



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY TO
NAVSEAINST 9093.1B
Ser 53/033
6 Jun 02

NAVSEA INSTRUCTION 9093.1B

From: Commander, Naval Sea Systems Command

Subj: COMBAT SYSTEM SHIP QUALIFICATION TRIALS FOR SURFACE SHIPS

Encl: (1) CSSQT Objectives, Definitions and Guidelines
(2) CSSQT Conduct Decision Tool
(3) NAVSEA CSSQT Review Metrics

1. Purpose. Provide policy and identify responsibilities for Combat System Ship Qualification Trials (CSSQT) for surface ships. This is a major revision to the previous instruction.

2. Cancellation. NAVSEAINST 9093.1A of 4 October 1988.

3. Background. CSSQT originated in 1960 with the introduction of semi-active guided missile systems into the surface Fleet. The purpose was to ensure an operational shipboard weapon system prior to the ship undergoing shakedown or refresher training. This was accomplished by providing shipboard technical assistance for maintenance training and system grooming after completion of industrial periods. As the complexity of the weapon systems onboard ships increased, so did the need to expand the concept of CSSQT to cover additional weapon and support systems and, under certain circumstances, the entire ship's combat system. Historically, ships completing new construction, modernization or overhauls were subjected to a series of post delivery (or post-overhaul) test and trial events including the combining of gun/missile SQT, Underway Replenishment (UNREP), and ASW Weapon System Accuracy Trials (WSAT), into a single CSSQT.

4. CSSQT Purpose. The purpose of CSSQT is to verify that an individual ship's combat/weapon systems have been installed correctly and can be operated and maintained in a safe and effective manner. This is accomplished by assisting ship's force in achieving (1) a sustainable level of combat/weapon system operational readiness and (2) a maintainable level of material readiness. Enclosure (1) outlines the detailed objectives, provides detailed scope and specific guidelines for the conduct of CSSQT.



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5. Policy. As a minimum, surface combatants, aircraft carriers, amphibious and auxiliary ships completing new construction, conversion/modernization and overhauls will be scheduled for CSSQT. Designating additional ships for CSSQTs upon the completion of intermediate availabilities (e.g., Selected Restricted Availabilities (SRAs) or Phased Maintenance Availabilities (PMAs)) will be determined by the Type Commanders and PEOs in coordination with NAVSEA 53. These decisions will be based on the extent of combat system changes made during the availability, or the cumulative effect of combat system changes since the last CSSQT. A Decision Tool is provided in enclosure (2), which assists in the determination of invoking a CSSQT and missile firing requirements. This will be reviewed during an annual meeting with the Type Commanders hosted by NAVSEA utilizing the metrics provided in enclosure (3). It is expected that all combat systems equipments and computer programs, including data links, will have met all certification requirements prior to the start of CSSQT and that all high priority trouble reports will have been resolved. CSSQT is intended to be the **final** qualification test, not another step in problem identification.

6. Responsibilities. Naval Sea Systems Command (NAVSEA) and the Fleet Type Commanders have joint responsibility for scheduling, coordinating, funding and conducting CSSQTs. Specific responsibilities are as follows:

a. NAVSEA. NAVSEA has responsibility for establishing CSSQT guidance, coordinating CSSQTs with Fleet commands and PEOs, and monitoring CSSQT programs.

(1) NAVSEA 53

(a) NAVSEA is the Technical Authority for CSSQTs.

(b) Establish and coordinate overall policy with the Fleet and other commands as necessary.

(c) Monitor CSSQT efforts and conduct (co-chair with Fleet Commanders) an annual review to ensure that CSSQTs are achieving desired objectives and define out-year CSSQT requirements in support of budget planning, Fleet scheduling and the D-30 Battle Force Certification Process.

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(2) Program Executive Officers (PEOs)

(a) Identify those surface combatants, etc., that require CSSQTs, and coordinate their scheduling with NAVSEA 53 and Fleet commands.

(b) Through the appropriate Program Managers, coordinate budgeting and funding the CSSQT program for ships/systems under their cognizance completing construction, conversion modernization or availabilities.

(c) In coordination with the NAVSEA Technical Authority, determine the efforts required to ensure adequate testing and training during CSSQT.

(d) Ensure that overall CSSQT objectives are met.

(e) Ensure scenarios are developed with test objectives that demonstrate combat system performance. Ensure that required T&E resources (i.e., ordnance, targets and test services) are requested and available that support the scenario(s).

(f) Assign responsibility for the planning, scheduling, coordination, and conduct of CSSQTs to the Execution Agent who will serve as the single point of contact during CSSQTs.

(g) Schedule and conduct appropriate test readiness reviews; i.e., Mission Control Panels, Mission Readiness Reviews, Range Readiness Reviews, etc., to ensure the participating ship, test range, and resources and services are available and ready to conduct CSSQT.

(h) Assign the CSSQT Execution Agent responsibility for submitting a qualification message to PEO/TYCOM/NAVSEA.

(3) Program Managers

(a) Coordinate budgeting and funding the CSSQT program for ships/systems under their cognizance completing construction, conversion modernization or availabilities.

(b) Ensure that overall CSSQT objectives are met.

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(c) Assign responsibility for the planning, scheduling, coordination, and conduct of CSSQTs to the Execution Agent who will serve as the single point of contact during CSSQTs.

(d) Schedule and conduct appropriate test readiness reviews; i.e., Mission Control Panels, Mission Readiness Reviews, Range Readiness Reviews, etc., to ensure the participating ship, test range, and resources and services are available and ready to conduct CSSQT.

b. Fleet Commands. Assist in the determination of CSSQT requirements and scheduling of Fleet air, surface and sub-surface assets, and make available OPTAR funds to maximize ship readiness to conduct CSSQT. Fleet Commanders will co-chair the Annual CSSQT review with NAVSEA 53. The annual review will decide which ships will require CSSQT and what type of CSSQT will occur (i.e., Live Fire, Non-Firing, etc.).

(1) Type Commanders

(a) Approve the coordinated CSSQT Schedule.

(b) Ensure that all prerequisite post-availability testing is accomplished prior to CSSQT.

(c) Ensure that ship's schedule allows for proper conduct of inport and at-sea phases of CSSQT. Scheduling should optimize resources and quality of life during Inter-Deployment Training Cycle (IDTC).

(d) Assist in the identification of K or D alts (equipment installs) requiring at-sea testing that can be done concurrently with CSSQT.

(e) Ensure that the CSSQT Execution Agent coordinates testing and Fleet training schedules to optimize sharing of assets.

(f) Ensure adequate OPTAR funds are available to maximize ship readiness to conduct CSSQT.

(g) Issue qualifications for systems that have successfully undergone trials.

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(2) Immediate Superior in Command (ISIC)

(a) Ensure ship's schedule allows for completion of required CSSQT events and accomplishment of CSSQT objectives.

(b) Monitor ship's progress throughout CSSQT and provide assistance as required.

(3) Participating Ships

(a) Develop a detailed Schedule of Events (SOE) with the NAVSEA CSSQT Execution Agent planning the CSSQT, and submit the schedule to the Type Commander for approval.

(b) Ensure required combat systems and crewmembers are available to support the SOE, and maintain close liaison throughout the entire CSSQT to make any required adjustments to the SOE.

(c) During the planning and conduct of CSSQT, participate in various test readiness reviews.

(d) Submit Test Observation reports (TOR) encountered to the CSSQT Execution Agent for inclusion in the lessons learned report.

c. CSSQT Execution Agent. Responsible for the overall planning and execution of CSSQTs for surface ships. Specific responsibilities include:

(1) Coordinate long-range CSSQT schedules, as well as target, ordnance, services requests and test objectives with affiliated PEOs and NAVSEA 53.

(2) Maintain the Technical Qualification Standard (TQS) Program for key members of the CSSQT team.

(3) Assign a Project Officer (PO), Project Engineer, and other CSSQT team members. Coordinate with other activities in identifying government and contractor personnel for the remaining CSSQT team assignments.

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(4) Coordinate the CSSQT SOE with the participating ship and ISIC, and identify crewmember and combat system availability requirements for the conduct of each scheduled event.

(5) Participate in the development and approval process for event scenarios.

(6) Develop a CSSQT test plan and other required documents.

(7) Participate in test readiness reviews to ensure the participating ship, test range, and resources and services are available and ready to conduct CSSQT.

(8) Assign a senior representative to be on-site during the conduct of the event to supervise the execution of live ordnance firing events, and to coordinate with the affiliated PEOs in resolving emergent test execution issues.

(9) Recommend the PEO qualify the combat system for applicable mission areas as safe and effective based on performance of combat system elements and crew during CSSQT. PEO will forward recommendations to Type Commander.

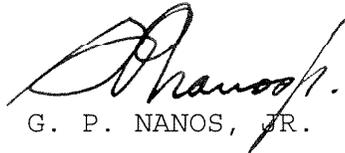
(10) Submit final and follow-up CSSQT reports, via naval message to PEO. Information copies should be provided to all participating activities, commands and other activities as appropriate. The final report will detail all CSSQT activities, problems identified, and recommended corrective action. The final report shall recommend appropriate qualifications or identify requirements for additional testing, firings and/or training necessary to obtain qualification. Follow-up CSSQT reports shall address status of open issues.

(11) Ensure lessons-learned are captured and provided to the units and activities. Format the lessons learned so they can be disseminated and used by teams conducting future CSSQT

d. Other Shore Engineering and Fleet Support Commands.
Assist the designated Program Executive Office, Program Manager, Type Commander and the CSSQT Execution Agent, in the formulation of CSSQT requirements, plans and procedures and provide technical support as required.

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7. Implementation. CSSQTs will be conducted in accordance with ship-specific CSSQT schedules. NSWC Port Hueneme shall issue CSSQT program schedules on a monthly basis based on inputs received from the CSSQT Execution Agents.



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Distribution:

SNDL A3	CNO
21A	Fleet Commanders in Chief and Detachments
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24A	Air Force Commanders
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26A	COMPHIBGRU
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26H	COMFLETRAGRU
26J	Afloat Training Group
26K	COMUNDERSEASURV Det
26MM	FLTILOTEAM
28A	COMCARGRU
28B	COMCRUDESGRU
28D	COMDESRON
28L	COMPHIBRON
29A	Guided Missile Cruiser (CG) (CGN)
29B	Aircraft Carrier (CV) (CVN)
29E	Destroyer (DD) 963 Class
29F	Guided Missile Destroyer (DDG)
31A	Amphibious Command Ship (LCC)
31G	Amphibious (LPH)
31H	Amphibious Assault Ship (LHA)
31I	Amphibious (LSD)
31N	Amphibious (LHD)
32H	Fast Combat Support Ship (AOE)
32N	Oiler (AO)
C28D	FTSC
C84A	NSWC
FA30	AFWTF
FB44	Pacific Missile Range Facility
FF8	PREINSURV only
FKA1A	COMNAVAIRSYSCOM
FKA1B	COMSPAWARSYSCOM
FKP1E	NUWC
FKP1H	Ordnance Center and Facility
FKP16	Ship Systems Engineering Station
FKP20	AEGIS Training and Readiness Center
FKP27	AEGIS Technical Representative
FKP4F	NWAS
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FKP8	Shipbuilding and Repair
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CSSQT OBJECTIVES, DEFINITIONS AND GUIDELINES

1. Objectives. The objective of the CSSQT program is to assist the ship in achieving a safe and effective combat system that can be maintained and operated by the ship's force on a continuing basis. This is accomplished by a combination of Planned Maintenance System (PMS) actions and inport or at-sea combat system engineering exercises. These exercises employ the combat system under test and ship's force in realistic environments (live or simulated/stimulated exercises). These actions provide a demonstration of the selected sub-systems, maintenance readiness and operational readiness. Measures of effectiveness (MOE) in assessing overall readiness include: System Documentation Adequacy, Logistics Support Adequacy, Maintenance Adequacy, Operation Adequacy, and other areas deemed as required by the Type Commander, PEO or appropriate Program Manager. The table below maps the revised goals, objectives, readiness requirements and readiness actions required to conduct a safe and effective CSSQT.

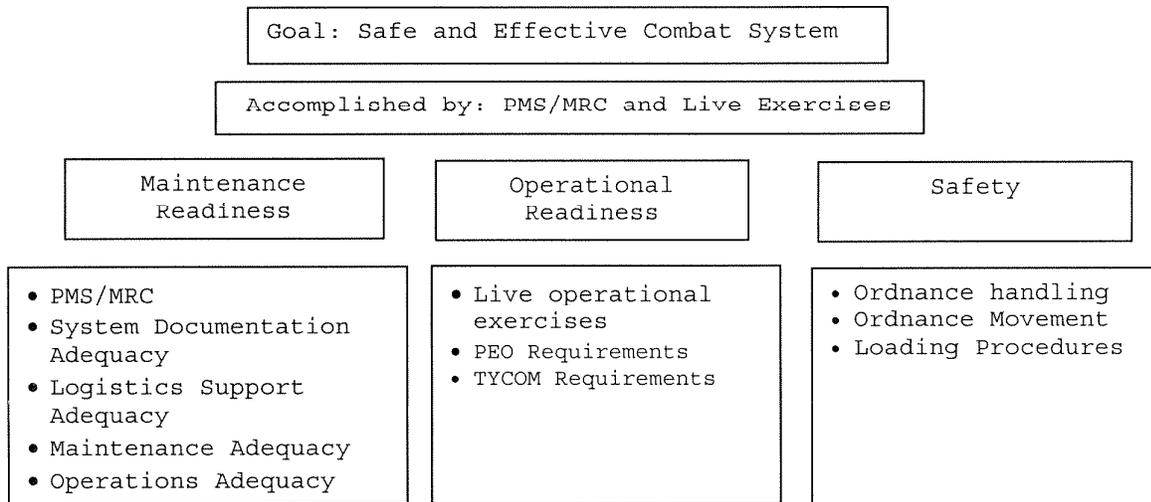


Figure 1

Safe and Effective: Safety is the condition of being safe from undergoing or causing hurt, injury, or loss. In the context of a Safe and Effective it represents the level to which risks of injury or damage (hazards) to personnel and equipment have been reduced to an acceptable level.

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The metrics of safety will vary based on the type and level of the subject under review. The following components of safety should be determined/measured:

- How many risks/hazards exist and what are they?
- How many incidents/mishaps have occurred and at what frequency?
- Is the frequency increasing/decreasing (Are incidents occurring more or less often)?
- How much (in dollars) are safety incidents costing the Navy?
- How are we informing the fleet (feedback responses, bulletins) and what effect has this information had?

Over time, a number of tools and measures have been utilized to assess the Effectiveness of equipment and systems. System Effectiveness has been defined as the probability of a system completing its mission. A cogent treatment of this subject states that system effectiveness (E) at any given moment is the result of the following three factors:

- The capability to perform the mission (PC);
- The availability of systems when needed (AO); and,
- Having the people trained and available to operate the system (PP)

All three factors are necessary for mission success.

a. Primary Objectives

(1) Demonstrate the capability of ship's force to operate and maintain ship systems and equipment and employ them individually and collectively in a safe and effective manner.

(2) Provide instruction and familiarization to ship's force in the maintenance and operation of the installed systems and equipment. In addition, provide instruction and familiarization in the use of all combat system level documentation as applicable (e.g., Combat System Technical Operations Manual (CSTOM), Combat System Alignment Manual (CSAM), Combat Systems Operating Sequencing System (CSOSS), Combat Systems Accuracy Trials (CSAT), Overall Combat System Operability Test (OCSOT) and Capabilities and Limitations Document).

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(3) Verify through actual demonstration, operational performance of the applicable combat systems, and where possible conduct operational exercises, if not previously verified.

b. Secondary Objectives

(1) Identify and document system and equipment deficiencies and provide feedback to the technical community.

(2) Identify and document system documentation, logistic and test equipment deficiencies and provide feedback to the logistics community.

(3) Identify deficiencies in training that would adversely impact the ship's battle group capabilities or ability to maintain a stable level of combat readiness.

(4) Provide realistic combat systems training in conjunction with meeting technical objectives.

(5) Optimize resources and quality of life by coordination of schedules with Fleet training and maintenance events.

2. CSSQT Scope

a. Combat System Ship Qualification Trials (CSSQT). CSSQT verifies mission critical elements of surface ship combat systems. The combat system is defined as a functional grouping of all the shipboard equipment and systems that are designed to detect, track, identify, communicate, process, evaluate and execute the engagement of enemy forces, either actively or passively. It is the war-fighting capability of the ship. Readiness is achieved by providing instruction on correct maintenance and operational actions, performing exercises to demonstrate system performance, material readiness, operator/maintainer proficiency and ensuring logistics adequacy and sustainability. The following systems shall be included in CSSQT:

- Air Defense Warfare (ADW) Systems
- Strike Warfare Systems (STW)
- Surface Warfare Systems (SUW)

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Underwater Weapon System (UWS)
Gun Weapon systems
Combat Direction Systems
Electronic Warfare Systems (including SRBOC)
Self Defense Systems
Tactical Local Area Networks (TLAN)
IFF Systems

While not part of the combat system, the following systems are critical to the success of the CSSQT, and to the safe and effective operation of the ship. Affiliated PEOs should include the following events in CSSQT:

Combat System Support Elements (Power, Dry Air, Coolant System)
IC/Navigation Systems
Underway Replenishment Systems (Missiles and Ammunition only)
Command, Control, Communications, Computers and Intelligence Systems
LAMPS and Armed Helicopters
Tactical Data Links
Signal Intelligence (including Combat DF)
Vertical/Underway Replenishment Systems

The CSSQT effort shall, if required, commence with auditing logistic support (Logistics Special Assistance Team - LOGSAT), publication accuracy (Publications Special Assistance Team - PUBSAT) and test equipment adequacy (Test Equipment Special Assistance Team - TESAT) for combat/ordnance systems. The effort then progresses from the maintenance by ship's force within the framework of the Planned Maintenance System (PMS) to the operation of individual systems through the more complex inter-system maintenance and operations. CSSQT culminates in a final demonstration of combat system operability through simulated and live firing exercises.

b. CSSQT Team. A team of experienced, TQS qualified engineers and technicians will be assembled to provide maintenance and technical operations instruction to shipboard personnel. The team may be designated to groom selected weapon systems with ships force assistance and provide PMS instruction. Composition of the team is based on the events scheduled during CSSQT.

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c. Weapon System Accuracy Trials (WSAT). WSAT is a standardized program conducted by the NAVSEA WSAT Execution Agent on Anti-Submarine Warfare (ASW) capable surface ships as part of the new construction or overhaul process. WSAT consists of a series of comprehensive dockside tests followed by on-range sensor accuracy tests and exercise weapon firings on a three-dimensional underwater tracking range where the performance of the entire ASW system is evaluated. Whenever possible WSAT is conducted concurrently with CSSQT, and the completion of WSAT dockside testing is a prerequisite for ASW test events. WSAT results are used by NAVSEA as the basis for granting ASW certification that the combat system can be operated and maintained in a safe and effective manner. Other at-sea WSAT tests may include exercise weapon firings against real and simulated targets.

3. Guidelines

a. General Conduct. Initial CSSQT visits are normally accomplished inport and are conducted to validate documentation, test equipment, onboard spares, and PMS procedures and to ensure proper operation of support systems such as dry air, electrical power and cooling systems. These visits must be conducted as early as possible to ensure that any corrective action can be taken before commencement of CSSQT. Initial phases of CSSQT are devoted to determining the basic operational condition of the equipment and the qualification of the ship's personnel through accomplishment of applicable PMS tests. Performance of PMS provides training for ship's force in both preventive and corrective maintenance. Live tracking exercises are introduced to further assess the performance of the systems and allow the maintenance personnel to observe the effect of their maintenance actions. After successful and stable combat system performance has been established, scenarios are introduced to allow for combat system operation and, if possible, operation in multi-threat environments. The final phase of the CSSQT shall consist of live firings on selected systems to serve as final verification of the safe and effective use of the combat system.

b. Formal Instruction. For CSSQT, formal instruction is conducted which provides sufficient knowledge to enable ship's force to operate and maintain their combat system and to ultimately support the successful conclusion of CSSQT. The instruction consists of structured discussions on capabilities,

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limitations, modes of operation, information flow and combat system level documentation, followed by extensive hands-on watch team training in combat system operations during the at-sea phases.

c. Certification. Systems that are certified during CSSQT must meet specified criteria established and published by formal certifying authorities. The appropriate Systems Command will provide a certification letter or message for those systems certified during CSSQT.

d. Qualification. Proper ship system(s) performance is the criteria used for recommending qualification to the Type Commander for those systems not requiring certification. This is accomplished by ship's force demonstrating their capability to maintain and operate the equipment or systems through simulated and live firings. The affiliated PEO will recommend safe and effective final qualification.

e. CSSQT Firing Exercises. The intent of CSSQT live firing exercises is to demonstrate the complete detect-to-engage weapon firing sequence. This enables the collection of engineering data for assessment of end-to-end performance of combat/weapon system(s), and provides the opportunity for ship's force to demonstrate their ability to safely and effectively operate the system(s).

(1) ASW firing criteria for WSAT is included in OD 40087, ASW Weapon System Accuracy Trials Program for Surface Ships. Successful completion of WSAT is desired prior to completion of CSSQT.

(2) Minimum number of ADW missile firings shall be determined based on the requirement to demonstrate full ordnance on target capability of the combat system. Minimum requirement shall include one missile firing per launcher.

(3) Autonomous Missile firings (e.g., Tomahawk, Harpoon, RAM) live firing requirements will be reviewed annually via the Fleet Commander/SEA 53 CSSQT review meeting. Accomplishment of certifications, maintenance, end-to-end checks, and simulated engagements should be included to enhance crew training and increase confidence in Surface Warfare/Strike Warfare (SUW/STW) systems.

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(4) Gun System firings, both surface and air, are conducted to demonstrate proper operation and gun battery alignment. Satisfactory qualification is determined by successful target engagements.

(5) Decoy Launching Systems (DLS) firings are conducted to demonstrate proper operation of EW equipment and to enhance crew training.

(6) Ensure scenarios are developed that demonstrate the combat system.

(7) Armed Helicopter anti-surface missile firings are encouraged, but not required. The target location, identification, communications, and engagement processes require a significant amount of crew coordination and should be exercised during CSSQT. Captive Air Training Missiles (CATM) can be used as an option to accomplish this event.

f. Duration. The duration of CSSQT is dependent upon:

- (1) The complexity of the system/Combat System
- (2) The types and numbers of systems onboard
- (3) The expertise of ship's force
- (4) Work accomplished during the availability

g. Scenario Guidance. CSSQT scenarios provide a challenging operational environment to achieve improved levels of training in all warfare areas through a coordinated series of exercises. Scenarios consist of single and multi-target engagements representing current and projected threats. Coordinated multi-warfare scenarios are conducted in clear and heavy Electronic Warfare (EW) environments incorporating Command and Control (C²), threat Electronic Attack (EA), own-ship EA and undisclosed profiles to achieve battle group readiness. Live and simulated weapons firings demonstrate systems operability and provide increased emphasis on team training required for safe and effective employment of the ship and its combat systems.

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h. Initial CSSQT Visits. Visits are conducted at dockside availabilities of opportunity. These availabilities should be of sufficient length to accomplish the required tasks (e.g., combat support system grooming, Interior Communications (IC) grooming and navigation system certification).

i. Test Plan. The test plan will provide an overall description of all events that are to be conducted during the CSSQT. Tests will be based on approved Test Objectives developed from rigorous, engineering-based requirements. The Project Officer will establish liaison with the ship and conduct an onboard briefing well in advance of the CSSQT. This briefing will address the test plan, recommended schedules and inform the ship's personnel of preparations required by the ship.

j. Ship Preparation. Ships that have been designated for CSSQT will receive maximum benefits if the following prerequisites are accomplished for CSSQT:

(1) Following the industrial period, the ship has successfully completed the required TYCOM post-availability assessment and has been recommended for continuation of follow-on evolutions.

(2) Sufficient formally trained personnel are onboard to adequately maintain and operate the equipment and systems.

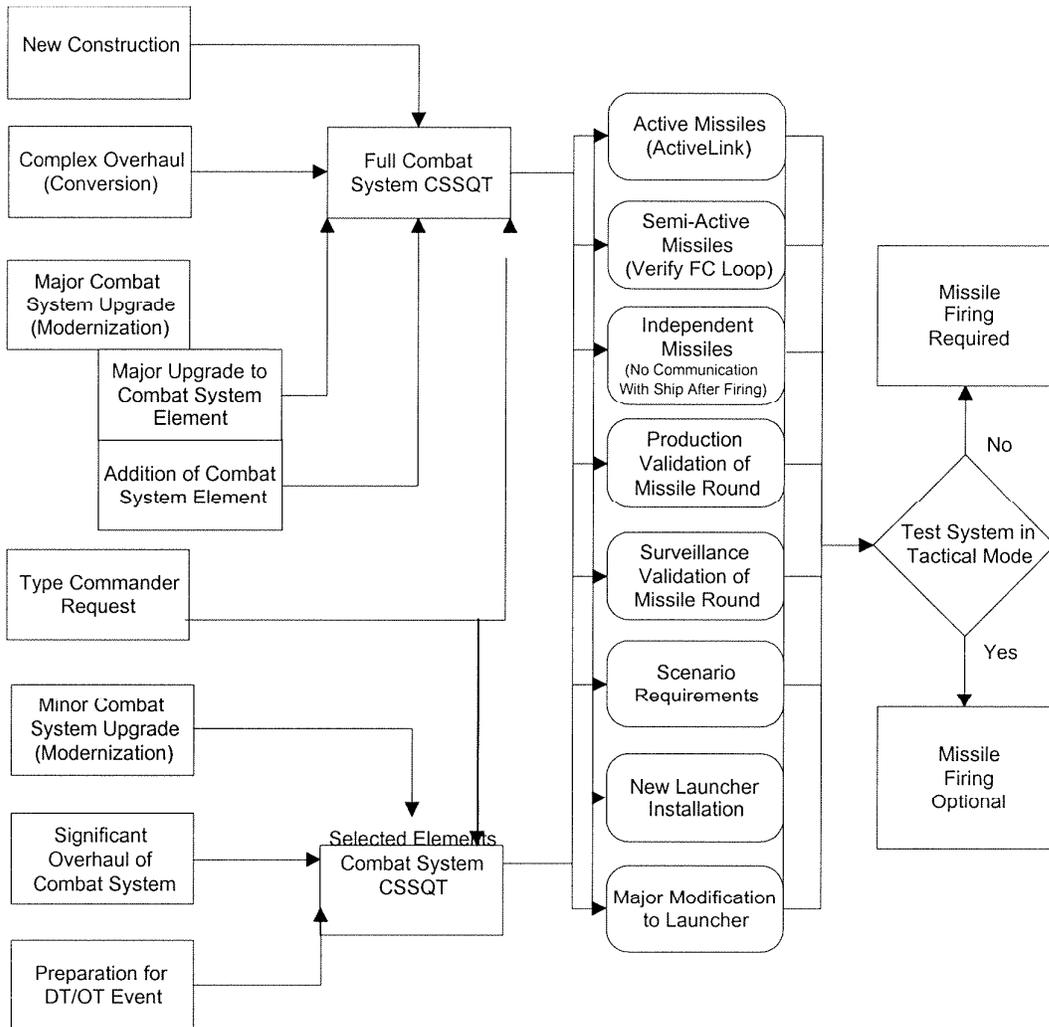
(3) Supporting test equipment for all systems is available, operable, calibrated and distributed to the appropriate work centers for use.

(4) All support systems are operable and capable of supporting the applicable system and equipment during CSSQT. Support systems include, but are not limited to chilled water, cooling systems, dry air, air conditioning and electrical power.

(5) Scheduling of tracking services, target services and firing range services are arranged in accordance with applicable instructions to support the CSSQT test plan. This effort is to be coordinated with the CSSQT Project Officer.

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CSSQT Conduct Decision Tool



NAVSEA CSSQT Review Metrics

Combat System Capability Overview. Discuss upgrades and capabilities added during availability or during new construction.

CSSQT Plan of Action and Milestones. Include events such as: Test and Evaluation Process, Test Objective formulation for upcoming CSSQTs, Test Plan Development schedule, Fleet Scheduling meetings, Scenario Development and Certification schedule, Readiness Review schedule, and finally the actual CSSQT schedule.

Test and Evaluation Process. Provide systems engineering process that determines or derives the engineering objectives for the CSSQTs under review.

Performance Assessment. Provide best estimate when WSPR and other post-trial performance reviews are scheduled.

Review Specific Reliability, Maintainability, and Availability Technical Requirements of each Combat System or Weapon System. Specifically the RM&A data of each component of the detect-to-engage sequence should be provided. Methods for deriving RM&A data should be briefly discussed.

Surface Ship Ordnance Data. The review of each surface ship weapon system, should include reliability specification requirements and certification intervals. The threshold confidence interval for reliability analysis is 90% with a goal of 95%.

Previous Missile Firing Data Summary. Provide a high level summary of rounds fired to date and a summary of scoring results in terms of successes divided by successes plus failures.

Ordnance Inventory Data. Provide the following information:

- Distribution of all missiles fired versus Time Since Last Round Level Test (TSLRLT)
- Distribution of Rounds in the Fleet versus TSLRLT
- Time missile spent in storage and where (launchers, magazines overseas or CONUS)

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- Built in Test Function availability.

Number of Firings Required to Complete Reliability Analysis.
Establish the number of firings or pre-flight checks required for a 90% (95% objective) confidence interval in missile reliability throughout its certification period. A binomial statistical approach should be used, with the above ordnance inventory data, to establish the number firings (samples) needed to meet required confidence intervals.

Recommendation for Live Firing Events. The amount of live firing should be recommended based on previous firing data, TSLRLT, confidence intervals, and engineering objective-based scenarios for each warfare area.

Other Issues. Include all relevant technical, programmatic, financial issues requiring NAVSEA support. Open technical issues remaining from previous CSSQs or Fleet firings should be presented. Additionally present lessons learned from previous CSSQs or Fleet firings.