.3 **Scope:** When a 412 TW unit is not responsible for the overall safe conduct of the test (i.e., not designated or acting in the capacity of an ETO), but either 412 TW assets are being utilized or the 412 TW is responsible for safety of the general public, the 412 TW Test Safety Process must still be accomplished. The scope of the safety planning will be restricted to assessing the risk to 412 TW assets, the general public, and, if applicable, the risk-increment of utilizing 412 TW assets (such as personnel) to affect the safe outcome of the test. The 412 TW may conduct a broader scope of review if requested by the customer.[356] Refer to Section 1.2 of this handbook for more guidance on the scope of the risk assessment for these instances.

10.3.4 **Required Documentation:** The test package will include the non-AFTC safety plan and other supporting documentation and will use a 412 TW Form 5001 or 5002 (or equivalent) to obtain approval from the appropriate 412 TW TEA for 412 TW participation.[357]

10.3.5 **Technical Reviews:** Activities will be reviewed IAW EDWARDSAFBI 99-101 to determine if they are technically adequate or are a reasonable use of 412 TW resources.[358]

[352] AFTCI 91-202, 6.6.1
[353] AFTCI 91-202, 6.6.2
[354] AFTCI 91-202, 6.6.2
[355] AFTCI 91-202_412 TW SUP, A10.2.1
[356] AFTCI 91-202_412 TW SUP, A10.2.2
[357] AFTCI 91-202_412 TW SUP, A10.2.3
[358] AFTCI 91-202_412 TW SUP, A10.2.4

10.4 USAF TPS.

10.4.1 The TPS shall conduct an internal safety review of all staff projects, curriculum and curriculum-related events. These events will be clearly defined by TPS developed publications such as Mission Planning Guides (MPG) and Qualitative/Evaluation Review Board (QRB) packages. These types of events shall not exceed manufacturer flight envelopes or normal procedures. Events that exceed these criteria must use the regular 412 TW Test Safety Process for approval.[359]

10.4.2 Student Test Management Projects (TMPs).

10.4.2.1 Student test management projects (TMPs) may proceed into the Safety Review with the following signatures: PSL, UTSO, and a staff advisor. Appropriate staff advisors include the TPS/DO, the TPS chief pilot for the applicable aircraft or the staff technical advisor assigned to the TMP.[360] Final section 1 signature may be done by the TMP staff advisor but should still be done prior to document release.

10.4.2.2 Combined TRB/SRB in-person is the standard for all student TMPs, regardless of proposed risk level, and does not require advanced coordination from the TRA.

10.4.2.3 412 TW/SET should prioritize TMP review meetings above other 412TW programs to ensure curriculum execution remains on schedule.

10.4.2.4 Upon completion of the review, the students will incorporate any changes, finish coordinating the test package with the safety reviewers, and then submit it to the TPS Technical Director and Commandant for their review and approval.[361] TABs with TPS/CC are expected for all packages.

10.4.2.5 All other guidance in the test safety process is unchanged.

[359] AFTCI 91-202_412 TW SUP, A10.3.1
[360] AFTCI 91-202_412 TW SUP, A10.3.2
[361] AFTCI 91-202_412 TW SUP, A10.3.2

11.0 APPROVAL PHASE

11.1 Overview.

11.1.1 The approval phase provides appropriate leadership the opportunity to make an informed risk acceptance and test approval decision based on the safety review and risk assessment completed in the Test Safety Review Phase. All activities conducted IAW AFTCI 91-202, paragraph 1.6, require approval before beginning execution. The TEA for these activities is based on the overall risk level as outlined in AFTCI 91-202, Table 6.1.[362]

Table 6.1: Approval Process Coordination Path (from AFTCI 91-202)

Organization Level	**LOW Risk (NEGLIGIBLE Risk)**	**MEDIUM Risk**	**HIGH Risk**
Safety Office	Note 4	Note 4	Note 4
Squadron CC (or equivalent)	Approve[1, 3]	Note 4	Note 4
Group CC (or equivalent)	Info[5]	Approve[1, 3]	Note 4
Wing/Complex CC	Not Required	Info	Coord[3]
AFTC/SE	Not Required	Not Required	Coord
AFTC/CC	Not Required	Not Required	Approve[2]
HQ AFMC/SE and A3	Not Required	Not Required	Info

Notes:

1. Delegation of test approval is authorized to the TEA's deputy commander or deputy director when the TEA is unavailable. If a unit does not have a deputy commander or deputy director, then it can be the Commander/Director's designated representative who per AFI 51-509 paragraph 7.2.4.2, "acts, at the direction of the commander, for the commander in the commander's name, just as is routinely done when the commander is present." An example may be a Sq/DO or Director of Projects. This delegation will not be further delegated (e.g., Sq/ADO). The Commander/ Director's deputy or designated representative will be trained in the AFTC test safety review process. If this person is also not available, then the TEA role will be assumed by the next higher leadership level.
2. HIGH risk approval may be delegated in writing to the Test Wing/Complex commander. In the absence of the Test Wing/Complex commander, the vice commander can approve the testing; however, this cannot be further delegated. If delegated to a Test Wing/Complex commander, the AFTC/SE and AFTC/CC will be coordinated for 'Info' only.
3. A commander may elevate the TEA responsibility to the next level at their discretion.
4. Coordination is not required unless required by local instruction. Subordinate commanders or their representatives are expected to provide their inputs to the TEA either before or during the TAB, if one is held.
5. Not required for NEGLIGIBLE risk.

[362] AFTCI 91-202, Table 6.1

11.1.2 Approval is defined as permission to conduct or participate in the test project or activity granted by the appropriate TEA. Signature of the TEA on 412 TW Form 5001 or 5002 (or equivalent) is required prior to test execution to indicate acceptance of the risk and approval to begin activities under the conditions set forth in the test package. A signed safety package does not authorize deviation from Air Force, AFMC, or AFTC instructions or directives.[363]

11.1.2.1 In rare circumstances where the TEA personally reviews and approves of the test package, but becomes unavailable or unable to sign the 412 TW Form 5001 or 5002 (or equivalent), the TEA may positively affirm approval of the test package and designate another individual to sign in his or her stead, providing that individual is TEA trained, assigned to the appropriate level organization for the risk level, and eligible to act as TEA IAW AFTCI 91-202, Table 6.1 Note 1. That individual should annotate in the coordination comments any direction received from the TEA. Alternatively, the TEA may provide a positive approval of the test package via email or other written means that can be included in the test package. Once the TEA is able to sign the 412 TW Form 5001 (or equivalent), he or she should do so.

11.1.3 For TEA delegation to be utilized IAW AFTCI 91-202, Table 6.1 Note 1, see section 3.2.5 of this handbook for defining what constitutes TEA unavailability.

11.1.4 The TEA will be in the ETO's chain of command. If multiple AFTC Wings/Complex are involved, the Wing/Complex with the designated ETO may transfer the TEA role to the other Wing/Complex if the Wing/Complex commanders of both organizations agree. Control of most of the assets at risk is not a criterion for TEA designation.[364] If TEA is to be transferred to another unit within 412 TW, both unit commanders/directors must agree.

11.1.5 "Elevated risk" activities are those that result in a residual risk level of medium or high.[365]

11.1.6 If appropriate, a test package can have split risk assessments for AFTC and non-AFTC assets, for different phases of the test projects, or for individual test events. Test points in each risk category will be clearly identified in the safety plan.[366]

11.1.6.1 For split overall risk packages, the TEA for each risk level as defined in AFTCI 91-202, Table 6.1, must grant approval prior to the test team conducting test at the corresponding risk level.

11.1.7 A TEA may elect to elevate the approval authority to a higher TEA.[367] Elevation to a higher TEA does not change the assessed risk level produced by the SRB.

11.1.8 In the rare case where a member of the test team whose attendance at the SRB is mandatory is also qualified to act as TEA for that test package (e.g., if the PSL, UTSO, or project operator on a low risk package is also the Sq/DO), that individual will not approve the test package as TEA; another qualified individual must be used.[368]

[363] AFTCI 91-202, 6.1
[364] AFTCI 91-202, 6.1.1
[365] AFTCI 91-202, 6.3
[366] AFTCI 91-202, 4.6.2.2
[367] AFTCI 91-202_412 TW SUP, A11.1
[368] AFTCI 91-202_412 TW SUP, A11.1.1

11.1.9 Coordinating the post-SRB test package with subordinate units before delivering it to the TEA is not required. This is intended to avoid staffing redundancy but is not intended to reduce opportunities for the subordinate units to review the package and provide inputs.[369]

11.1.9.1 For elevated risk package, test teams will provide subordinate commanders/directors the test package in its ready-for-approval state no later than when it is delivered to the TEA.[370]

11.2 Low-Risk (Including Negligible-Risk) Approval.

11.2.1 Per AFTCI 91-202, Table 6.1, the TEA for all low-risk (including negligible-risk) test events is no lower than the responsible Sq/CC (or equivalent) or their deputies[371].

11.2.1.1 If an individual is temporarily appointed commander/director through g-series orders, wherein they hold command authority over the unit, to include flight and test operations, until the permanently appointed commander/director returns, that individual may act as TEA for the duration of their temporary appointment (e.g., another military officer who was temporarily appointed as acting squadron commander while the permanent Sq/CC takes parental leave may act as TEA until the permanent Sq/CC returns). The TEA training requirements still apply.[372]

11.2.2 For low-risk test packages with no discernible unit attachment, 412 TW/SET may propose a TEA. That coordination should begin during the planning phase.

11.2.3 As a group-level commander, the USAF TPS/CC may approve all low and medium risk flight and ground tests conducted for the USAF TPS curriculum such as the TMP and Staff Projects, as well as all operations required for curriculum execution and development of new curriculum material. This includes approval authority for training and/or aerial events such as the TPS Qualitative/Evaluation Program when the TPS/CC or TPS/CD has been given Flight Operations Authority (FOA).[373]

11.3 Medium-Risk Approval.

11.3.1 Medium-risk tests require approval of the Group CC (or equivalent). The OG/CC deputies may serve in this capacity IAW AFTCI 91-202, Table 6.1 Note 1.

11.3.2 The USAF TPS/CC may approve certain medium-risk activities.

11.4 High-Risk Approval.

11.4.1 The TEA for all high-risk activities is the AFTC/CC; however, approval to execute high-risk testing has been currently delegated to the Test Wing/Complex CC IAW AFTCI 91-202, Table 6.1 Note 2. Currently, AFTC/CC directed this delegation of TEA will not be further delegated to Test Wing/Complex deputy commanders.[374] The delegation memorandum can be located on the 412 TW/SET SharePoint.

[369] AFTCI 91-202, 6.1
[370] AFTCI 91-202_412 TW SUP, A11.2
[371] AFTCI 91-202, Table 6.1
[372] AFTC/SET interpretation
[373] AFTCI 91-202_412 TW SUP, A11.4.1.1
[374] *Delegation of Authority to Approve High Risk Tests Memorandum*, Scott A. Cain, Major General, USAF, Air Force Test Center, Edwards AFB, California, 9 August 2024.

11.4.2 If non-AFTC assets/personnel are involved, the asset owner must be notified of the high residual risk prior to test execution.[375] Units are responsible for providing high-risk notification to asset owners via appropriate means. Units will inform 412 TW/SET (412.TW.SET@us.af.mil) when all notifications have occurred.[376]

11.5 Test Approval Brief (TAB).

11.5.1 Overview. The TEA may require a TAB to assist in making an informed decision. A TAB should be an executive-level meeting that provides a test project overview and highlights test unique hazards, mitigation measures, discussion points during the independent review (e.g., Formal SRB, ESR, Combined TRB/SRB), and any contention or disagreement by the independent review board and the test team.[377]

11.5.1.1 The PSL is responsible for scheduling and coordinating a TAB with the TEA. The PSL should assume one a TAB is required until informed otherwise.[378]

11.5.1.2 Test teams can request approval without a TAB. Generally, this option is applicable for simple and straightforward packages via Form 5001 or amendments via MFR. An email template to request approval without a TAB is available on the 412 TW/SET SharePoint.

11.5.1.3 If a TAB is held and if slides are used, the slides will be archived with the test package documentation,[379] typically in Tab 5.

11.5.2 Invitation and Attendance.

11.5.2.1 Composition of the TAB members is at the discretion of the TEA. The PSL will ensure subordinate commanders are invited to attend the TAB (i.e., if the TEA is the TW/CC, the SQ/CC and OG/CC must be invited, but their attendance is not necessarily required). The PSLs should provide readahead copies of the test package to all TAB invitees. The individuals named in Sections I and II of the 412 TW Form 5001 (or equivalent) should be invited to the TAB, if held.[380]

11.5.2.1.1 For medium-risk TABs, 412 OG/CC has issued a policy memorandum requiring the test team to ensure the following individuals attend the TAB in-person or virtually: SRB Chairperson (or designee), PSL, project aircrew, project engineer, and applicable discipline engineers. Additionally, the PSL will provide TAB readahead copies to all attendees no later than 2 business days before the TAB.[381]

11.5.2.1.2 For high-risk TABs, 412 TW/CC requires that test teams invite 412 TW/CT.

[375] DAFI 91-202_AFMC SUP, 16.7.1.1.1
[376] AFTCI 91-202_412 TW SUP, A11.5
[377] AFTCI 91-202, 6.4
[378] AFTCI 91-202_412 TW SUP, A11.6.1
[379] AFTCI 91-202, 6.4
[380] AFTCI 91-202_412 TW SUP, A11.6.2
[381] *Policy on Test Approval Board Attendees*, Ryan A. Sanford, Colonel, USAF, 412th Operations Group, Edwards AFB, California, 25 September 2023.

11.5.2.1.3 The 412 TW/SET recommended additional invitees include:

- Appropriate project personnel (government and contractor) to answer such questions as may be reasonably expected to arise.
- If an action item or dispute was not resolved prior to the TAB, the commenting official should be present.

11.5.2.1.4 The SRB Chairperson should extend TAB invites to 412 TW/SE leadership, especially for controversial or high-visibility test packages.

11.5.3 Scheduling.

11.5.3.1 The test team is responsible for scheduling the TAB time and location with the TEA.[382]

11.5.3.2 Required attendees will be contacted to verify they are aware of the briefing time, date, location and their ability to attend.[383]

11.5.3.3 The test team should ensure appropriate computer, projection, and communication support is available to conduct the meeting.[384]

11.5.3.4 The test team should contact the following email addresses to schedule the TAB:

- Low risk: Office of the Squadron Commander (or equivalent)
- Medium risk: 412 OG/CCE Executive Officer Workflow
- High risk: 412 TW Distribution Box and 412/CCE Executive Officer

11.5.3.5 To request elevated risk TABs, 412 TW/SET recommends test teams use the medium- and high-risk TAB email request templates available on the 412 TW/SET SharePoint.

11.5.4 TAB Content and Conduct.

11.5.4.1 The test team will provide the briefing in a suitable format; it is recommended teams use the most current TAB Template (hosted on the 412 TW/SET SharePoint).[385]

11.5.4.2 Teams should consider having a physical copy of the 412 TW Form 5001 (or equivalent) and coordination comments sheet at the TAB, in the event the TEA elects to sign at the meeting. If the meeting is held virtually, teams should be prepared with a digital copy of the 412 TW Form 5001 or equivalent such that the TEA may sign upon completion of the TAB.

11.5.4.3 The TEA will review all coordination comments prior to approval and will adjudicate unresolved coordination comments.[386]

[382] AFTCI 91-202_412 TW SUP, A11.6.3.1
[383] AFTCI 91-202_412 TW SUP, A11.6.3.2
[384] AFTCI 91-202_412 TW SUP, A11.6.3.3
[385] AFTCI 91-202_412 TW SUP, A11.6.4.1
[386] AFTCI 91-202_412 TW SUP, A11.3.1

11.5.4.4 Coordination comments made during the approval briefing will be written and the wording verified by the commenting TEA so the test team has clear understanding of tasking. Coordination comments not requiring a team response should be annotated as such.[387]

11.5.4.4.1 When written by the TEA, coordination comments may constitute (but are not limited to) direction to the test team, conditional approval of the test package, or approval/disapproval of a waiver request within that commander/director's authority.[388]

11.5.4.5 The test team will make any required changes to the safety documentation that result from the approval briefing. The approval authority may approve the test package at the approval briefing with or without conditions.[389]

11.5.4.6 For medium-risk tests, the 412 OG/CC requires the PSL or designees to record minutes for the TAB and provide a summary of proceedings (SOP) for the TAB following the briefing. The PSL or designee will coordinate the SOP with all attendees before submitting to the TEA. The SOP must be completed before the TEA will make a final determination on the test and sign the 412 TW Form 5001.[390]

11.6 Accelerated Tests, Test Surges, and Air Force Materiel Command (AFMC) Plan 70 Material Surges.

11.6.1 Accelerated tests or test surges will be designated by the 412 TW/CC. Programs designated as AFMC Plan 70 materiel surges will be communicated to the stakeholders, including the 412 TW/SET and the independent reviewers.[391]

11.6.2 Accelerated tests, test surge, and AFMC Plan 70 material surges are prioritized over other programs but are required to comply with all documentation and review requirements specified by AFTCI 91-202 and AFTCI 91-202_412 TW SUP.[392]

11.6.3 The steps of the process may be compressed to minimize the time required for final test approval. This is typically accomplished by combining the TRB and SRB, then conducting a TAB to obtain the TEA's signature on the test package.[393]

11.6.4 In some instances, the TW/CC may request a TAB although TEA rests with a subordinate commander. It is recommended that subordinate unit commanders be involved and informed throughout the accelerated test / test surge process.[394]

[387] AFTCI 91-202_412 TW SUP, A11.3.2
[388] AFTCI 91-202, Terms
[389] AFTCI 91-202_412 TW SUP, A11.6.5.1
[390] *Policy on Test Approval Board Attendees*, Ryan A. Sanford, Colonel, USAF, 412th Operations Group, Edwards AFB, California, 25 September 2023.
[391] AFTCI 91-202_412 TW SUP, A11.7.1
[392] AFTCI 91-202_412 TW SUP, A11.7.2
[393] AFTCI 91-202_412 TW SUP, A11.7.3
[394] AFTCI 91-202_412 TW SUP, A11.7.4

11.7 Final Package Assembly and Info Cycle.

11.7.1 Following approval of an original package or a major amendment, the test team will provide signed copies of the constituent test package documents to the 412 TW/SET.[395] The TEA will return approved NRRs to the team. The PSL or an UTSO assisting the team will notify 412 TW/SET when the NRR is approved.[396]

11.7.1.1 The constituent test package documents may consist of Form 5001/5002 (or equivalent), summary of changes, TRM/RUGR, test plan(s), safety plan, and/or supporting documentation (i.e., TAB slides, waivers, etc.). The 412 TW/SET recommends providing the constituent test package documents in PDF format.

11.7.1.2 Package assembly is expected for original packages and every major amendment. Package re-assembly following a minor or administrative change is done by-request on a workload-permitting basis; teams should advise 412 TW/SET if they are requesting it.

11.7.2 The 412 TW/SET will assemble the final test package and perform the Info Cycle specified by AFTCI 91-202, Table 6.1; these tasks may be performed by the unit, at the unit's request, or when required by releasability/classification restrictions.[397]

11.7.2.1 For high-risk test packages approved by the Test Wing/CC or CV, the 412 TW/SET will notify the AFTC/SET upon approval of the package.[398] The AFTC/SET will perform higher level info cycles to the AFTC/SE and AFTC/CC IAW AFTCI 91-202, Table 6.1.

11.7.2.1.1 The AFTC must notify AFMC prior to the start of high-risk testing.[399] Therefore, if test teams are involved in a fast-paced program, then they should work with the SRB Chairperson to ensure it moves quickly up the chain.

11.7.2.2 The NRR test packages will additionally be Info Cycled to the 412 TW/CT and the group CC (or equivalent). The NRR and low-risk test packages approved by TPS/CC (or equivalent) will be Info Cycled to 412 OG/CC.[400]

11.7.3 No signatures are required for the Info Cycle. The Info Cycle is complete once the notification is sent. The individual should update the 412 TW Form 5001/5002 (or equivalent) indicating the date the Info Cycle was completed and the members included in the Info Cycle.

11.7.4 Once the Info Cycle is complete, the PSL (with assistance from the UTSO) should be prepared to respond to questions from senior leadership.

[395] AFTCI 91-202_412 TW SUP, A11.8.1
[396] AFTCI 91-202_412 TW SUP, A9.6.4
[397] AFTCI 91-202_412 TW SUP, A11.8.2
[398] AFTCI 91-202 2.1.6.10 and DAFI 91-202_AFMC SUP, 16.7.1.1.1.
[399] AFTCI 91-202, 2.1.6.10
[400] AFTCI 91-202_412 TW SUP, A11.8.3

12.0 TEST PACKAGE CHANGES/AMENDMENTS AND TIME LIMITS

12.1 Overview. An active test package is a living document. It is not unusual for a test package change to arise after receiving test approval. A change to either the test plan and/or safety plan is a change to the test package and must be approved via the AFTCI 91-202 process.[401] The terms "change" and "amendment" are used interchangeably in the context of the AFTCI 91-202 and AFTCI 91-202_412 TW SUP. There are four types of amendments to a test package:

- Major Amendment
- Minor Amendment
- Administrative change
- Closure Amendment

There are also two types of coinciding amendment notations:

- Review Amendments
- Re-Opening Amendments

12.1.1 For changes to the overall test package, the appropriateness of a major or minor amendment will be at the discretion of the SRB Chairperson or a member of the 412 TW/SET, or in the case of a pre-approved minor change, an independent TSO.[402] For test plan changes, the CTF Chief Engineer shall consult with the TRA to determine whether a change is major or minor, IAW EDWARDSAFBI 99-101.[403] The SRB Chairperson or member of the 412 TW/SET will consult with and rely on the TRA and CTF Chief Engineer to determine the type of test plan changes.

12.1.1.1 A major safety plan change is any change to the content of the safety plan that the SRB Chairperson or member of 412 TW/SET determines to be outside the scope of the previously approved safety plan.[404] Whereas a minor safety plan change is any change that determined to be is within scope of the previously approved safety plan.[405] Determining whether a change is within the scope of a previously approved safety plan requires judgement. Some common examples that usually constitute an expansion of scope are:

- Identifying a new hazard (to include adding a new THA)
- Adding a new type of test, especially if it adds a discipline that was not represented in the previous safety review.

12.1.1.2 The 412 TW/CT may provide guidance on how to address test plan changes for test efforts involving RUGRs.

12.1.1.3 The individual who made each minor or administrative change determination will be named. 412 TW/SET recommends noting this in the Summary of Changes. In the case of an amendment via memorandum, this can be specified in the coordination section.[406]

[401] AFTCI 91-202, 8.1
[402] AFTCI 91-202_412 TW SUP, A12.3
[403] EDWARDSAFBI 99-101, 4.0
[404] AFTCI 91-202, 8.4
[405] AFTCI 92-202, 8.3.2
[406] AFTCI 91-202_412 TW SUP, A12.3.1

12.1.3 The NRR changes/amendments have specific requirements (see section 12.13 of this handbook).

12.1.4 Unless specified otherwise in the test package, updates to test package supporting documents (typically those in Tab 5) do not require a test package amendment, provided that they do not identify new hazards or otherwise change the assessed and accepted risk. Test package supporting documents are regarded as reference documents for the safety reviewers and TEA(s), with an expectation that should they be revised, the team will reference the most current version.

Example 1: If a test team includes an operating limit, military flight release, or predictions in Tab 5, and if such documents get revised, then the test team will reference the most recent documents, and a test package amendment is not required.

Example 2: If a draft copy of a flight manual deviation/waiver was provided to the SRB and TEA (included in Tab 5), and deviation/waiver was approved "as-is" by the Chief Engineer/Delegated Technical Authority, then the flight manual deviation/waiver can be added via an administrative change. However, if changes to the flight manual deviation/waiver are made after TEA approval (even if execution has not yet begun), then an amendment and TEA reapproval may be required. Test team should consult 412 TW/SET on the path forward.

12.2 Request for Safety Review – Amendment (RSR-A).

12.2.1 If an amendment is required, teams should notify the 412 TW/SET via a request for safety review – amendment (RSR-A). Teams are strongly encouraged to utilize the latest RSR-A template on the 412 TW/SET SharePoint.

12.2.2 The RSR-A must contain information sufficient to understand the test and/or safety plan changes such that the major/minor/administrative change determination can be made, and 412 TW/SET can approve the documentation format, type of safety review, and venue (if required); determine the appropriate reviewers; verify the participants eligibility/training status; and facilitate test package metric tracking.

12.2.3 In the case of a test plan change, the RSR-A should document TRA/chief engineer concurrence on test plan change determination.

12.2.4 An RSR-A is required for major safety plan changes[407] and NRR amendments,[408] but it is recommended for any amendment that would increment the control number. With the exception of administrative changes, test plan and/or safety plan changes are all documented via formal change through the 412 TW/SET control number.[409]

[407] AFTCI 91-202_412TWSUP, A5.3
[408] AFTCI 91-202_412TWSUP, A12.14.2.1
[409] AFTCI 91-202_412 TW SUP, A12.1

12.3 Documentation Methods.

12.3.1 The documentation method is dependent on the nature of the change with an emphasis on whether additional or modified safety planning is required. In all cases, the overall objective is to provide the test team with a single source document that incorporates all changes to the safety plan up to that date to ensure accurate mission preparation and briefing.

12.3.2 The type of documentation required can be determined by referencing AFTCI 91-202_412 TW SUP, Table A12.1.[410]

Table A12.1 Test Package Changes/Amendments (from AFTCI 91-202_412 TW SUP)[411]

Change Type[1, 2]	Documentation Method	Possible Reasons	Approval Authority
Major Amendment	412 TW 5001 or equivalent	1. Change in risk level 2. Major changes to safety plan 3. Unexpected Test Event[4]	TEA appropriate to the highest affected risk level
Major Amendment	Memorandum	1. Major[3] test plan changes or added[6] test plan with no or minor changes to safety plan 2. Unexpected Test Event[4]	TEA appropriate to the highest affected risk level
Minor Amendment	Memorandum	1. Minor[3] test plan changes with no or minor changes to safety plan 2. No test plan changes with minor[7] changes to safety plan	Squadron Commander (or equivalent)
Review Amendment	412 TW 5001 or equivalent	Required a minimum of every 3 years at discretion of test organization leadership[5]	Overall test package TEA or higher
Closure Amendment	Email	Closure	412 TW/SET
Administrative Change	On existing documentation	Administrative changes	TSO

NOTES:

1. 412 TW/SET may advocate the use of a different documentation method or approval authority on a case-by-case basis. As such, test team will verify that their documentation method and approval authority is appropriate.
2. All changes require that the test package control number be incremented except for administrative changes; administrative changes must be tracked by the unit, such that test package documentation configuration control is maintained.
3. Major and minor test plan changes and procedures are defined in EDWARDSAFBI 99-101.
4. 412 TW/SET will determine the appropriate documentation to resolve an Unexpected Test Event.
5. Test Pilot School standard curriculum event safety plans will be reviewed at least every four years.
6. Additional test plans may be incorporated into an existing test package via an amendment, so long as they are accompanied by an appropriate amount of additional safety planning. In some cases, no change to safety planning may be required.
7. The TEA may pre-approve minor safety plan changes. See A12.6.
8. See A12.14 for guidance on changes/amendments to NRR package.

[410] AFTCI 91-202_412 TW SUP, A12.3.2
[411] AFTCI 91-202_412 TW SUP, Table A12.1

12.3.3 Any changes to test planning documentation must be coordinated with the TRA. Documentation of TRA concurrence, digitally or via new TRM/RUGR, must be obtained and included in the amended test package.[412/413]

12.4 Annotation of Changes.

12.4.1 Summary of Changes.

12.4.1.1 The test package will include a Summary of Changes section documenting all changes since the original safety package was approved. Every change/amendment will be accounted for in this summary,[414] including administrative changes. A Summary of Changes template is available on the 412 TW/SET SharePoint.

12.4.1.1.1 The UTSOs will ensure traceability of all changes to a specific individual. 412 TW/SET recommends the use of names of the PSL and/or UTSO in the Summary of Changes section.[415]

12.4.1.1.2 For NRRs, all amendment information (changes to test or safety plan) will be documented on the 412 TW Form 5002 (or equivalent) under "Summary of Changes" section.[416]

12.4.2 Clarity of Changes.

12.4.2.1 Changes will be made directly to the existing documentation and will be clearly identified within the test package.[417] In all cases it should be clear to readers what changes have been made within the test package. At a minimum, changes associated with the most recent amendment will be clearly annotated to reviewers and the TEA (if applicable). The method of incorporating changes is left to the discretion of the test team.[418]

[412] AFTCI 91-202_412 TW SUP, A12.14.2.2
[413] EDWARDSAFBI 99-101, 4.0 and 4.2
[414] AFTCI 91-202_412 TW SUP, A12.2
[415] AFTCI 91-202_412 TW SUP, A12.2.1
[416] AFTCI 91-202_412 TW SUP, 12.14.2.3
[417] AFTCI 91-202_412 TW SUP, A12.4
[418] AFTCI 91-202_412 TW SUP, A12.5

12.4.2.2 The following is considered a best practice: switch the color of the amended text in the test and/or safety plan to RED and add a footnote or endnote to that paragraph, line, or section as appropriate. The footnote or endnote should reference the amendment number of that change, if applicable. If a test package has multiple amendments, it is possible a line or paragraph may have more than one footnote indicating that it was changed more than once in the course of the test program. The RED text color should only be used for current changes that are pending approval. All previous changes should be converted back to the original text color (usually BLACK), with footnotes or endnotes remaining. Previously approved deletions (e.g., strikethrough text) may be removed in subsequent amendments, but footnotes or endnotes should remain for reference. See example in Figure 4.

Original

2.6 General Minimizing Procedure

a) Successful captive carriage is required prior to jettison testing.

Amendment 1

2.6 General Minimizing Procedure

a) Successful captive carriage is required prior to jettison testing.

b) All jettison test points shall be conducted in day VMC with no greater than moderate turbulence.[1]

[1]Amendment 01

Amendment 2

2.6 General Minimizing Procedure

a) Successful captive carriage is required prior to jettison testing.

b) All jettison test points shall be conducted in day VMC with no greater than ~~moderate~~ light turbulence.[1] Jettisons may be performed with cloud decks located below the aircraft.[2]

[1]Amendment 01

[2]Amendment 02

Figure 4 Example of Amendment Text

12.4.3 Amendments Affecting Multiple Test Packages. The test team should include a list of all affected test packages in the RSR-A email sent to the 412 TW/SET. If it is a major or minor amendment documented via memorandum, then the amendment can be completed on a single memorandum annotating each affected test package control number. The amendment will be approved IAW AFTCI 91-202_412 TW SUP, Table A12.1. For split risk packages, the amendment would require TEA approval for the risk level associated with the test package change as indicated by each affect test package risk level breakdown. After approval the archived copy of the memorandum should be included in each affected test package.

12.5 Major Amendments.

12.5.1 General. Major amendments will be approved IAW AFTCI 91-202_412 TW SUP, Table A12.1.[419]

12.5.1.1 A major safety plan change is any change to the content of the safety plan that the SRB Chairperson or member of the 412 TW/SET determines to be outside the scope of the previously approved safety plan.[420]

12.5.1.2 A major test plan change is defined in EDWARDSAFBI 99-101 as any substantive change to test objectives, technical approach or test methodology, or changes to test procedures or test scope.[421]

12.5.1.3 The minimum safety independent review composition will be a member of the 412 TW/SET, an Operations Reviewer, and other ISRs determined by the SRB Chairperson as required reviewers due to the changes. Individuals in the SRB should be the same as those from the original package, if available.[422]

12.5.1.4 For changes to test packages with split-risk levels, the approval authority for the changes will be based on the portion of the test package that is being changed. For example, a test package that has been approved as high risk for test points over 800 knots calibrated airspeed (KCAS) and medium risk for all other test points. A change is submitted that only affects test points below 800 KCAS. The approval authority for the change corresponds to the medium-risk TEA.[423]

12.5.1.5 Following a major amendment, the underlying assumptions may change regarding leadership decisions (e.g., removing buildup requirements could decrease system maturity assumptions).

12.5.1.5.1 The team should obtain re-affirmation from the amendment TEA whether preapproved minor safety plan changes are authorized. If pre-approved minor safety plan changes are not re-affirmed, teams should not assume they are still authorized.

12.5.1.5.2 The team may need to obtain re-approval of a waiver/deviation if the waiver authority's decision may be impacted by the substance of the test package change. Teams should consult 412 TW/SET for guidance as to whether re-approval is appropriate.

[419] AFTCI 91-202_412 TW SUP, A12.7.1
[420] AFTCI 91-202, 8.2
[421] EDWARDSAFBI 99-101, 4.2
[422] AFTCI 91-202, 8.2
[423] AFTCI 91-202, 8.2.1.3

12.5.2 Process Details. The major amendment will normally contain all requirements of an initial package with the following exceptions/additions:

- The control number will be assigned by 412 TW/SET in their response to the RSR-A.[424]
- Any previous coordination comments coordination comments will be retained with the previously approved 412 TW 5001/5002 (or equivalent) with which they were made.[425]
- Any additional THAs shall be added to the safety plan as required. Changes to existing THAs shall be made to the most current version.[426]
- The results of the technical review following a major test plan change will be documented in a TRM IAW EDWARDSAFBI 99-101. Test teams will include this TRM in the test package amendment.[427/428]
- If a memorandum format is used, the amendment does not need to contain all requirements of an initial package. The control number will be assigned by the 412 TW/SET in their response to the RSR-A. The memorandum will detail the requirement for the changes, a summary of the changes, and any coordination officials involved.[429] The coordination block should reflect compliance with EDWARDSAFBI 99-101 (i.e., TRA and Chief Engineer) as well as AFTCI 91-202 (e.g., UTSO, member of 412 TW/SET, Operations Reviewer, and at least one other ISR).[430] A major amendment memorandum template is available on the 412 TW/SET SharePoint.

12.5.3 Risk Level Changes. For major amendments involving risk level changes, the following applies:

- The approval authority for an increase in risk level will be based on the "new" risk level IAW Table 6.1 in AFTCI 91-202 (i.e., an upward change to high risk requires AFTC/CC approval if not already delegated to TW/CC).[431]
- The approval authority for a decrease in risk level will be based on the "original" risk level IAW Table 6.1. in AFTCI 91-202 (i.e., a downward change from high risk requires AFTC/CC approval if not already delegated to TW/CC).[432]
- If a high-risk package is downgraded to medium risk and approved by the TW/CC, then AFTC and AFMC do not need to be notified.[433]

[424] AFTCI 91-202_412 TW SUP, A12.7.2.1
[425] AFTCI 91-202_412 TW SUP, A12.7.2.2
[426] AFTCI 91-202_412 TW SUP, A12.7.2.3
[427] AFTCI 91-202_412 TW SUP, A12.7.2.4
[428] EDWARDSAFBI 99-101, 4.2
[429] AFTCI 91-202_412 TW SUP, A12.7.3
[430] AFTCI 91-202, 8.2
[431] AFTCI 91-202, 8.2.1.1
[432] AFTCI 91-202, 8.2.1.2
[433] AFTC/SET interpretation

12.6 Minor Amendments.

12.6.1 General.

12.6.1.1 Minor amendments will be approved IAW AFTCI 91-202_412 TW SUP, Table A12.1.[434] The memorandum will detail the requirement for the changes, a summary of the changes, and any coordination officials involved in determining the minor nature of the changes. A minor amendment memorandum template is available on the 412 TW/SET SharePoint.[435]

- If coordination with the TRA was required during amendment coordination, that review will be annotated in the coordination section of the memorandum.[436] A technical review by the TRA or delegated authority is required to confirm test plan changes are minor prior to amendment coordination IAW EDWARDSAFBI 99-101.
- The impacts of any test plan changes on the safety plan must be made clear in the amendment.[437]
- The coordination block should reflect compliance with EDWARDSAFBI 99-101 (i.e., TRA and Chief Engineer) as well as AFTCI 91-202 (e.g., UTSO, member of 412 TW/SET, and other ISRs [as required]).

12.6.1.2 Minor amendments will be coordinated by the PSL (with UTSO assistance). The SRB Chairperson will be info-copied upon approval of the amendment.[438]

12.6.1.3 After the amendment has been approved, the test package will be updated to reflect the amendment. The signed memorandum will be included in the test package for reference and the summary of changes page will be updated accordingly.[439] For example, if a signed memorandum adds a mitigation to the safety plan, then the safety plan will be updated to include the new mitigation and the summary of changes will include a pointer to the section that was updated.

12.6.1.1 During the amendment review process, a member of the 412 TW/SET or independent TSO should verify all the constituent documents are updated to coincide with the memorandum. This review of all the constituent documents is to understand exactly how the proposed change is being implemented and that is meets the intent of the memorandum. Other ISRs involved in the review should also be provided all constituent documents.

[434] AFTCI 91-202_412 TW SUP, A12.8.1
[435] AFTCI 91-202_412 TW SUP, A12.8.2
[436] AFTCI 91-202_412 TW SUP, A12.8.2.1
[437] AFTCI 91-202_412 TW SUP, A12.8.2.2
[438] AFTCI 91-202_412 TW SUP, A12.8.3
[439] AFTCI 91-202_412 TW SUP, A12.8.4

12.6.2 Pre-approved Minor Safety Plan Changes.

12.6.2.1 If the TEA has pre-approved minor safety plan changes, the SRB Chairperson or an independent TSO must concur that the safety plan change is minor and there is no risk level change. Concurrence from other ISRs may also be required at the discretion of the SRB Chair or the independent TSO. If the change is determined to be minor, the TSO may make the minor safety plan change to the test package and update the summary of changes. The TSO should clearly annotate that the change is a "minor safety plan change" in the summary of changes. The 412 TW/SET will be info cycled on these changes. Use of this mechanism constitutes a minor amendment. The test package control number will be updated for this type of change.[440]

12.6.2.2 This pre-approval can be obtained upon initial signature by the TEA. If the TEA elects to approve this after initial approval, the approval must be included in the test package. An email is acceptable.[441]

12.6.2.2.1 For split risk packages, the TEA for each risk level should state whether they pre-approve minor safety plan changes for testing at their respective risk level.

12.6.2.2.2 For split risk packages, where the lower risk level TEA permitted pre-approved minor safety plan changes, but the elevated risk TEA(s) did not permit pre-approved changes, then approval depends on the risk level associated with the minor safety plan change.

Example: A split low/medium risk package where the Squadron Commander (or equivalent) permitted pre-approved minor safety plan change but the Operating Group Commander did not, then the following approval would be required for a minor safety plan change: If the portion of the safety plan that is being updated is obviously a low risk component, then the minor safety plan change can be approved with independent TSO concurrence. If the affected risk level is ambiguous or if the change is related to medium risk components, then IAW AFTCI 91-202_412 TW SUP, Table 12.1, the Squadron Commander (or equivalent) would approve of the minor safety plan change via memorandum.

12.6.2.2.3 Coordination with the 412 TW/SET is required for any pre-approved minor safety plan change to ensure control numbers are properly updated for these types of changes.[442]

12.6.2.2.4 The PSL or TSO assisting the test team may make the safety plan changes if an independent TSO concurs that the change is minor. See sections 2.3 of this handbook for more guidance on TSO independence.

12.6.2.2.5 For documentation and approval of a pre-approved minor safety plan change 412 TW/SET recommends an MFR signed by the PSL (or UTSO) and independent TSO and coordinated serially. The following process is recommended:

1. Draft the MFR, update Summary of Changes, and request independent TSO review. If requesting 412 TW/SET to act as independent TSO, then send an RSR-A email to the 412 TW/SET.
2. If requested by the independent TSO, then coordinate the MFR with appropriate ISRs.

[440] AFTCI 91-202_412 TW SUP, A12.6 / AFTCI 91-202, 8.3
[441] AFTCI 91-202_412 TW SUP, A12.6.1
[442] AFTCI 91-202_412 TW SUP, A12.1

3. Incorporate feedback from independent TSO and ISRs (if applicable).
4. Resend final MFR to reviewers for concurrence.
5. Notify independent TSO you are ready to begin the approval phase, the independent TSO will sign off on the MFR.
6. Send approved MFR to 412 TW/SET for archiving and incrementing control number.

12.7 Review Amendments.

12.7.1 General. The benefit of periodically reviewing the package is to determine if it can be improved (e.g., because of lessons learned, because of potential updated/conflicting guidance, because the scope of testing has been reduced, because something might be obsolete, etc.). Additionally, this review protects against complacency; this is especially true for low-risk projects where self-satisfaction can be accompanied by a loss of awareness of the hazards.

12.7.2 Time Limit. As part of the risk management process, safety plans will be reviewed at least every three years to ensure identified hazards and mitigation measures are appropriate and to incorporate any lessons learned. USAF TPS standard curriculum event safety plans will be reviewed at least every four years.[443/444]

12.7.2.1 To prevent test program delays, test packages should be renewed prior to the time limit stated above. A test package that has exceeded the time limit IAW AFTCI 91-202, paragraph 8.4 may be renewed via a Review Amendment only if the time limit has not been exceeded by more than 12 calendar months. Until the Review Amendment is approved, the test project does not have approval to continue execution.[445]

12.7.2.1.1 Calendar months are defined as ending on the last day of the month. For example, a test package approved on 15 July 2016 would exceed the 3-year time limit IAW AFTCI 91-202, paragraph 8.4 on 15 July 2019, but could be renewed via a review amendment on or prior to 31 July 2020.

12.7.3 Process Details.

12.7.3.1 Teams will document this review on a 412 TW Form 5001 (or equivalent) by completing Section I. In all cases, the documentation should make clear that the team has conducted a review of the package IAW the requirements of AFTCI 91-202, paragraph 8.4, to include identifying any new risks and mitigation measures; highlighting key issues experienced since approval or the last review; and purging non-applicable guidance.[446]

12.7.3.2 Test team rationale for changes (or lack thereof) should be clear in the amendment documentation. Teams will additionally highlight pertinent lessons learned since the last approval or review. The amendment number will be assigned by the 412 TW/SET.[447]

[443] AFTCI 91-202, 8.4
[444] AFTCI 91-202, 2.2.4.7 and 8.4
[445] AFTCI 91-202_412 TW SUP, A12.9.1
[446] AFTCI 91-202, 8.4
[447] AFTCI 91-220_412 TW SUP, A12.9.2

12.7.3.3 Once the team determines what changes are required, if any, the SRB Chairperson or a member of 412 TW/SET will determine whether the Review Amendment should be categorized as major, minor, or administrative. In the case where the team-identified changes constitute a minor safety plan change and the TEA has pre-approved minor changes, any independent TSO may make this determination.[448] Typically, this determination is made in response to the RSR-A email sent to the 412TW/SET. A control number will be assigned by 412 TW/SET and will be updated in the same fashion as a normal amendment to the package.

12.7.3.3.1 **Major Safety Plan Changes.** IAW AFTCI 91-202, paragraph 8.2, an independent safety review is required, and Section II of the 412 TW Form 5001 (or equivalent) will be completed, as described in section 12.3 of this handbook. The type of review will depend on the scope of changes. In some circumstances, the ESR path may be appropriate.[449]

12.7.3.3.2 **Minor Safety Plan Changes.** IAW AFTCI 91-202, paragraph 8.3, an independent safety review is not required but concurrence from other ISRs may also be required at the discretion of the independent TSO. Section II of the 412 TW Form 5001 (or equivalent) will include the names of the ISRs and the independent TSO who determined the magnitude of the change.[450]

12.7.3.3.3 **Administrative or No Proposed Safety Plan Changes.** IAW AFTCI 91-202, paragraph 8.3, an independent safety review is not required; Section II of the 412 TW Form 5001 (or equivalent) will be left blank except for the signature of the independent TSO who determined the magnitude of the change. In the case of no proposed safety plan changes, the independent TSO's role is to validate that no changes are needed.[451]

12.7.3.4 The Summary of Changes section will be explicitly annotated as a Review Amendment. If a Review Amendments is accomplished in conjunction with other amendments, the Summary of Changes must note that the requirements of AFTCI 91-202, paragraph 8.4 were met.[452]

12.7.3.5 The TEA will approve the Review Amendment by signing Section III of the 412 TW Form 5001 (or equivalent).[453]

12.7.3.6 After TEA approval, 412 TW/SET or the independent TSO will re-compile, archive, and info cycle the test package.

[448] AFTCI 91-202, 8.2 and 8.3 / AFTCI 91-202_412 TW SUP, A12.9.3
[449] AFTCI 91- 202_412 TW SUP, A12.9.3.1
[450] AFTCI 91-202_412 TW SUP, A12.9.3.2
[451] AFTCI 91-202_412 TW SUP, A12.9.3.3
[452] AFTCI 91-202_412 TW SUP, A12.9.4
[453] AFTCI 91-202_412 TW SUP, A12.9.5

12.8 Closure Amendments.

12.8.1 General.

12.8.1.1 Once testing is complete, a closure amendment will be filed. Unless a Review Amendment is completed, test teams will close test packages that have exceeded the time limit in AFTCI 91-202, paragraph 8.4 by more than 12 calendar months, regardless of test program status. Once closed, no further test execution may be conducted.[454]

12.8.2.1 The closure amendment allows test teams to initiate closure of a test package in writing. The test team will focus on documenting lessons learned from the test effort. A well-written closure amendment will close the loop on a test package and help future researchers benefit from lessons learned during testing and pertinent information that the test team would have found beneficial at the beginning of the test program.[455] The lessons learned should be from throughout the life cycle of the test program to include safety, technical, and programmatic lessons learned.

12.8.2 Process Details.

12.8.2.1 Prior to submitting the closure amendment, the UTSO will prepare the test package for final archiving with all revisions incorporated.[456]

12.8.2.2 The closure amendment email will include:[457]

- Control Number (include in Subject line)
- Title of Original Test Package
- Lessons Learned
- Review of Safety Plan and THAs
- SRB technical reviewer disciplines

12.8.2.2.1 A sample closure amendment email template is available on the 412 TW/SET SharePoint.

12.8.2.3 The 412 TW/SET will review the closure amendment and contact the UTSO if questions or comments arise.[458]

12.8.2.4 The 412 TW/SET will approve closure amendments in writing to the UTSO.[459]

12.8.2.5 The 412 TW/SET or a unit TSO will archive the closed test package IAW section A.3 of this handbook. Generally, if releasability permits, 412 TW/SET will archive the closed test package on the 412 TW/SET SharePoint and 96 TW LiveLink site.

[454] AFTCI 91-202_412 TW SUP, A12.10.1
[455] AFTCI 91-202_412 TW SUP, A12.10.2
[456] AFTCI 91-202_412 TW SUP, A12.10.3
[457] AFTCI 91-202_412 TW SUP, A12.10.4
[458] AFTCI 91-202_412 TW SUP, A12.10.5
[459] AFTCI 91-202_412 TW SUP, A12.10.6

12.9 Administrative Changes.

12.9.1 An administrative change to the test package clarifies information contained in the package and does not affect test conduct or the safety plan.[460] These changes are not considered to be an amendment to the test package and will not increment the control number.[461]

12.9.2 Any change may be an indication of inadequate safety planning, no matter how minor it originally appears. The test team and assisting TSOs must thoroughly question the background and implications of all administrative changes to ensure they would not benefit from additional review.[462]

12.9.2.1 **Changes to test plan.** The UTSO must obtain TRA concurrence that the change is administrative in nature. If the TRA concurs, the UTSO may make red line changes directly to the test package. The change must be documented in the Summary of Changes section and must indicate that the TRA concurred.[463]

12.9.2.2 **Changes to safety plan.** The UTSO may make red line changes directly to the test package. The change must be documented in the Summary of Changes section.[464]

12.9.3 The UTSO that made the changes to the test package should be listed on the Summary of Changes.[465]

12.9.4 The 412 TW/SET will be notified of all administrative changes.[466]

12.10 Re-Opening Amendments.

12.10.1 General. A closed test package may be re-opened under its original control number, provided the package has not exceeded its time limit IAW AFTCI 91-202, paragraph 8.4, by more than 12 calendar months. Re-opening a closed test package will be considered, at a minimum, a minor amendment for the purposes of incrementing the control number.[467] If the package has exceeded its time limit IAW AFTCI 91-202, paragraph 8.4, the team will additionally accomplish the requirements of a Review Amendment IAW section 12.7 of this handbook. The package re-opening and the Review Amendment actions should be combined into a single package amendment.[468]

12.10.2 Process Details. When accomplishing a Re-Opening Amendment and a Review Amendment is not required:

1. The PSL will add the original closure amendment to the test package as supporting documentation (typically part of Tab 1).[469]
2. An UTSO will document the package re-opening change in the Summary of Changes. The Summary of Changes should reflect the date the package was originally closed and the date the package was re-opened.[470]

[460] AFTCI 91-202 8.3
[461] AFTCI 91-202_412 TW SUP, A12.1
[462] AFTCI 91-202_412 TW SUP, A12.12.1
[463] AFTCI 91-202_412 TW SUP, A12.12.2
[464] AFTCI 91-202_412 TW SUP, A12.12.3
[465] AFTCI 91-202_412 TW SUP, A12.2.1
[466] AFTCI 91-202_412 TW SUP, A12.12.4
[467] AFTCI 91-202_412 TW SUP, A12.11.1
[468] AFTCI 91-202_412 TW SUP, A12.11.2
[469] AFTCI 91-202_412 TW SUP, A12.13.1
[470] AFTCI 91-202_412 TW SUP, A12.13.2

3. The team will inform the 412 TW/SET. The test team is then cleared to resume execution under that package.[471]
4. The 412 TW/SET will Info Cycle the TEA (unless the TEA signature was already required as part of a Review Amendment).[472]

12.11 Unexpected Test Events (UTEs).

12.11.1 UTE Criteria.

12.11.1.1 Unexpected test events are events that affect the continued safe execution of the test. Unexpected test events include, but are not limited to:[473]

- Unexpected or unplanned damage to the SUT or support equipment.
- Exceeding safety of test limits.
- Unfavorable departure from predicted simulation/analysis.
- Unanticipated frequency of occurrence of a hazard.
- Failure of planned mitigations that allowed a hazard to occur.
- Hazard occurrence without cause(s) fully identified or understood.

12.11.1.2 Occasionally, an instrumentation issue (such as incorrect calibration equations) is the root cause of an indicated value exceeding a test limit. However, when the instrumentation issue is resolved, the actual value did not exceed the limit threshold. These issues should not be counted as UTEs. However, teams should consider documenting the event as a test lesson learned.

12.11.1.3 If a T-2 modification failure affects the continued safe execution of the test, then the event should be treated as a UTE. For example, if the spin chute (which is a T-2 modification) unexpectedly deploys during test, then it is a UTE.

12.11.1.4 A hazard occurrence that does not affect continued safe execution of the test must still be reported to an independent TSO (see section 12.12 of this handbook for further details).

12.11.2 Immediate Actions.

12.11.2.1 If an unexpected test event occurs (actual or suspected), the test team will put the test on hold and consult with the independent TSO assisting the test team for confirmation of an unexpected test event.[474] Consultation with 412 TW/SET satisfies requirements for TSO independence (see 2.3 of this handbook for further information on TSO independence).

12.11.2.1.1 Test teams are encouraged to enter details of a suspected/possible UTE on the 412 TW/SET UTE tracker to facilitate this confirmation, with the Status: "Open – Suspected/Possible UTE". This facilitates UTE confirmation/disconfirmation.

[471] AFTCI 91-202_412 TW SUP, A12.13.3
[472] AFTCI 91-202_412 TW SUP, A12.13.4
[473] AFTCI 91-202, 7.4.1
[474] AFTCI 91-202, 7.4.2

12.11.2.2 A UTE amendment does not constitute a mishap investigation, if one is required by DAFI 91-204. Test teams will suspend testing immediately and notify 412 TW Safety if a mishap occurs.[475]

12.11.3 Confirmed UTE Actions.

12.11.3.1 If a UTE is confirmed, the PSL or UTSO will provide notification of the event to the members of the SRB, 412 TW/SET, and to the TEA through the appropriate chain of command.[476]

12.11.3.2 Test points associated with the unexpected test event will be placed on hold, but if the test team and the independent TSO concur, other unrelated test points can continue.[477] The independent TSO may choose to engage additional ISRs to determine which test points should be placed on hold.

12.11.3.3 Once suspended for safety, only the TEA (or higher) can authorize resumption of testing.[478] This authorization would be from the TEA associated with the affected test points.

12.11.3.4 Confirmed Unexpected Test Events must be reported via the 412 TW/SET UTE Tracker located on the 412 TW/SET SharePoint within one working day of the determination. For classified or sensitive programs, the 412 TW/SET may approve UTE tracking via other means. Do not include classified or proprietary information on the 412 TW/SET UTE Tracker.[479] Teams should enter the confirmed UTE details with the Status: "Open – Confirmed UTE".

12.11.3.5 The SRB chair may elect to reconvene the SRB to review and revalidate that all associated risks have been mitigated/addressed before the associated testing can continue.[480]

12.11.3.6 Once a recovery plan of action is determined, unexpected test events will be documented with a safety plan major amendment IAW Table A12.1 in AFTCI 91-202_412 TW SUP. Testing of the suspended test points may be resumed upon approval of the appropriate change documentation. The 412 TW/SET will determine the documentation method required for a UTE.[481]

- An amendment following an unexpected test event will describe the occurrence of the event, summarize the cause(s) as they are understood by either analysis or hypothesis, and identify the test team's intended path for the resumption of testing.[482] Any additional required changes (including mitigations) to address the UTE should be included in the amendment.
- See section 12.4 of this handbook for more guidance on major amendments.

12.11.3.7 The test team will send a RSR-A to 412 TW/SET of their desire to begin the safety review process for the major amendment.[483] The latest RSR-A email template is available on the 412 TW/SET SharePoint.

[475] AFTCI 91-202_412 TW SUP, A12.13.5
[476] AFTCI 91-202_412 TW, A12.13.1
[477] AFTCI 91-202, 7.4.2
[478] AFTCI 91-202, 8.2.2
[479] AFTCI 91-202_412 TW SUP, A12.13.3
[480] AFTCI 91-202, 7.4.2
[481] AFTCI 91-202_412 TW SUP, A12.13.2 / AFTCI 91-202, 7.4.3
[482] AFTCI 91-202, 7.4.3
[483] AFTCI 91-202_412 TW SUP, A5.3

12.11.3.8 Upon resolution of the UTE with appropriate documentation, the team must update the 412 TW/SET UTE Tracker with the resolution.[484]

12.12 Hazard Occurrence but Not a UTE.

12.12.1 If a hazard occurs or arises that is not considered an unexpected test event, it will be reported to the independent TSO assisting the test team as soon as practical (e.g., after post-test debrief).[485]

12.12.1.1 The TSO assisting the test team must be independent of the project being assisted. Consultation with 412 TW/SET satisfies requirements for TSO independence (see section 2.3 of this handbook for further information on TSO independence).

12.12.2 At a minimum, UTSOs will document the event as a lesson learned IAW AFTCI 91-202_412 TW SUP, Table A13.1.2, and include a description of the event in the test package closure amendment.[486] This information could be of use to future test teams in their safety planning.

12.12.3 If the test team determines the hazard occurrence requires additional mitigations not already specified in the test package, then the test team should consult 412 TW/SET on path forward.

12.13 NRR Changes/Amendments.

12.13.1 Test teams should evaluate the impact of any changes on the technical adequacy of the effort and safety planning for the effort. If NRR qualification criteria are no longer met, a formal safety review must be conducted.[487]

12.13.2 **Process Details.** Amendments will be documented via an updated test package and control number.

12.13.2.1 Teams will notify 412 TW/SET if an amendment is required via an RSR-A. 412 TW/SET will assign an updated control number[488] and provide preliminary concurrence. The test teams should provide justification on how the proposed changes still satisfy the NRR qualification criteria see section 9.0 of this handbook for more information.

12.13.2.2 Any changes to test planning documentation must be coordinated with the TRA. Documentation of TRA concurrence, digitally or via new TRM/RUGR, must be obtained and included in the amended test package.[489] The TRA concurrence should be documented in the pre-requisites section on the 412 TW Form 5002.

12.13.2.3 All amendment information (changes to test or safety plan) will be documented on the NRR template form under "Summary of Changes."[490]

12.13.2.4 Teams shall follow the NRR Review, Concurrence, and Approval guidance (outlined in section 9.0 of this handbook) to process NRR amendments.[491]

[484] AFTCI 91-202_412 TW SUP, A12.13.4
[485] AFTCI 91-202, 7.5
[486] AFTCI 91-202_412 TW SUP, A12.13.6
[487] AFTCI 91-202_412 TW SUP, A12.14.1
[488] AFTCI 91-202_412 TW SUP, A12.14.2.1
[489] AFTCI 91-202_412 TW SUP, A12.14.2.2
[490] AFTCI 91-202_412 TW SUP, A12.14.2.3
[491] AFTCI 91-202_412 TW SUP, A12.14.2.4

12.13.3 **Review Amendment.** The review amendment will follow the guidance specified in 12.7 of this handbook except that the 412 TW Form 5002 (or equivalent) will be used.[492]

12.13.4 **UTEs for NRR Package.** If changes to the NRR test package are required following a UTE, then teams will follow the guidance specified in AFTCI 91-202_412 TW SUP, paragraph A12.10 except that the 412 TW Form 5002 (or equivalent) will be used.

13.0 TEST EXECUTION

13.0.1 The procedures, restrictions, and mitigations documented in the safety plan must be observed while conducting the test to maintain the accepted level of risk. Safety plan requirements take precedence over those specified in the test plan. The test package is a contract between the test team and the TEA.[493]

13.0.2 In this section, the term "test cards" refers to any test execution documents describing the test activity procedures in a step-by-step or checklist format used by test teams to successfully complete test activities. They may be reused for multiple test projects but should not be overly general in documentation. Inherently, they should be a synopsis of operation, test and/or manufacturing technical data immediately available to reference for the test team in executing test activities safely, effectively, and efficiently.[494]

13.1 Test Card Preparation.

13.1.1 During test card preparation, the test team will review applicable GMPs and THAs to ensure the procedures comply with safety limits, procedural constraints or approved test plan requirements.[495]

13.1.1.1 The test card preparer will be responsible for ensuring all steps are in compliance with flight manual or similar operational manual guidance and current MAJCOM and AF level waivers.[496]

13.1.1.2 Test cards will be coordinated with the lead project operator (flight crew member, ground test tunnel operator, etc.) and the lead project engineer. The lead project operator and lead project engineer will ensure the test cards are IAW the test plan and verify compliance with the applicable manual and waivers. For a multidisciplinary test, the lead project test engineer referred to here may be replaced with the appropriate project test engineer(s).[497]

13.1.2 The minimum elements for a test card are specified in EDWARDSAFBI 99-105.[498]

13.1.3 For test team utilizing acceptance of safety planning across AFTC, the test execution materials (e.g., test cards or mission decks) may be developed by either the originating or supporting test wing. The organization creating the mission materials will adhere to local guidance for formatting, content and approval. Mission materials will be approved by the ETO in accordance with their local procedures.[499]

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[492] AFTCI 91-202_412 TW SUP, A12.14.2.5
[493] AFTCI 91-202, 7.1
[494] AFTCI 91-202, 7.2.1
[495] AFTCI 91-202, 7.2.2
[496] AFTCI 91-202, 7.2.2.1
[497] AFTCI 91-202, 7.2.2.2
[498] EDWARDSAFBI 99-105, 2.2.2
[499] AFTCI 91-202, 6.5.3

13.2 Test Card Approval.

13.2.1 Test cards must be approved prior to use during testing.[500]

13.2.1.1 All ground test and flight test events will be conducted from approved test cards.[501]

13.2.1.2 The test card approval authority will be informed of the safety risks and any applicable deviations or waivers and will have access to the test and safety plans.[502] Teams may request test card approval at the same time as the test package is approved.

13.2.1.3 AFTCI 91-202 specifies test card approval levels, but more restrictive approval levels are specified in EDWARDSAFBI 99-105; the more restrictive guidance takes precedent.[503]

- Low Risk: SQ/CC (or equivalent) approval signature
- Medium Risk: OG/CC (or equivalent) approval signature
- High Risk: TW/CC (or equivalent) approval signature

13.2.1.3.1 Test cards will be approved no lower than one organizational level below the TEA who approved the test (including the allowances in the notes of AFTCI 91-202, Table 6.1).[504] **Note:** This guidance is currently written based on the individual who approved the specific test package, not the lowest leadership level permitted to approve packages of that risk level.

13.2.1.3.2 Delegation of test card approval authority is authorized, at commander's discretion, to the deputy commander or deputy director. If a unit does not have a deputy commander or deputy director, then it can be the Commander/Director's designated representative (e.g., a Sq/DO or Director of Projects) who, per AFI 51-509, paragraph 7.2.4.2, "acts, at the direction of the commander, for the commander in the commander's name, just as is routinely done when the commander is present." This delegation will not be further delegated (e.g., Sq/ADO). If this person is also not available, then the card approver role will be assumed by the next higher leadership level.[505]

Example 1: If OG/CC approved a medium-risk test package, then AFTCI 91-202 permits the medium-risk test cards to be approved no lower than SQ/CC (or SQ/DD, IAW AFTCI 91-202, Table 6.1 Note 1). However, at 412 TW, medium-risk test cards may be approved by 412 OG/CC or 412 OG/CD.

Example 2: If AFTC/CC approved a high-risk test package (due to TW/CC unavailability, etc.), then the high-risk test cards may be approved no lower than TW/CC (or TW/CV, IAW AFTCI 91-202, Table 6.1 Note 1). The AFTC/CC's prohibition on TW/CV approving high-risk test packages does not extend to high-risk test cards,[506] and 412 TW policy allows high-risk test cards to be approved by 412 TW/CV.

[500] AFTCI 91-202, 7.2.3
[501] AFTCI 91-202, 7.2.3.1
[502] AFTCI 91-202, 7.2.3.2
[503] EDWARDSAFBI 99-105, 2.2.3
[504] AFTCI 91-202, 7.2.3.2
[505] Email sent on 25 February 2025 from 412 OG/CD to 412 TW/SET with the subject: "Suggested 99-105 Clarification for SET."
[506] AFTC/SET interpretation

Example 3: If 412 TW/CC approved a high-risk test package, then AFTCI 91-202 permits the high-risk test cards to be approved by OG/CC (or OG/CD, IAW AFTCI 91-202, Table 6.1 Note 1). However, at 412 TW, high-risk cards may be approved by 412 TW/CV.

13.2.2 The order or sequence of the test cards may have a direct effect on the safety of a given test mission. Approved test cards, or "test decks", may be reordered or re-sequenced without reapproval if there is no impact to the required buildup order or test safety. Test teams must ensure that test approach and build-ups, as defined or intended in the test and safety plans, are adhered to in all cases, and they should carefully analyze test point sequencing to avoid hidden pitfalls. Resequencing of test cards that would result in a violation of a safety build-up as prescribed in the safety plan requires a safety review and amendment to the safety plan.[507]

13.2.2.1 Approved test cards may be altered due to the prevailing test environment so long as the safety plan is followed.[508] For example, the test altitude could be modified to accommodate a cloud deck, provided that there are no safety concerns resulting from testing at a different altitude (such as TSM or physiological effects). Additionally, teams should consider the technical impacts of making such a change, and whether the test objective will still be met.

13.3 Test/Mission Execution Briefing. During the test/mission execution brief, the test team will address the procedures and restrictions specified in the safety plan. Test unique hazards applicable to the scheduled testing, risk minimizing procedures or controls, and go/no-go criteria must be briefed at the test/mission execution briefing. These can be captured in GMPs or THAs.[509]

[507] AFTCI 91-202, 7.2.4
[508] AFTCI 91-202, 7.2.4.1
[509] AFTCI 91-202, 7.3

14.0 REFERENCES

1. 412TW-TIH-22-01, *Test Plan Author's Guide*, 412th Test Wing, Edwards AFB, California, 16 November 2022.

2. AFI 11-215_AFMCSUP, *USAF Flight Manuals Program*, 1 August 2022.

3. AFI 21-101_AFMCSUP_EDWARDSAFBSUP, *Aircraft and Equipment Maintenance Management (Air Force Materiel Command/Edwards Air Force Base Supplement)*, 5 January 2022.

4. AFMAN 11-2FTV3, *Flight Test Operations Procedures*, 29 December 2020.

5. AFMAN 13-212V1, *Range Planning and Operations*, 14 March 2023.

6. AFMAN 13-212V1_EDWARDSAFBSUP, *Range Planning and Operations*, 22 January 2024.

7. AFMAN 11-214, *Air Operations Rules and Procedures*, 29 November 2022.

8. AFTCI 63-101_20-101, *Technical Order Writing Procedures*, 2 November 2018.

9. AFTCI 91-202, *Air Force Test Center Test Safety Review Policy*, 23 November 2022.

10. AFTCI 91-202_412TWSUP, *412th Test Wing Test Safety Review Policy*, 16 February 2023.

11. DAFI 91-202, *The Department of the Air Force (DAF) Mishap Prevention Program*, 10 April 2024.

12. DAFI 91-202_AFMCSUP, *The Department of the Air Force (DAF) Mishap Prevention Program (Air Force Materiel Command Supplement)*, 23 September 2024

13. DAFI 91-204, *Safety Investigations and Reports*, 10 March 2021

14. DAFI 91-204_AFMCSUP, *Safety Investigations and Reports (Air Force Materiel Command Supplement)*, 6 January 2022.

15. DAFMAN 11-401_AFMCSUP_EDWARDSAFBSUP, *Aviation Management (Air Force Materiel Command/Edwards Air Force Base Supplement)*, 16 May 2024.

16. EDWARDSAFBI 13-204, *Flying and Airfield Operations*, 28 June 2024.

17. EDWARDSAFBI 21-126, *Temporary 2 (T-2) Modification Program*, 27 February 2024.

18. EDWARDSAFBI 99-101, *412 TW Test Plans*, 15 September 2016.

19. EDWARDSAFBI 99-105, *Test Control and Conduct*, 13 September 2019.

20. DESR6055.09_DAFMAN91-201_AFMCSUP_AFMCGM2024-01, *Explosives Safety Standards*, 12 March 2024.

21. DoDI5000.89_DAFI99-103, *Capabilities -Base Test and Evaluation*, 12 September 2024.

22. DoDI5000.89_DAFI99-103_AFMCSUP, *Capabilities -Base Test and Evaluation (Air Force Materiel Command Supplement)*, 17 October 2022.

23. DoDI 6055.07, Change 2, *Mishap Notification, Investigation, Reporting, and Record Keeping*, 11 June 2019.

24. *R-2508 Complex User's Handbook*, Air Force Test Center, Edwards AFB, California, 23 April 2024.

25. *Delegation of Authority to Approve High Risk Tests Memorandum*, Scott A. Cain, Major General, USAF, Air Force Test Center, Edwards AFB, California, 9 August 2024.

26. *Delegation of RUGR Authority for NRRs Memorandum*, Daniel W. Osburn, 412th Test Wing, Edwards AFB, California, 27 April 2021.

27. *Policy on Test Approval Board Attendees*, Ryan A. Sanford, Colonel, USAF, 412th Operations Group, Edwards AFB, California, 25 September 2023.

APPENDIX A – ADDITIONAL UTSO GUIDANCE

A.1 Documentation Requirements.

A.1.1 The UTSOs will ensure all changes to the test package are documented in the test package summary of changes.[510]

A.1.2 The UTSOs will collect and document lessons learned throughout the test program for inclusion in the closure amendment; these may be technical, safety, or programmatic. Additionally, UTSOs will document hazard occurrences which are not a UTE.[511]

A.2 Active Test Package Library.

A.2.1 Each test unit Primary UTSO will develop and maintain a storage area or library for all active (i.e., approved but not-yet closed) test packages for tests conducted within their organization. This library may be electronic and/or physical and must include all test package documentation, updated through the most recent change/amendment, including Administrative changes. The 412 TW/SET SharePoint is an acceptable storage location for active unclassified test packages as long as any Administrative changes are captured by subsequent major/minor changes.[512]

A.2.1.1 The test team should have one truth source location for each test package. This location should have all the constituent documents related to the test package (i.e., Front Matter [e.g., Form 5001/5002 (or equivalent), amendment memorandum, coordination comments, SRBS memorandum, Summary of Changes], previously approved Front Matter, technical adequacy documentation [i.e., TRM/RUGR], Test Plan/Training Plan/Procedures, Safety Plan, Supporting Documents [e.g., waivers, TAB slides, etc.])

A2.1.2 Test package re-assembly will be accomplished after every original, major, or review amendment. Package re-assembly following a minor, closure, or administrative change is done by-request on a workload-permitting basis; please advise if you are requesting it. Regardless, the unit test package library must still include all test package documentation.

A.2.2 Each test unit utilizing the NRR process will ensure the unit's test package library includes active NRRs approved prior to the introduction of NRR control numbers in early 2020.[513]

A.3 Approved Test Package Archive.

A.3.1 Original test packages and amendments (i.e., major, minor, closures, review, and re-open) will be archived upon their approval. The default archive will be the 412 TW/SET SharePoint and 96 TW LiveLink site, releasability and classification restrictions permitting; the 412 TW/SET will accomplish the archiving to these sites. If the closed test package cannot be kept in the 412 TW/SET archive, it should be maintained by the test unit for as long as reasonably able. Administrative changes will not be archived by 412 TW/SET unless incorporated in an amendment which drives test package re-assembly.[514]

[510] AFTCI 91-202_412 TW SUP, A13.1.1
[511] AFTCI 91-202_412 TW SUP, A13.1.2
[512] AFTCI 91-202_412 TW SUP, A13.2.1
[513] AFTCI 91-202_412 TW SUP, A13.2.2
[514] AFTCI 91-202_412 TW SUP, A13.3.1

A.4 Unit Test Safety Program Inspections.

A.3.1 The 412 TW/SET will conduct reviews of each 412 TW test unit's test safety program IAW DAFI 91-202. These reviews are meant to provide feedback to both the test unit leadership and the 412 TW/SET on areas for improvement and sharing of best practices. The test unit Primary UTSO should support the inspection.[515]

A.3.2 Areas for review will be IAW the *Unit Test Safety Program Inspection Checklist*. The 412 TW/SET will make this checklist available to units. The UTSOs are highly encouraged to perform self-assessments regularly using this checklist.[516]

A.5 Best Practices for UTSOs.

A.5.1 General.

A.5.1.1 The UTSOs should reference the 412 TW/SET SharePoint regularly for relevant test safety information and provide this information to test units.

A.5.1.2 For units with more than one UTSO, Primary UTSOs should conduct at least one annual UTSO training session or equivalent meeting within the organization to ensure squadron test safety planning policies and processes are understood.

A.5.2 Develop and Maintain a Test Package Log.

A.5.2.1 The unit's Primary UTSOs should develop and maintain a Test Package Log for tracking the status and location of each test package for tests conducted within their organization. The log, if utilized, should be maintained IAW security classification requirements. At a minimum, the log should include the following information:

- Test package control number and title.
- Indication of test package status – OPEN or CLOSED.
- List of all amendments (in control number order) for each test package.
- Discrepancies with 412 TW/SET archive and the planned resolutions.
- Physical or electronic location of each test package. A direct link to the electronic storage location is recommended.

A.5.2.2 Regularly compare unit's Test Package Log with the archive maintained by the 412 TW/SET to ensure accuracy of the log and completeness of the archive.

[515] AFTCI 91-202_412 TW SUP, A13.4.1
[516] AFTCI 91-202_412 TW SUP, A13.4.2

A.5.3 Develop and Maintain an UTSO Continuity Book.

A.5.3.1 The unit's Primary TSO should develop and maintain an UTSO Continuity Book to ensure their organization's unique test safety information is available for reference by test unit personnel. The continuity book should be bookmarked for easy access to information and should contain the following:

- Test Package Tracking Log (see section A.5.2 of this handbook)
- Log of unit test safety training events including a list of topics covered and attendance list.
- Log of applicable correspondence, training, or reference material.
- Last inspection results memorandum.

A.5.4 Develop and Maintain a Lessons Learned List or Database.

A.5.4.1 The unit's Primary UTSO should maintain a tailored list or database of lessons learned applicable to the test unit, in addition to the repository on LiveLink.

APPENDIX B – QUALIFICATIONS, DESIGNATIONS, AND TRAINING OF TEST SAFETY PERSONNEL

B.1 PSLs.

B.1.1 PSL Qualification Requirements:

B.1.1.1 Completion of the 412 TW/SET Project Safety Lead training. USAF TPS students will obtain this training in the course of the curriculum.[517]

B.1.1.1 Observation of at least one formal SRB. This requirement will be tracked and documented by the unit. Exception: USAF TPS student PSLs are not subject to this observation requirement; the TPS Primary UTSO will ensure TPS student PSLs are sufficiently mentored to mitigate this lack of experience.[518]

B.1.2 The PSL for any given project will be assigned through internal squadron processes.[519]

B.1.2.1 The PSL must be an individual with test experience, must be familiar with the SUT, and should be involved in the test plan development when feasible.[520]

B.1.2.2 In cases where an external customer accomplishes test planning without 412 TW involvement, the PSL will additionally become familiar with the 412 TW assets involved.[521]

B.1.4 PSL Currency:

B.1.4.1 The PSLs will maintain currency by completing PSL continuation training annually, expiring on the last day of the 12th calendar month from the date the training occurred.[522] This currency is tracked on the 412 TW/SET SharePoint.

B.1.4.2 If PSLs are unable to renew their currency upon expiration, they may continue to serve as a PSL for up to one month beyond expiration per the discretion of the 412 TW/SET. The PSLs will work to regain currency at the soonest possible training opportunity.[523]

B.1.4.3 The PSLs more than 72 calendar months beyond their most recent PSL training date will renew their currency by re-accomplishing initial PSL training.[524]

[517] AFTCI 91-202, 2.2.3.1/ AFTCI 91-202_412 TW SUP, A14.1.1
[518] AFTCI 91-202_412 TW SUP, A14.1.2
[519] AFTCI 91-202_412 TW SUP, A14.2
[520] AFTCI 91-202_412 TW SUP, A14.3
[521] AFTCI 91-202_412 TW SUP, A14.4
[522] AFTCI 91-202_412 TW SUP, A14.5
[523] AFTCI 91-202_412 TW SUP, A14.5.1
[524] AFTCI 91-202_412 TW SUP, A14.5.2

B.2 UTSOs.

B.2.1 UTSO Qualification Requirements:

B.2.1.1 Completion of 412 TW/SET PSL Training[525]

B.2.1.2 Completion of 412 TW/SET UTSO Training and associated coursework.[526]

B.2.1.3 Participated in or observed at least one formal SRB prior to being designated an UTSO. This requirement will be tracked and documented by the unit.[527]

B.2.1.4 Sign as PSL on at least two 412 TW original test packages or amendments prior to being designated an UTSO. For at least one of these original test packages or amendments, the UTSO candidate must have signed as the PSL in Section I on the 412 TW Form 5001 (or equivalent) as part of a Formal SRB, ESR, or Combined TRB/SRB.[528]

B.2.2 UTSO Appointment Letters. Designation of qualified UTSOs will be accomplished in writing by the squadron commander (test unit commander, director or equivalent).[529]

B.2.2.1 The latest list of squadron commander-designated UTSOs will be made available to the 412 TW/SET and hosted on the 412 TW/SET SharePoint. The 412 TW/SET will make these appointments available to units.[530]

B.2.3 UTSO Currency:

B.2.3.1 The UTSOs will maintain currency by completing UTSO continuation training annually, expiring on the last day of the 12th calendar month from the date the training occurred.[531]

B.2.3.2 If UTSOs are unable to renew their currency upon expiration, they may continue to serve as an UTSO for up to one month beyond expiration per the discretion of the 412 TW/SET. The UTSOs will work to regain currency at the soonest possible training opportunity.[532]

B.2.3.3 The UTSOs more than 36 calendar months beyond their most recent UTSO training date will renew their UTSO currency by re-accomplishing initial UTSO training.[533]

B.2.3.4 The UTSOs more than 72 calendar months beyond their most recent UTSO training date will renew their UTSO currency by re-accomplishing initial UTSO training and participating in or observing at least one 412 TW formal SRB within the previous 12 calendar months.[534]

[525] AFTCI 91-202, 2.1.7.3/ AFTCI 91-202_412 TW SUP, A14.6.1
[526] AFTCI 91-202_412 TW SUP, A14.6.2
[527] AFTCI 91-202_412 TW SUP, A14.6.3
[528] AFTCI 91-202_412 TW SUP, A14.6.4
[529] AFTCI 91-202, 2.2.2.4/2.2.2.5
[530] AFTCI 91-202_412 TW SUP, A14.7
[531] AFTCI 91-202_412 TW SUP, A14.8
[532] AFTCI 91-202_412 TW SUP, A14.8.1
[533] AFTCI 91-202_412 TW SUP, A14.8.2
[534] AFTCI 91-202_412 TW SUP, A14.8.3

B.3 Independent Safety Reviewers (ISRs).

B.3.1 In all cases, ISRs must be independent of the test project.[535]

B.3.2 See section 3.7 of this handbook for additional details on ISR roles and responsibilities.

B.3.2 **SRB Chairpersons:**

B.3.2.1 Individuals selected as SRB Chairpersons will be approved in writing by 412 TW/SE.[536] Units may refer to the approved list of SRB Chairpersons on the 412 TW/SET SharePoint.

B.3.2.2 SRB Chairpersons Qualification Requirements:

B.3.2.2.1 Accomplish Initial PSL Training and SRB Chairperson Training.[537]

B.3.2.2.2 Prepare (as PSL, UTSO, or Project Operator) or review (as ISR) at least two 412 TW original test packages or amendments prior to being designated an SRB Chairperson. For at least one of these original test packages or amendments, the SRB Chairperson candidate must have had an active and substantial role in the preparation or review of a non-NRR test package, as indicated by their name appearing on a 412 TW Form 5001 (or equivalent) in Section I or Section II.[538]

B.3.2.2.3 Have 3 years test experience or have graduated from a recognized TPS.[539]

Note: Exceptions to these requirements or credit for equivalent experience may be approved by 412 TW/SE.[540]

B.3.2.2.4 Be a government employee.[541]

B.3.2.3 The SRB Chairpersons will perform a minimum of one SRB under the 412 TW/SET supervision prior to being permitted to perform SRBs independently.[542]

B.3.2.4 The SRB Chairpersons that have not chaired an SRB within the last 6 calendar months will undergo refresher training prior to chairing an SRB.[543]

[535] AFTCI 91-202_412 TW SUP, A14.9.1
[536] AFTCI 91-202_412 TW SUP, A14.9.2.1
[537] AFTCI 91-202_412 TW SUP, A14.9.2.2.1
[538] AFTCI 91-202_412 TW SUP, A14.9.2.2.2
[539] AFTCI 91-202_412 TW SUP, A14.9.2.2.3
[540] AFTCI 91-202_412 TW SUP, A14.9.2.2.4
[541] AFTCI 91-202, 2.3.2.6
[542] AFTCI 91-202_412 TW SUP, A14.9.2.3
[543] AFTCI 91-202_412 TW SUP, A14.9.2.4

B.3.3 **Technical Reviewers, Operations Reviewers, Other Reviewers:**

B.3.3.1 These ISR Qualifications:

B.3.3.1.1 Should be senior in test experience or have formal TPS training.

B.3.3.1.2 Should have applicable knowledge and sufficient expertise in the test activity to be reviewed.

B.3.3.1.3 Accomplish the ISR Training.[544]

B.3.3.1.4 Will maintain currency by completing ISR continuation training annually, expiring on the last day of the 12th calendar month from the date the training occurred.[545]

B.3.3.2 New Technical Reviewers may be proposed by a team. NH-4 flight chiefs and technical experts meet the requirements for knowledge and experience by definition of their position descriptions. For other personnel, the 412 TW/SET will verify with the individual's supervisor (e.g., for engineer personnel, the individual's flight chief) that the individual's knowledge and experience are adequate to serve as an ISR.

B.4 Test Package Approvers.

B.4.1 Unit commanders (or equivalent) or authorized delegates will accomplish TEA training before they approve test packages.[546]

B.4.2 Unit commanders (or equivalent) or authorized delegates should maintain currency by re-accomplishing TEA training whenever updates are published to AFTCI 91-202 or AFTCI 91-202_412 TW SUP.[547]

B.5 Training Currency Tracking.

B.5.1 The 412 TW/SET will track training currency for the following: PSL, UTSO, ISR, SRB Chairperson, and TEA Training. The 412 TW/SET will make the training currency tracker viewable by units. Qualifications more than 72 calendar months old will be purged from the training currency tracker.[548]

[544] AFTCI 91-202, 2.31/ AFTCI 91-202_412 TW SUP, A14.9.3.2
[545] AFTCI 91-202_412 TW SUP, A14.9.3.3
[546] AFTCI 91-202_412 TW SUP, A14.9.4.1
[547] AFTCI 91-202_412 TW SUP, A14.9.4.2
[548] AFTCI 91-202_412 TW SUP, A14.10

APPENDIX C – RECOMMENDED TEST PACKAGE LAYOUT

C.1 Form 5001 Test Package Layout.

C.1.1 The SRB Chairperson will assemble the test package for approval unless otherwise agreed-to by the test team.[549]

C.1.2 The test package is typically arranged with the layout shown in Table C1. If the package is electronic, all files should be uploaded to the 412 TW/SET SharePoint in appropriate folders corresponding to the tabs listed in the unit's eSafety Packages in Review. If the package is physical, a three-ring binder with clearly divided and labeled sections should be used.

Table C1 Recommended Form 5001 Test Package Layout

Document	Location In Test Package
-412 TW Form 5001 (or equivalent) -Coordination Comments -SRB Summary -Test Package Summary of Changes -Any approved and applicable amendment documented via memorandum format*	Front Matter
Previously Approved Front Matter -412 TW Form 5001 (or equivalent) from previous amendments -MFRs (i.e., amendments documents via memorandum) -Coordination Comments from previous amendments -SRB Summaries from previous amendments	Tab 1
Technical Adequacy Documentation (i.e., TRM/RUGR)	Tab 2
Test Plan(s)/Training Plan(s)/Procedures	Tab 3
Safety Plan	Tab 4
Supporting Documentation -TAB Slides -Waivers -SPO Chief Engineer Waiver Concurrence	Tab 5

* If the most recent amendment is a major amendment via memorandum format, the memorandum should be placed in the front matter and the 412 TW Form 5001 moved to Tab 1.

Front Matter. This section contains the latest 412 TW Form 5001 (or equivalent), any associated coordination comments, the associated SRBS memorandum, and the Test Package Summary of Changes.

Tab 1 – Previously Approved Front Matter. This section includes any previously approved Form 5001 (or equivalent) or MFR (i.e., amendment memorandum), any associated coordination comments, and the SRBS memo should be relocated to Tab 1. If the coordination comment page is blank, it does not need to be included in this section.

Tab 2 – Technical Adequacy Documentation. This section includes the signed TRM or RUGR provided by the TRA.

Tab 3 – Test Plan/Training Plan/Procedures. This section includes the approved test plans, any training plans, or procedures to be used for an activity and should be kept up-to-date.

[549] AFTCI 91-202_412 TW SUP, A6.11.4

Tab 4 – Safety Plan. This section includes the approved safety plan and should be kept up-to-date.

Tab 5 – Supporting Documents. Supporting documents should be attached in Tab 5 (engineering analysis/predictions, flight clearance or approval, results from previous testing, etc.). Once approved, all waivers required for testing should be included in Tab 5. If a TAB is conducted, the briefing slides must be included in the test package.[550] Teams should place these in Tab 5.

C.2 Form 5002 NRR Test Package Layout.

C.2.1 Test teams will compile the NRR form, TRM/RUGR, and the test plan, test procedures, and/or test information sheets into a test package (single document). 412 TW/SET may assist with this upon request.[551] The NRR test package is typically arranged with the layout shown in Table C2.

C.2.2 If the package is electronic, all files should be uploaded to the 412 TW/SET SharePoint in appropriate folders corresponding to the tabs listed in Table C2. If the package is physical, a 3-ring binder with clearly divided and labeled sections should be used.

Table C2 Recommended Form 5002 NRR Test Package Layout

Document	Location In Test Package
412 TW Form 5002 (or equivalent) -Coordination Comments on Form 5002 -Test Package Summary of Changes on Form 5002	Front Matter
Previously Approved NRRs -412 TW Form 5002 (or equivalent) from previous amendments -Coordination Comments from previous amendments	Tab 1
Technical Adequacy Documentation (i.e., TRM/RUGR)	Tab 2
Test Plan(s)/Training Plan(s)/Procedures	Tab 3
Supporting Documentation	Tab 4

Front Matter. This section contains the latest 412 TW Form 5002 (or equivalent) with any associated coordination comments and the Test Package Summary of Changes.

Previously Approved Front Matter. Following an amendment, the previously approved Form 5002, and any associated coordination comments should be relocated to Tab 1.

Technical Adequacy Documentation. This section includes the signed TRM or RUGR provided by the TRA.

Test Plan/Training Plan/Procedures. This section includes the approved test plans, any training plans, or procedures to be used for an activity and should be kept up-to-date.

Supporting Documents. Supporting documents should be attached in Tab 5 (engineering analysis/predictions, flight clearance or approval, results from previous testing, etc.). Once approved, all waivers required for testing should be included in Tab 5. If a TAB is conducted, the briefing slides must be included in the test package.[552] Teams should place these in Tab 5.

[550] AFTCI 91-202, 6.4
[551] AFTCI 91-202 412 TW SUP, A9.5.2
[552] AFTCI 91-202, 6.4

APPENDIX D – ABBREVIATIONS, ACRONYMS, AND SYMBOLS

Abbreviation	Definition
AA	amendment number
ACM	aircraft configuration manager
AD	Air Dominance
AFB	Air Force Base
AFI	Air Force instruction
AFMAN	Air Force manual
AFMC	Air Force Materiel Command
AFNET	Air Force network
AFRC	Armstrong Flight Research Center
AFSEO	Air Force Seek Eagle Office
AFTC	Air Force Test Center
AFTCI	Air Force Test Center instruction
AGE	aerospace ground equipment
AME	alternate mission equipment
AoA	angle of attack
AoB	angle of bank
AOL	aircraft operating limitation
AoSS	angle of sideslip
AR	aerial refueling
C2	command and control
C/MP	controls/mitigating procedure
CA/EP	correcting actions/emergency procedure
CAS	Contact Administration Service
CCB	complex control board
COCO	contractor-owned, contractor-operated
CONOPS	concept of operations
COOL	Center Operations Online
Coord	coordination
CTF	Combined Test Force
DAF	Department of the Air Force
DAFI	Department of the Air Force instruction
DAFMAN	Department of the Air Force manual
DCMA	Defense Contract Management Agency
DD	deputy director
deg	degree/s
deg/s	degrees per second
DESR	Defense Explosives Safety Regulation
DEW	directed energy weapon

Abbreviation	Definition
DEWSB	Directed Energy Weapon Safety Board
DIR	director
DO	director of operations
DoD	Department of Defense
DoDI	Department of Defense instruction
DOP	director of project
DRB	Design Review Board
DSN	defense switched network
DT&E	developmental test and evaluation
DTO	Distributed Test Operations
ESR	Electronic Safety Review
ETO	executing test organization
FAA	Federal Aircraft Administration
FOA	Flight Operations Authority
FOD	foreign object damage
FOLD	flight operations limit document
FoS	family of systems
FTE	Flight Test Engineer
FTS	flight termination systems
g	acceleration due to gravity
GMP	general minimizing procedure
HQ	headquarters
IAW	in accordance with
IFE	inflight emergency
ILSO	Installation Laser Safety Office
Info	information
IRB	Independent Review Board
ISR	independent safety reviewer
JCWG	Joint Checklist Working Group
KCAS	knots calibrated airspeed
KIAS	knots indicated airspeed
LAIRCM	large aircraft infrared countermeasures
LDTO	lead developmental test organization
LSO	laser safety officer
MAJCOM	major command
MCM	munitions configuration manager
MDS	Mission Design series
MED	medium
MFR	memorandum for record
MPG	Mission Planning Guide

Abbreviation	Definition
MRTFB	Major Range and Test Facility Base
M&S	modeling and simulation
N/A	not applicable
NAS	national airspace system
NGAD	Next Generation Air Dominance
NIOSH	National Institute for Occupational Safety and Health
NNMSB	Non-nuclear Munitions Safety Board
NNN	test package control number
No.	number
NRR	negligible risk review
Nz	normal acceleration
O&M	operations & maintenance
OBOGS	on-board oxygen generation system
OFP	operational flight plan
OPR	Office of Primary Responsibility
OSHA	Occupational Safety and Health Administration
P	roll rate
PDF	portable document format
PIC	pilot in command
PIRA	Precision Impact Range Area
PPE	personal protective equipment
PSL	project safety lead
PTO	participating test organization
Q	pitch rate
QA	quality assurance
QRB	Qualitative/Evaluation Review Board
R	yaw rate
RDT&E	research, development, test and evaluation
RFD	required-for-data
ROA	Range Operating Authority
RSO	Range Safety Office
RSOP	range safety operational plan
RSR	request for safety review
RSR-A	request for safety review – amendment
RTB	return-to-base
RUGR	Reasonable Use of Government Resources
SAF	Standard Air Force
SAFSO	squadron-assigned flight safety officer
SDP	standard/source data package
SOF	safety-of-flight

Abbreviation	Definition
SOH	safety and occupational health
SOP	summary of proceedings
SOT	safety-of-test
SPORT	space positioning optical radar tracking
SRB	Safety Review Board
SRBS	safety review board summary
SSRA	system safety risk assessment
SUP	supplement
SUT	system under test
T-2	temporary-2
TAB	test approval brief
T&E	test and evaluation
TEA	test execution authority
TEMP	test evaluation master plan
TEP	test essential personnel
THA	Test Hazard Analysis
TIH	technical information handbook
TIS	test information sheet
TLSO	test laser safety officer
TMP	test management project
T.O.	technical order
TOL	test operating limit
TPS	Test Pilot School
TRA	technical review authority
TRB	Technical Review Board
TRM	technical review memorandum
TSM	time safety margin
TSO	test safety officer
TW	Test Wing
UAS	unmanned aircraft system
U.S.	United States
USAF	United States Air Force
UTE	unexpected test event
UTSO	unit test safety officer
WWM	Wing weapons manager
YYYY	year
&	and
℃	degrees Celsius
℉	degrees Fahrenheit
-	negative

Abbreviation	Definition
±	plus or minus
+	positive

APPENDIX E – DISTRIBUTION LIST

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