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DEPARTMENT OF THE NAVY
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UNITED STATES PACIFIC FLEET
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IN REPLY REFER
5830
Ser N00/026
28 Mar 14

FINAL ENDORSEMENT on CAPT [redacted], USN
ltr of 20 Dec 13

From: Commander, U.S. Pacific Fleet
To: File

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013

1. (U) I have reviewed the subject investigation and approve the Investigating Officer's (IO) findings of fact, opinions, and recommendations, as modified by the three intermediate endorsements and this final endorsement.

2. [redacted] Executive Summary

a. [redacted] Background. [redacted] On 16 November 2013, USS CHANCELLORSVILLE (CG 62) (CHV) and USS JOHN PAUL JONES (DDG 53)(JPJ) were participating in the Combat Systems Ship's Qualifications Trials (CSSQT) for CHV's installation of the AEGIS Weapons Systems Baseline 9A program. In particular, they were executing CSSQT Test Plan event ADW-LF-09. LF-09 was intended to test [redacted] successfully accomplish [redacted]. While originally a [redacted], the final approved plan made [redacted] and all [redacted] Specifically, [redacted] profile: the [redacted]e, and the [redacted] Both [redacted]. The targets were intended to [redacted]

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Derived from: Multiple Sources
Declassify on: 18 December 2023

[redacted] On the day of execution only two BQM-74s successfully launched. The decision was made by the Test Conductor and the Test Director to continue the presentation with the two functioning BQM-74s in flight. The [redacted] The two targets [redacted] Due to unauthorized changes to CHV's Auto-SM doctrine statement, the presentation did not trip CHV's weapons doctrine and, as a result, the ship conducted a manual simulated Evolved Sea Sparrow Missile (ESSM) engagement. The manual ESSM engagement was consummated at [redacted] During this presentation, Target 1's (T1) control system failed, causing it to ignore the turn-away command given by the Test Conductor At the 2.5 NM mark, [redacted] with CHV if it continued on course and speed, which it did.

[redacted] When the drone did not turn out [redacted] CHV watch standers believed, incorrectly in part due to the manual ESSM engagement of T1, that the target tracks were "coasting"; they did not realize that the test team was trying to establish control of the drone. The ship's Close-In Weapons System (CIWS) operator received a "recommend fire" alert at his console [redacted] The operator reported the alert verbally in CIC but did not pass the alert over an internal control net. In accordance with the ship's standard procedures at the time, only the Air Warfare Coordinator (AWC), Tactical Action Officer (TAO) or the Commanding Officer (CO) had the authority to authorize engagement. While the AWC did hear the "recommend fire" call, he did not act on it. Furthermore, the Test Conductor did not immediately call a "Rogue Drone" when T1 failed to turn away [redacted] The drone struck the ship at 13:14:00. The Test Conductor called "Rogue Drone" at 13:14:17.

[redacted] The drone struck the ship at (Port Break), penetrating the watertight bulkhead of [redacted] causing both Class Alpha and Class Charlie fires. The impact and resulting damage caused minor injuries to two CHV Sailors. Fortunately, no one was killed. The cost to repair CHV [redacted] and will take approximately six months to complete. This incident caused the temporary loss of one of the U.S. Navy's front-line combatants and delayed [redacted]

b. (U) Causation. The Investigating Officer (IO) concluded that the failure of the System for Navy Target Control (SNTC) hardware/software interaction with the BQM-74E target drone was the primary cause of the drone hitting the CHV. I concur. Post-event reconstruction showed the Master Control Console (MCC) and the Backup Control Console (BCC), - the devices designed to coordinate all systems functions, including transferring control of the targets between the Target Control Consoles (TCCs) - were operating in conflict with one another. Moreover, there were no indications apparent to anyone in the control room that this conflict was occurring during the target presentation. The failsafe sequence to "pull the plug" on the BQM-74E - controlled via SNTC from the range operations center - takes at least 11 seconds from when the decision is made to "pull the plug" to when the drone responds.

[redacted] The IO opined that organizational flaws at Point Mugu contributed to the incident; namely, there was no dedicated range safety person in the control room because the exercise was a track-ex instead of a missile-ex. I concur. Functionally, personnel assigned were responsible for flying, tracking, testing, and/or collecting data as their primary duties. Safety of the ship was an additional vice primary duty/responsibility. Moreover, there were individuals at the range and on the ship positioned to prevent or mitigate the problems caused by SNTC malfunction. However, despite training and briefings, virtually everyone involved in this exercise believed the possibility of a drone actually hitting the ship was extremely remote. They were focused on the targeting and data acquisition components of the exercise vice the physical safety concerns presented by aiming a drone directly at a ship. This false confidence in the system adversely affected the time it took to both recognize and act on the problem. Additionally, the investigation revealed that the crew believed that previous drone presentations during CSSQT,

[redacted] Thus the "recommend fire" was not seen as a definitive indication of a threat to the ship.

(U) The target control team and CHV leadership each had independent opportunities to prevent this mishap. Instead, they failed to properly manage risks posed by target drones conducting [redacted] zero CPA profiles on CHV.

(U) During this mishap, the target control team violated the essential trust relationship required between a range and a ship when firing a target drone directly at the ship. Prior to the launch of the BQM-74E drones, one of which impacted CHV, the control team knew the target drone control system had failed or exhibited abnormalities several times that day; yet, the controllers decided not to stop the event and chose not to communicate these control problems to CHV for the ship's situational awareness. I question this control team's ability to continue to adequately service Pacific Fleet ships.

(U) However, notwithstanding the control team's failures, the IO determined that CHV's CO had the obligation and means to defend his ship, which he failed to do. I concur. The CO's enduring responsibility that places safety of his ship as paramount per Navy regulations was not sufficiently met in exercise preparation, rehearsal, pre-briefing and execution. My conclusion is not diminished by independent target and range related factors described above and elsewhere in this endorsement.

3. (U) Findings of Fact (FoF). I concur with and approve the IO's FoFs as previously modified and supplemented by the intermediate endorsers, subject to the following:

a. (U/FOUO) FoF 128 is approved as modified: (U/FOUO) The script did not include actions to engage a drone with CIWS or a procedure to determine whether the missile was continuing inbound after the planned turn out point. [Encl 51]

b. (U) FoF 202, previously modified in Commander, U.S. THIRD Fleet's endorsement, is approved as modified: (U) Naval Air Warfare Center Weapons Division (NAWCWD) Threat Target Systems Department initiated an engineering investigation to determine the root cause of observed System for Navy Target Control (SNTC) malfunctions. The investigation determined that the SNTC was incorrectly configured and caused a significant

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013

increase in network message transmissions and system instability. [Encl 14, 57]

c. (U) Add FoF 208: Control Room Alpha was not used due to a known SNTC network problem. [Encl 15]

d. (U) Add FoF 209: Backup Target Control Console (TCC) positions were not manned with personnel at their stations 30 seconds prior to impact; the TCC3 operator had been standing behind the TCC2 operator, and the TCC4 operator had been positioned near the Master Control Console (MCC). [Encl 25]

4. (U) <u>Opinions</u>. I concur with and approve the IO's opinions as previously modified and supplemented by the three intermediate endorsers, subject to the following:

a. (U) Add Op 28: (U) NAWCWD did not appreciate the collective effect of the individual target control system anomalies and failures, causing them to fail to take appropriate actions to minimize risk to CHV. [FOF 51-52, 63-68, 72-73, 208]

b. (U) Add Op 29: (U) CHV's CO failed to develop and implement a process that used all available sensor information to determine whether the target drones were continuing inbound after they passed through the planned turn away range circle. [FOF 128]

c. [redacted] Add Op 30: [redacted] CHV's Combat Information Center (CIC) team relied upon a "Rogue Drone" call by the target range as the <u>sole indicator and warning</u> to determine whether the target drone was a threat. When they did not hear a "Rogue Drone" call, they did nothing to protect the ship (e.g. fire CIWS). CHV's watch team failed to recognize and act upon the immediate threat indicated by CIWS "Recommend Fire." [FOF 125, 128-129, 132, 155]

d. (U) Add Op 31: (U) Despite the real risk presented by the target drone, CO, CHV failed to establish positive command and control between personnel with "Batteries Release" authority and the CIWS RCS operator. [FOF 51, 157-159, 163]

e. [redacted] Add Op 32: [redacted] As outlined in FOFs 136-142, CHV's Combat Systems Coordinator (CSC) changed [redacted]

AEGIS Auto-SM doctrine without informing the CO - an action that contravenes standard practice within the AEGIS community that only the CO can approve a change to [redacted] This unauthorized change precluded activation of the doctrine and added to the confusion in CIC during the inbound drone presentation by lowering the maximum speed to 500 knots. The inbound drones, traveling just over 500 knots due to a prominent tail wind, did not activate the Auto-SM weapons doctrine. The result: CHV leadership and watch standers, expecting auto-engagements, were distracted attempting to conduct manual engagements while the T1 drone continued inbound. [FOF 136-142]

f. (U) Add Op 33: (U) The Executive Officer (XO) was not present in CIC where he could have served as an experienced observer by providing forceful backup. [FOF 175]

5. (U) Actions. I concur with and approve the IO recommendations as previously modified and supplemented by the three intermediate endorsers, subject to modifications below. Further, in the subparagraphs below, I delineate the actions I will take, the actions I direct Commander, Naval Surface Force, U.S. Pacific Fleet (CNSP) and Commander, THIRD Fleet (COMTHIRDFLT) to take, and the actions I request Naval Sea Systems Command (NAVSEA) and Naval Air Systems Command (NAVAIR) to take.

a. (U) I concur with the recommendation from CNSP that no punitive action be taken concerning the CO, USS CHANCELLORSVILLE. I will take appropriate administrative actions with the CO concerning his failure to defend CHV.

b. (U) By copy of this endorsement, I direct CNSP to take appropriate administrative action(s) concerning the CHV's Tactical Action Officer, Anti-Air Warfare Coordinator, and Combat System Coordinator at the time of the incident.

c. (U) By copy of this endorsement, I direct that zero CPA drone presentations in the Pacific Fleet remain suspended until a comprehensive range safety plan is developed and implemented for the safe execution of zero offset radial inbound tests and the Commander, Naval Sea Systems Command recommends resumption. I retain exclusive authority to resume zero CPA drone presentations until further notice.

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d. (U) By copy of this endorsement, I direct CNSP and COMTHIRDFLT to incorporate lessons learned from this event in future school house training pipelines, waterfront training for combat systems watchstanders, and future range safety briefs and provide a plan of action and milestones to accomplish this to the Deputy Commander, U.S. Pacific Fleet (DCOM) within thirty-days of the date of this endorsement.

e. (U) By copy of this endorsement, I request NAVSEA take the following actions:

(1) (U) Advise me when zero CPA drone presentations can be safely resumed.

(2) (U) Determine alternative approaches to Anti-Ship Cruise Missile testing along with a comprehensive range safety plan.

(3) (U) Conduct technical analysis, modeling and simulation to determine actual risk to ships in the event a drone is engaged using CIWS. There is a widespread belief in the Fleet that CIWS engagements of BQM-74 drones within 2 nautical miles will result in significant shrapnel damage to the ship.

(4) (U) Ensure that any adjustments to AEGIS weapons doctrine of ships conducting live fire and tracking exercises are fully briefed to all participants and are correct for the event as planned.

(5) (U) Define the ship's self-defense zone for each target presentation to ensure adequate stand-off and timely unit response for any exercise where unmanned airborne targets will fly in proximity to a ship.

f. (U) By copy of this endorsement, I request NAVAIR take the following actions:

(1) (U) Take appropriate administrative action(s) concerning the test conductors and MCC operator.

(2) (U) Determine the root cause of the SNTC abnormalities and implement appropriate corrective action.

(3) (U) Evaluate SNTC as a system; specifically, evaluate whether the proposed SNTC Engineering Change Proposals, if implemented, are sufficient to address the many interface, frequency, and control issues that presently create safety concerns.

(4) (U) Evaluate the organization and manning of the control room during drone exercises to facilitate effective and timely communication and decision making with regards to the safety of the ship, particularly in zero CPA presentations.

(5) (U) Conduct technical analysis to determine if a "kill switch" that will immediately terminate a drone flight should be developed and implemented when presentation requirements dictate flight profiles close aboard to ships; further, determine if the ship should have ability to initiate this sequence.

(6) (U) Determine how future range safety briefs can better inform shipboard personnel about design limitations and actions to be taken in the event of system malfunction or abnormal operation, including when a ship should activate self-defense systems during live tracking events. These procedures should detail any condition that activates automated self-defense systems, expected actions the ship will take when these indications are evident, and what, if any, conditions would cause the ship to impede automated self-defense systems for engaging a target.

6. (U) Conclusion. In the Naval profession, we expect and trust our Commanding Officers to execute their duties with the utmost attention to detail, and we hold them accountable when they fail. Likewise, we must set the conditions for success with our supporting actions. In this case, the personnel and systems designed to support and execute this complex test of CHV's combat system failed. Multiple indicators of control system anomalies were discounted or ignored. The control team failed to present a safe target profile to CHV and in so doing, put the ship at risk.

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(U) However, I expect and trust my COs to operate their ships and sophisticated combat systems with confidence and precision, especially in circumstances of ship defense. The CHV CO did not sufficiently meet his enduring responsibility to place safety of his ship as paramount in exercise preparation, rehearsal, pre-briefing and execution. This responsibility is not diminished by independent target and range related failures. The CO, CHV did not do everything he could and should have done; he failed to use the full range of tools available to him to protect his ship. He allowed his Combat Systems Coordinator to change AEGIS weapons doctrine without informing him, and he did not adequately train his watch team to recognize an impending threat to his ship and properly respond. His failure particularly concerns me given his experience and knowledge of AEGIS ships, as this was his second AEGIS command and he had been Operations Officer in an AEGIS Cruiser before that. It was his duty to fully understand and execute the fundamental principle of protecting his ship. He failed to do so.

(U) Finally, the damage control efforts of the crew are commendable. The actions of the first responders, in particular, were instrumental in quickly limiting the spread of damage and likely saved lives. Their actions are in keeping with the highest traditions of the Naval service and are deserving of admiration and recognition.

HARRY B. HARRIS, JR.

Copy to:
CNO (DNS, OJAG)
COMUSFFC (N00, N01, N7)
COMNAVSURFPAC
COMTHIRDFLT
COMCARSTRKGRU 9
COMNAVAIRSYSCOM
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CO, NAWCWD
CAPT [redacted]

DEPARTMENT OF THE NAVY
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IN REPLY REFER TO
5830
Ser N00/161
21 Feb 14

THIRD ENDORSEMENT on CAPT [redacted] USN,
ltr of 20 Dec 13

From: Commander, Naval Surface Force, U.S. Pacific Fleet
To: Commander, U.S. Pacific Fleet

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013 (U)

1. (U) Forwarded, concurring overall with the findings of fact, opinions, and recommendations of the investigating officer (**IO**), as modified and endorsed by Commander, U.S. THIRD Fleet (**C3F**) and Commander, Carrier Strike Group NINE (**CCSG-9**), subject to comments below.

2. (U) The investigation report accurately and thoroughly details the technical problems that caused the drone to fail to maneuver, and ultimately strike CHANCELLORSVILLE (**CHV**). This endorsement focuses on actions onboard CHV, and whether the drone could have been stopped with organic ship defenses given the attendant conditions and test parameters under which the watch team was operating.

3. [redacted] The key factors leading to the drone strike that occurred during a zero CPA tracking exercise for CHV Combat Systems Ship Qualification Trial (**CSSQT**) were equipment malfunction and inadequate and untimely recognition of these malfunctions. These issues were compounded by a failure to call "rogue drone" prior to the drone strike. Although CIWS received a "rec fire" on CHV, there was inadequate time for watch standers to process the situation and consummate the engagement in the absence of a definitive "rogue drone" call. The original report notes there were [redacted] fire." However, the [redacted]

[redacted]

4. (U) Findings of Fact (FoF). I concur with the IO FoFs as modified by C3F and CCSG-9, subject to the following:

a. (U) **New CNSP FoF #207** (*numbered in series is added to the IO Post-Event section*) as follows: "There was no detailed prior to system operation checklist for SNTC. [Encl (57)]"

5. (U) Opinions. I concur with the IO opinions as modified and supplemented by C3F and CCSG-9, subject to the following:

a. [redacted] **IO OPs #13 and #15: Concur as amplified.** Technical authorities at the missile range were indecisive when acting on the available information that the drone and associated control equipment were malfunctioning. Uncertainty and human error in internal reporting, combined with a casualty not previously experienced by watchstanders using SNTC, caused the drone's operation control room to delay making the "rogue drone" call. These delays caused the "rogue drone" call to occur [redacted] and after the drone impacted CHV, and affected the watch team's posture regarding what it perceived was occurring and how to respond to the threat. [FF 89-111]

b. [redacted] **IO OP #19: Concur as amplified.** Changes made to the [redacted] doctrine were based on technical representative input directly to the watchstander. The CO was never apprised of this or afforded the opportunity to review/approve the weapons doctrine. The manual ESSM engagement [redacted] This [redacted] and drew attention away from the developing situation with the drone. [FF 38, 133-134, 136-138, 152-160]

c. [redacted] **IO OP #21: Concur as amplified.** The drone egress circle of [redacted] In the absence of [redacted]

d. [redacted] **CCSG-9 OP #24** *(numbered in series from the basic correspondence, at para. 6.b of the First endorsement)*. **Concur in principle, but the opinion lacks supporting evidence.**

> The opinion states, [redacted] "*There existed throughout the supervisory watch team a pervasive belief that track-ex's, including LF-09 Mod 0, were intrinsically less dangerous than live fire events. Yet, any zero (0) CPA drone presentation is potential is potentially dangerous. Shipboard preparations for the event focused on dealing with the event's complexity (quad presentation), rather than its intrinsic hazards. [FF 9-14, 21, 121-129, 132-134]*"

<u>CNSP Justification</u>: While there may be [redacted], it is [redacted].

e. [redacted] **New CNSP OP #26** *(numbered in series from the basic correspondence and additional opinions of the CCSG-9 First Endorsement paragraphs 6.a-c)*: "The [redacted] resulted in [redacted] [FF 9-13, 129]"

<u>CNSP Justification OP #26</u>: During the [redacted] Additionally, r[redacted] were discussed and it was established that "[redacted]. During previous tracking events, [redacted].

f. [redacted] **New CNSP OP #27** *(numbered in series from the basic correspondence and additional opinions of the CCSG-9 First Endorsement paragraphs 6.a-c)*: "Had the [redacted] there could have been a [redacted] [FF 153, 159-161]"

CNSP Justification OP #27: There is no [redacted]. Although [redacted].

6. (U) Recommendations. I concur with the IO recommendations as modified and supplemented by C3F and CCSG-9, subject to the following:

a. (U) **I do not recommend punitive action.** The Commanding Officer (**CO**) is ultimately responsible for the safety of the ship and crew. In this instance however, the CO was placed in a environment where the decision cycle timeline and ranges were so tight, that a "rogue drone" call was necessary to make a "kill call" in order to prevent an engagement of a drone that was in a normal egress flight path. Had the CO acknowledged and treated every "rec fire" as an indication that a drone strike was imminent, he could have erroneously engaged multiple drones during the evolutions prior to this event. Since the CO was placed in a position where an undesirable outcome was pre-determined (possibly shoot a drone that was properly egressing or fail to recognize a drone that would impact the ship without a rogue drone call), punitive action would not be appropriate.

b. (U/FOUO) **I recommend copy of this report be provided to PEO IWS and tests remain suspended**, until a comprehensive range safety plan is developed and implemented for the safe execution of zero offset radial inbound tests.

c. (U/FOUO) I recommend PEO IWS develop and include in all range safety briefs a clear procedure for when a ship is to activate self defense systems during live tracking events. These procedures must detail any condition that activates automated self defense systems, expected actions the ship will take when these indications are evident and what, if any, conditions would cause the ship to impede automated self defense systems from engaging a target.

d. (U/FOUO) I recommend a ship's self-defense zone be defined to ensure adequate stand-off and timely unit response for any exercise where unmanned airborne targets will fly in proximity to a ship. Any target passing inside will be engaged within the discretion of the commanding officer.

7. (U) Conclusion. The CO of the CHV was placed in a position where he was not armed with the information he needed regarding the SNTC and range limitations to terminate the drone presentation. Without the range calling "rogue drone," he did not have sufficient battle space or time to take proper steps to defend the ship. It is unfortunate that it took this costly, and fortuitously not deadly, event to recognize and move to correct stated deficiencies in zero CPA testing and range procedures.

T. H. COPEMAN

Copy to:
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COMCARSTRKGRUNINE

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DEPARTMENT OF THE NAVY

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IN REPLY REFER TO:
5830
Ser N00/ 001
4 Feb 14

SECRET - Unclassified upon removal of basic correspondence and enclosures

SECOND ENDORSEMENT on CAPT [redacted] USN, ltr of 20 Dec 13

From: Commander, U.S. THIRD Fleet
To: Commander, U.S. Pacific Fleet
Via: (1) Commander, Naval Surface Force, U.S. Pacific Fleet

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013 (U)

Encl: (56) NSWC Corona SIMDIS Replay Video [redacted]
(57) NAVAIR PMA-208, Target Mission Support Systems, Threat/Target Systems Department Engineering Investigation, EI N63126-13-5014 (U)
(58) Program Executive Officer Integrated Warfare Systems (PEO IWS) Director for Cruiser and Destroyer Combat Systems Information Paper of Jan 2014 (U)

1. (U) Forwarded, concurring with the findings of fact, opinions, and recommendations of the investigating officer, as modified and endorsed by Commander, Carrier Strike Group NINE (CCSG 9), subject to further modifications below. An executive summary of events is included within the first endorsement.

2. (U) During a radial inbound (zero offset) tracking exercise for the CHANCELLORSVILLE's (CHV) Combat Systems Ship Qualification Trial (CSSQT), a combination of factors including equipment malfunction, personnel error, risks inherent to zero offset radial inbound tests, and a misplaced confidence in "rogue drone" procedures created an error chain that resulted in this incident.

3. (U) <u>Findings of Fact (FoF)</u>. I concur with all FoFs of the investigating officer as modified by CCSG 9 subject to the following modifications:

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[redacted]

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013 (U)

a. (U) Enclosure (56) is added as additional support to FoFs 52 and 182. Enclosure (56) is an updated version of the NSWC Corona SIMDIS replay which was previously included as enclosure (52) and contains additional test range communications.

b. (U) FoF 202 within the Investigating Officer's "Post Event" section is modified as follows: "NAWCWD Threat Target Systems Department initiated an engineering investigation to determine the root cause of observed SNTC malfunctions. The investigation determined that the SNTC was incorrectly configured and caused a significant increase in network message transmissions and system instability. [Encl (14, 57)]"

c. (U) FoF 206 is added to the Investigating Officer's "Post Event" section as follows: "Program Executive Officer Integrated Warfare Systems is evaluating alternative approaches to achieve engineering and test objectives for subsonic air and anti-ship cruise missiles (ASCM). This assessment will define the tradeoffs to best balance risk versus presentation parameters. The results of the study may lead to employing offset approaches with subsonic targets if engagement results can be extrapolated meaningfully to characterize capability against subsonic ASCMs. The study is on track for completion by 1 March 2014. [Encl (58)]"

4. (U) Opinions. I concur with all opinions of the investigating officer as modified and supplemented by CCSG 9.

5. (U) Recommendations. I concur with all recommendations of the investigating officer as modified and supplemented by CCSG 9 subject to further amplification below.

a. (U) While the Commanding Officer is ultimately responsible for the safety of the ship and crew, there were external factors beyond the Commanding Officer's purview that significantly contributed to this incident. It is from this perspective that I do not believe punitive action is warranted; however, I recommend appropriate corrective measures be taken to address his deficiencies related to this incident.

b. (U) I recommend that a copy of this investigation be forwarded to NAVAIR and NAVSEA for further action as deemed appropriate in relation to personnel errors and process flaws noted by this investigation.

c. (U) I recommend that zero offset radial inbound tests remain suspended until the completion of PEO IWS's evaluation of alternative approaches to subsonic ASCM testing.

d. (U) I recommend that lessons learned from this event be incorporated into all waterfront training for combat systems watchstanders.

6. (U) I direct that CCSG 9 conduct a review of the qualifications of all CHV watchstanders involved in the incident to ensure they are properly trained, upgraded in knowledge, and re-qualified as deemed necessary by CCSG 9 before resuming operations.

7. (U) It is fortunate that this incident did not result in serious injuries. A full re-evaluation of range missile firing design and procedures focusing on the malfunction in target control equipment, procedures concerning active control of aerial targets, dependence upon active defense by Close-In Weapons Systems (CIWS), and alternative approaches to radial inbound tests to achieve engineering and test objectives should be conducted to avoid a recurrence of this event.

K. E. FLOYD

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DEPARTMENT OF THE NAVY
COMMANDER CARRIER STRIKE GROUP NINE
UNIT 25065
FPO AP 96601-4702

IN REPLY REFER TO:

5830
Ser N00J/001
7 Jan 14

FIRST ENDORSEMENT on CAPT [redacted] USN, ltr of 20 Dec 13

From: Commander, Carrier Strike Group NINE
To: Commander, U.S. Pacific Fleet
Via: (1) Commander, U.S. THIRD Fleet
(2) Commander, Naval Surface Force, U.S. Pacific Fleet

Subj: COMMAND INVESTIGATION INTO THE TARGET DRONE MALFUNCTION AND STRIKE OF THE USS CHANCELLORSVILLE (CG 62) ON 16 NOVEMBER 2013 (U)

Encl: (53) Accident Injury Report ICO [redacted], USN (U/FOUO)
(54) Accident Injury Report ICO [redacted], USN (U/FOUO)
(55) USS CHANCELLORSVILLE 172034Z Nov 13 [redacted]

1. (U) Per reference (a), I have reviewed the subject investigation.

2. [redacted] Upon review of this investigation, it is clear to me that the primary cause of the drone strike on USS CHANCELLORSVILLE (CG 62) on 16 November 2013 was [redacted] During the test, [redacted] including: [redacted]. The investigation also makes it clear that [redacted] including: [redacted]. The [redacted]

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[redacted]. However, [redacted] it is unclear if [redacted]

3. [redacted] Executive Summary. On 16 November 2013, USS CHANCELLORSVILLE (CG 62) and USS JOHN PAUL JONES (DDG 53) were participating in the Combat Systems Ship's Qualification Trials (CSSQT) for USS CHANCELLORSVILLE's (CG 62) [redacted]. In particular, they were executing [redacted] While originally a [redacted]. [redacted] Specifically, [redacted]: [redacted] the second set of two targets (BQM-74) were at 125 degrees true. [redacted].

On the day of execution only [redacted] The [redacted] The [redacted] The p[redacted]. The [redacted]. At the [redacted]

When the drone [redacted] in part due to [redacted]

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[redacted] The ship's [redacted]. The operator [redacted] However, in accordance with the [redacted] only the [redacted] The [redacted]. Furthermore, the [redacted]. The drone [redacted] The T[redacted]

The drone [redacted] and causing both [redacted] The impact and resulting fires [redacted] USS CHANCELLORSVILLE (CG 62).

4. (U) Pursuant to reference (a), I concur with the findings of fact, opinions and recommendations of the investigating officer, subject to the below modifications.

5. (U) Many of the findings of fact are supported by additional enclosures and each finding of fact is supported by at least one enclosure. A detailed recitation of additional supporting enclosures is not included.

a. (U/FOUO) Contrary to the statement on page 3 of the investigation, two crew members suffered minor injuries in the drone strike: [redacted]. Both members were treated on board and cleared for full duty. [Encl (53), (54), and (55)]

6. (U) The following opinions are added:

a. Given the [redacted], it is clear that the [redacted]. The [redacted]. [FF 48, 50-52, 58-71, 72-77]

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b. There existed throughout the [redacted] Yet, [redacted]. [redacted] [FF 9-14, 21, 121-129, 132-134]

c. The failure of [redacted]. This [redacted]; however, [redacted]. Had [redacted] which would have [redacted]. [FF 38, 133-134, 136-142, 152-161, 166]

7. (U) The following recommendations are added:

a. I recommend that [redacted]. The [redacted]. It is easier to [redacted]. [redacted]

b. Ensure that [redacted]

8. (U) In response to this investigation and the opinions and recommendations offered by the investigating officer, I have taken the following actions:

a. (U/FOUO) I recognize and support the fact that the Commanding Officer is always responsible for the safety of his ship and crew and therefore I will take appropriate administrative action to ensure the Commanding Officer is aware

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of his deficiencies and that corrective actions have been taken to ensure similar mishaps do not occur in the future.

b. (U) I strongly support the remaining recommendations of the investigating officer and concur that a copy of this investigation be forwarded to NAVSEA, NAVAIR, and NAWCWD for action deemed appropriate upon review of this investigation. Additionally, a copy of the final investigation should be provided to Surface Warfare Officer School to be incorporated into relevant training pipelines.

9. (U) We are fortunate that no one was seriously injured in this mishap. The fact that this has never occurred before is astonishing given the risk involved and the drone system limitations that have been brought to light. In the future, anyone involved with weapon system test plans and execution should take into account the inherent limitations of the platforms used for presentation. The response and decision times involved in this mishap are extremely short and should have been better understood prior to execution.

P. D. HALL

20 Dec 13

From: CAPT [redacted]. [redacted] USN, XXX-XX-XXXX/[redacted]
To: Commander, Carrier Strike Group NINE

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Ref: (a) JAGMANINST 5800.7F
(b) Navy Regulations Chapter Eight
[redacted] NAVSEAINST 9093.1C (CSSQT for Surface Ships)
(d) NAVAIR 16-50 SNTC-1 (SNTC Tech Manual)
(e) NSWCPHD TP-CSSQT-CG 62-11-13 USS CHANCELLORSVILLE (CG 62) CSSQT Test Plan
(f) USS CHANCELLORSVILLE Aegis Capabilities and Limitations

Encl: (1) Command Investigation Appointment Ltr dtd 18 Nov 13 (U)
(2) Northrup Grumman BQM-74E Aerial Drone Data Sheet (U)
(3) Statement of LCDR [redacted] [redacted] [redacted]
(4) Statement of Mr. [redacted] [redacted]
(5) NSWCPHD Test Plan LF-09 Excerpt [redacted]
(6) Statement of CAPT William A. Hesser, Jr [redacted]
(7) Statement of Mr. [redacted] (U)
(8) USS CHANCELLORSVILLE Condition III Watch Bill (U)
(9) Statement of Mr. [redacted] [redacted]
(10) PEO IWS/NAWCWPN Pt Mugu CSSQT Pre-fire Brief Excerpt (U)
(11) Statement of Mr. [redacted]C)
(12) Statement of Mr. [redacted]g [redacted]
(13) Statement of Mr. [redacted] [redacted]
(14) Statement of Mr. [redacted] (U)
(15) Statement of Mrs. [redacted] (U)
(16) Statement of Mr. [redacted] (U/FOUO)
(17) Statement of Mr. [redacted] [redacted]
(18) Statement of Mr. [redacted] [redacted]
(19) Statement of Mr. [redacted] [redacted]
(20) Statement of Mr. [redacted] [redacted]
(21) Statement of Mr. [redacted] [redacted]
(22) Statement (Supplemental) of (U)
(23) Statement of Mr. [redacted] [redacted]
(24) SNTC Post Data Analysis Timeline (U/FOUO)
(25) Control Room M Layout Diagram of 16 Nov 13 (U)
(26) Audio recording of internal communications network from NAWCWPN Pt Mugu (U)
(27) Audio recording of primary communications circuit (U)
(28) Statement of LCDR [redacted] [redacted] [redacted]
(29) Statement of LTJG [redacted]
(30) Statement of LT [redacted] [redacted]
(31) Statement of Mr. [redacted]

Derived from: Multiple Sources
Declassify on: 18 December 2023

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(32) USS CHANCELLORSVILLE CSSQT LF-09 Blue Team Watchbill (U)
(33) Statement (Supplemental) of Mr. [redacted] (U)
(34) USS CHANCELLORSVILLE C&D Doctrine Worksheet LF-09 [redacted]
(35) NSWC Corona LF-09 Data Collection & Combat System Timeline Reconstruction Brief [redacted]
(36) Statement of Mrs. (U)
(37) Statement of FCCS [redacted]
(38) Statement of OS3 [redacted] [redacted]
(39) NSWC Corona LF-09 SPY/SPQ9/C&D Reconstruction Timeline [redacted]
(40) Statement of FC2 [redacted] [redacted]
(41) Statement of FC2 [redacted] [redacted]
(42) NSWC Indian Head Phalanx CIWS Performance Assessment Brief (U/FOUO)
(43) Statement of FC2 [redacted] (U)
(44) Statement of LCDR [redacted] [redacted] [redacted] (U)
(45) Photos (six) of USS CHANCELLORSVILLE damage (U)
(46) Statement of DCC [redacted] (U)
(47) Statement of LCDR [redacted] (U)
(48) PEO IWS RDML(S) Jon Hill Email ltr of 16 Dec 13 (U)
(49) Statement of Mr. [redacted] [redacted]
(50) NSWC Corona CIWS Reconstruction Timeline [redacted]
(51) USS CHANCELLORSVILLE CSSQT LF-09 Script (U/FOUO)
(52) NSWC Corona SIMDIS Replay (S)

Preliminary Statement

1. (U) Purpose and Scope.

a. (U) This Command Investigation (CI) was convened by order of Commander, Carrier Strike Group NINE in accordance with reference (a) and enclosure (1) from 18 Nov 2013 to 18 Dec 2013. The purpose of the CI was to investigate the cause of the malfunction of the BQM-74E target drone; the cause of the strike on the USS CHANCELLORSVILLE (CHV) and resulting injuries and damages; to determine fault, neglect, or responsibility on the part of the individuals involved in the exercise; and to recommend appropriate administrative or disciplinary action. LT [redacted] JAGC, USN was the appointed legal advisor and participated throughout the investigation.

b. (U) This document contains all the available information as of 18 Dec 2013. Some root-cause information, such as what exact technical hardware or software problem caused the System for Navy Target Control (SNTC) to malfunction in the manner that it did, is not currently known and is still under investigation. However, sufficient information and data exists to conclude that a malfunction did occur, and that malfunction contributed to the ultimate outcome.

c. (U) The CI does address the damage caused by the drone strike and the damage control efforts of the crew in minimizing and controlling the damage and resulting fires. However, it was not the focus of the investigation and is not dealt with in depth other than what is required to communicate that Damage Control was effectively and courageously accomplished by the crew of the CHV.

d. (U) Contrary to media reports, only one individual, FC2 [redacted] suffered reported injuries on the CHV as result of the drone impact. His injuries were minor, and he was not required to miss duty for 24 hours. Pursuant to reference (a), a line of duty determination was not required.

e. (U) Prior to beginning this CI, OJAG (Code 11) was contacted. LCDR [redacted], JAGC, advised to proceed with the CI and not to conduct a Litigation Report based on the facts available at the time.

2. (U) Methodology.

a. (U) The investigation began by reviewing available evidence and information upon receipt of the appointment letter. Interviews of the crew of the CHV were taken once the spaces and damage were inspected by the Investigating Officer (IO). The investigation made two trips to Naval Air Warfare Center Weapons Division (NAWCWD) at Point Mugu to interview the range/test personnel. The investigation then collected statements and interviewed the crew of the USS JOHN PAUL JONES (DDG 53) (JPJ). Finally, the investigation went to Naval Surface Warfare Center Corona Division, which was the designated data repository for all three investigations being conducted (JAGMAN, FRB, and SIB), in order to review the data analysis being conducted.

b. (U) All of the individuals and witnesses involved in this CI were cooperative, accessible, and forthcoming with all information.

c. (U) Five individuals interviewed who were working at Point Mugu were contractors working for the company 'SA-Tech.' Those five individuals, through their employer, requested that an attorney be present telephonically for their interviews. The investigation coordinated with Office of General Counsel representative [redacted] and arranged to have SA-Tech's legal representation, Mr. [redacted] or an associate telephonically present for all interviews.

d. (U) Evidence.

(1) (U) The internal communication nets of both the JPJ and CHV were not available at the time this investigation was submitted. It is not anticipated CHV Comms will ever be available because they

were not recorded, and it is unclear whether JPJ Comms will ultimately be available.

(2) (U) Immediately after the event, NAWCWPN's, CHV, & JPJ all took appropriate measures to collect and preserve physical evidence and personal statements.

(3) (U) The timeline developed for this CI uses multiple sources of data. Wherever possible, it relies on data generated by the instrument best positioned to record information in an effort to determine 'ground truth.' Where no data is available, then statements are used.

(4) (U) There are several timing sources that inform this investigation. When a ground truth system time is available, that source is used. If none is available, time references are best estimations based on previous or follow-on events.

(5) (U) NSWC Corona was designated as the data repository for all available data to include Aegis combat systems data, range telemetry data and voice recordings. This report includes excerpts of this data that support findings of facts and opinions.

e. (U) Background technical information on target control systems, drone specifications, and Close-In Weapons System (CIWS) will be provided following the executive summary.

3. (U) Reconstruction. Enclosure 52 is a SIMDIS video. SIMDIS is a set of software tools that provide two and three-dimensional interactive graphical and video display of live and post processed simulation, test and operational data. It is a visual depiction of the fusion of CHV combat/weapons system, telemetry and range data compiled by NSWC Corona. Events displayed are in time sequence and are viewed using a standard media player.

4. (U) Classification. This document is classified overall "Secret." Enclosures two, five, 28-30, 34, 35, 37-39 and 52 are classified Secret. Enclosures four, nine, 11-13, 17-21, 23, 31, 40, 41, 49 and 50 are classified Confidential. Enclosures 16, 24, 42 and 51 are U/FOUO.

Executive Summary

1. (U) The failure of the SNTC hardware/software interaction with the BQM-74E target drone was the primary cause of the drone hitting the CHV.

a. (U) Target C, or T1, struck the CHV at 13:14:00 PST on 16 Nov 2013.

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(1) (U) T1 was the lead drone, and Target D, or T2, was trailing in the presentation profile. T2 properly executed the escape maneuver when commanded to do so. Targets A & B were supposed to launch approximately 70 and 80 seconds after D, respectively. Neither drone was launched after an SNTC 'failover' occurred while they were on the launching pad. The drones went into their recovery sequence.

b. (U) T1 was being operated using Target Control Console One (TCC1). Approximately seven seconds before the turnout or 'escape left' was ordered, TCC1 failed over to TCC3, but continued to display on TCC1 as if it were flying normally, including updating the clock and telemetry data.

(1) (U) SNTC is not designed to allow the telemetry to continue to be seen on a TCC after it has failed over.

(2) (U) A 'failover' occurs when the connection between the TCC and the drone is interrupted. The Master Control Console (MCC) will transfer the drone from one console to the next one in sequence which is not in use. To the TCC operator, a failover is indicated when the screen cuts from the artificial horizon to a Windows desktop, and the artificial horizon then appears on the next console in sequence which has been designated as a backup TCC. No one at Point Mugu has seen or heard of a failover occurring without having the screen of the 'failed' TCC cut to the windows desktop.

c. (U) Post-event data reconstruction shows the MCC, and the Backup Control Console (BCC), the devices designed to coordinate the all system functions including transferring control of the targets between the TCCs, were operating in conflict with one-another.

(1) (U) The MCC and BCC machines themselves both believed they were in control of coordinating the drones. The BCC should never have exerted any control over the transferring target control between the TCCs without a failure of the MCC. Here, the MCC did not appear to fail.

(2) (U) There was no indication apparent to anyone in the control room, including the MCC and BCC operators, that this conflict was occurring during the target presentation.

2. (U) Design Flaws within SNTC compounded the problems encountered.

a. (U) The TCC itself has no switch to 'cut the carrier,' which severs the connection with the drone and begins the auto-recovery sequence after four seconds; only the MCC (or the BCC if the MCC failed) has this capability.

b. (U) When a TCC fails over, there is no indication to the Remote Control Operator (RCO), what happened, why it happened, or which back-up console accepted the fail over. They only see a Windows desktop.

c. (U) The failsafe sequence to 'pull the plug' on a BQM-74E operated by SNTC from the range takes at least 11 seconds from when the decision is made until the drone begins taking any abortive action. This is too long and too operator intensive a process for a drone traveling at 500 knots toward a manned vessel.

c. (U) Frequency interference, though an on-going problem with the use of the target drones at Point Mugu, does not appear to have played a role in the drone striking the CHV.

3. (U) Organizational flaws at Point Mugu contributed to the incident.

a. (U) Because the exercise was a track-ex instead of a missile-ex, there was no dedicated range safety person in the control room; functionally, everyone was responsible for flying, tracking, testing, and/or collecting data as their primary duty. Safety of the ship was an additional duty/ responsibility.

b. (U) The physical room set-up and the net usage did not lend itself to effectively communicating the loss of control from the RCO to the Test conductor to the ship.

4. (U) There were individuals at the range and on the ship positioned to prevent or mitigate the problems caused by the SNTC malfunction. However, despite the training and briefings, virtually everyone involved in the exercise believed the possibility of the drone hitting the ship to be extremely remote. They were focused on the targeting and data acquisition component of the exercise vice the physical safety concerns presented by aiming a drone directly at a ship. This focus and false confidence in the system adversely affected the time it took to both recognize and act on the problem.

a. (U) The MCC operator was the person at the range who was capable of 'cutting the carrier,' and thus starting the clock which would have led to the drone beginning its auto-recovery. The BCC operator could have theoretically done so as well, but would only be expected to in the event of an MCC failure. Additionally, it would have required closing additional windows for the BCC operator to 'cease radiation' to the target. The MCC operator was told by the TCC3 operator to "cut the carrier" 15 seconds before impact. However, the carrier was not actually cut until three seconds before impact, after multiple individuals called for it and the MCC operator requested clarification on his instructions.

b. (U) The Test Conductor was the only person on COMMs directly with the ship, and the person that would have been expected to make the "rogue drone" call. He saw something was happening with the drone, at the very least that it was continuing past the 2.5 nm mark via the General Range Intelligent Display System (GRIDS). However, answers to his requests for clarification from the Target Operations Conductors were "stepped on." He did not hear the Target Operations Conductors over the net until after the drone hit. The "rogue drone" call was only made after the drone hit the CHV.

c. (U) Only four individuals onboard CHV saw that the drone was going to hit the ship. They were the CIWS operator, the AAWC, MSS, and an embarked civilian CIWS technical representative. They saw the drone inbound and either the CIWS operator and/or the tech rep called "rec fire" when the CIWS displayed a 'recommend fire.' The CIWS operator had 5.4 seconds to press the 'fire' button to engage the drone before it hit the ship from when 'rec fire' was displayed. AAWC was the only individual positioned and authorized to order him to do so. Additionally, it was believed by the crew that previous drone presentations during CSSQT had resulted in a recommend fire even when the drone had turned out, thus the "rec fire" was not initially seen as an indication of threat to the ship. The AAWC did not have enough time to process the information and give the order to engage the drone before it impacted.

d. (U) It is possible that had CIWS engaged the drone, resulting shrapnel would have still caused damage to the CHV and/or her crew.

5. (U) The CO and crew of the CHV successfully engaged and quickly put out the fire in the computer room under very stressful circumstances.

Background Information

1. (U) Combat Systems Ship Qualification Trial (CSSQT).

a. (U) Per reference (c), the purpose of CSSQT is to verify and validate 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 a combination of Planned Maintenance System (PMS) actions and in-port or at-sea combat/weapon systems engineering exercises. These exercises employ the combat/weapon systems and ship's force in realistic test environments (live or simulated) and provide a demonstration of maintenance and operational readiness. In order to adequately test the systems and simulate realistic scenarios, the targets can be aimed directly at the ship (zero CPA) and behave in a way designed to challenge the ship's systems.

b. (U) Per reference (e), the CHV's previous experience during CSSQT consisted of multiple tracking and live-fire events including six 'zero CPA' target presentations.

2. (U) System for Naval Target Control (SNTC).

a. (U) System Overview. Per reference (d) SNTC is a target control system capable of controlling many targets including the BQM-74E. The SNTC consists of the following major components: Master Control Consoles (MCCs), Target Control Consoles (TCCs), Ground Radio Frequency Units (GRFUs), UHF antennas, GPS antennas, Model 53 Portable Test Set (PTS), Model 280-1 UHF Transponders, Shipboard Transponders, Airborne Relays and associated ancillary equipment. The SNTC provides system operators with a Microsoft Windows based interface enabling system configuration and control.

b. (U) In the SNTC configuration at Point Mugu, target control is achieved by the integration of a Master Control Console (System Controller) MCC(SC), Master Control Console (Backup Controller) MCC(BC), Target Control Consoles (TCCs), and Ground Radio Frequency Units (GRFUs). The control consoles and GRFUs are linked via a dedicated Ethernet connection, through the range infrastructure.

c. (U) The SNTC, using three Ground Frequency Radio Units (GRFUs), includes the hardware, software, and support equipment necessary to control up to four (aerial or surface targets) and up to eight (surface targets or track-only participants) simultaneously, during both Line of Site (LOS) and over-the-horizon operations. The system allows for multiplexing (surface targets or track only participants) on up to two of the three available data links. The system can control and track a maximum of twelve targets simultaneously. The system is configured as delineated in the 'Limits on System Configuration' in the SNTC O&M Manual. The system is capable of monitoring the health and status of the target, transponder, and data links. The SNTC utilizes GPS and Differential GPS (DGPS) for system control and Time and Space Position Information (TSPI).

d. (U) Vulnerability of the system to electromagnetic interference (EMI) is highly dependent on the relative positioning and orientation of the cables, consoles, nearby structures, and radiating sources. Operators are required to remain vigilant for signs of EMI such as system lockup, display interference and distortion, loss of cursor control, un-commanded pitch and roll inputs, and un-commanded discrete functions. Any non-SNTC RF emitter transmitting between 425 MHz and 460 MHz has the potential to jam the data link, but should not induce unintended commands other than the effects listed above.

e. (U) Major Components:

(1) (U) Master Control Console (MCC). The MCC provides the operator with the ability to coordinate all system activities. The

System Controller performs system health checks, presents mission configuration, monitors and controls other consoles, routes data to and from all other subsystems, including external Range interface, monitors RF and Ethernet link status, and records critical mission parameters. The System Controller automatically detects subsystem faults, performs hot switch-to-backups, if enabled, and performs post mission playback and data reduction. The MCC operator can secure UHF communications with the target by securing the carrier frequency in the event that the drone does not respond to TCC commands. This begins a flight termination sequence between the SNTC transponder and the autopilot. After a period of four seconds without a valid communication carrier, the transponder will trigger a "failure alarm" line on the transponder which initiates the autopilot's pre-programmed sequence to terminate the flight. The sequence is dependent on flight conditions. For a BQM-74E target in a Low Altitude Cruise (LAC) state, the autopilot will wait four seconds after the failure alarm is set (a total of eight seconds since loss of carrier) and then initiate a 15°pitch up (climb) for six seconds. The target then enters the delayed recovery sequence which includes pitching up to 30° and engine shutdown followed by deployment of the parachute when speed drops below 200 KIAS.

(2) (U) Master Control Console (Backup Controller or BCC). The Backup Controller automatically mirrors all functions of the Primary System Controller and monitors the status of the Primary System Controller. In the event of a Primary System Controller failure, the Backup Controller assumes control of the system.

(3) (U) Target Control Console (TCC). The TCC provides the Remote Control Operator (RCO) with the ability to input commands for the target control, display target telemetry, and display a map with all tracks. One TCC is required for each target controlled. TCCs can also be configured to operate as dedicated or floating backup consoles. Four primary TCC's and two back-up TCC's were utilized during the event.

(4) (U) Ground Frequency Radio Unit (GRFU). The GRFUs provide the UHF link between targets and GCS by radiating target uplink commands and receiving target downlink telemetry.

(5) (U) SNTC Model 280-1 Transponder. The Model 280-1 UHF Transponder, integrated on the target, is designed to provide a datalink between the Ground Radio Frequency Unit (GRFU) and the target autopilot of a Navy aerial or surface target.

(6) (U) SNTC Relay. The Airborne Relay may be installed in a manned vehicle, or the Ground Box, as an enhancement for SNTC datalink communications where Line of Sight (LOS) operations are limited or where extended range applications are required.

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3. (U) BQM-74E.

a. (U) Per enclosure (2), the BQM-74E is an aerial target drone produced by Northrup Grumman. It is turbine-powered, recoverable, remote controlled, and subsonic. It is capable of speeds up to Mach .86 or 515 knots at sea level. It is 12.95 feet long, 5.78 feet wide, weighs 455 pounds, and resembles a small Tomahawk cruise missile, though is painted bright orange. It uses JP-5, JP-8, or Jet A-1 jet fuel as the propellant.

b. (U) The BQM-74E has an integrated avionics unit, integral measurement unit (IMU), Air Data Computer, and Global Positioning System (GPS) to provide an accurate navigation solution. The target can be employed in either a manual mode or pre-programmed (hands off) mode using a variety of control systems including SNTC.

c. (U) Northrup claims that the BQM-74 series of drones have been the workhorse of the Navy's subsonic aerial target inventory, and that the BQM-74E has provided over 80% of the U.S. Navy's target presentations.

4. (U) Close-In Weapons System (CIWS).

a. (U) Per reference (e), CIWS has the capability to operate stand-alone or in cooperative operations with the Aegis Weapons Control System. CIWS has two tactical AAW operating modes: AAW Auto and AAW Manual.

b. In AAW Auto, [redacted]. [redacted] In addition, [redacted].

c. When a target is detected, i[redacted]. [redacted]

d. In AAW Manual, [redacted]

e. The need for [redacted] In AAW Auto, [redacted] operator must push the Hold Fire off button to allow firing. In AAW manual, hold fire off, the operator must push the firing button to allow firing.

f. [redacted] Per reference (f), the range at which CWIS can identify and engage a target is dependent on the speed, altitude, and trajectory of the target and on the configuration of the CIWS mount.

5. [redacted] Executive Timeline.

PST on 16 Nov 2013	Event
12:56:01	Targets C & D are reported as launched by the Range
12:57:30	Targets A & B fail to launch due to loss of carrier
12:57:40	On primary net, Range reports "only two targets launched, continuing with targets C & D"
13:10:25	On primary net, range reports "Target at IP" (Ingress Point)
[redacted]	On primary net, CHV reports "hold firm track bearing [redacted] strength two"
[redacted]	CIWS MT-22 has first detect on T1 [redacted]
13:13:31	TCC1 fails to TCC3 but is not known to TCC operator. SNTC post event analysis revealed BCC initiated failover but MCC showed no loss of command or failover
13:13:38	TCC1 operator orders target C to [redacted] (turn away from CHV and commence recovery sequence)
[redacted]	TCC3 operator (observing drone control) calls "kill carrier" to MCC operator
13:13:45	TCC3 operator calls "kill carrier T1" to MCC operator
13:13:46	Target test conductor calls "kill the carrier" to MCC operator
13:13:49	On primary RT net, CHV reports [redacted] On internal net, operation conductor asks target test conductor to "confirm up and out, target test conductor reports loss of carrier"
13:13:53	SNTC engineer (observing drone control) walks to MCC operator and asks T1 carrier status, MCC operator asks "do you want me to kill it?" Confirms request to kill carrier
13:13:55	CIWS MT-22 holds "recommend fire" on target C [redacted]
[redacted]	T1 loses carrier as a result of MCC operator action
13:14:00	T1 impacts CHV [redacted]
13:14:05	On internal net, operation conductor reports to target test conductor "I haven't heard a word you said." Target test conductor reports "loss of carrier"
13:14:17	On primary RT net, Plead M reports "rogue drone"
13:14:33	On primary RT net, CHV reports "the drone hit the ship"
1317	On CHV, 1MC DCA announces "white smoke in [redacted]

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	[redacted]
1325	GQ ordered by Commanding Officer on 1MC from Quarterdeck; Hose teams enter spaces and begin fighting fire in earnest
1327	Class A fire reported out, Class C fire appears to be out, overhaul in progress
1432	Muster report complete, full accounting of all personnel

Findings of Fact

Prelude to the Event

1. (U) The CHV was six months into the CSSQT. [Encl (3)]

2. In the course of that [redacted] [redacted] [Encl (4)]

3. (U) In a 'zero CPA' presentation, the target is flown by the controller along a line slaved to a beacon on ship, i.e., is aimed directly at the ship. [Encl (5)]

4. [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [Encl (6)]

5. [redacted] [redacted] [redacted] [redacted] [Encl (4, 5, 11)]

6. [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [Encl (4, 6, 11)]

7. (U) The LF-09 change was not attributed to concern about the safety of the ship during the target presentation. [Encl (6)]

8. (U) In the context of drone exercises done from NAWCWD Point Mugu, the 'test plan' defines technical requirements for each presentation. [Encl (5, 6)]

9. (U) A pre-fire brief was conducted prior to conducting LF-09 aboard the CHV on 5 Nov 13. [Encl (6, 7, 9, 10, 11)]

10. (U) The pre-fire brief covered the possibility of a 'rogue drone.' [Encl (3, 6)]

11. (U) The pre-fire brief stated that in the event of a SNTC or drone malfunction, the call "rogue drone" would be passed over the primary radio net. [Encl (3, 6)]

12. (U) The pre-fire brief stated that in the event of 'loss of carrier,' the drone would continue inbound for approximately 4 seconds prior to maneuvering. Encl (10)]

13. (U) The pre-fire brief stated that engaging a drone with CIWS may result in debris hitting ship. [Encl (10)]

14. (U) The brief did not, and normally would not, go into details on how long it would take the range to initiate the failsafe sequence in the event they lost control, or what the steps that were required for them to do so. [Encl (10)]

15. (U) The brief was given by [redacted] the assigned Test Conductor for the CHV and JPJ CSSQT. [Encl (9, 11)]

16. (U) Mr. [redacted] had personally briefed, conducted, and completed two prior events in May and August 2013 with CHV. [Encl (9)]

17. (U) This was the third pre-fire brief that the crew of the CHV had received in the course of the CSSQT. [Encl (9)]

18. (U) For the briefing for LF-09, Mr. [redacted] did not have electronic copies of the last two-thirds of the brief because the files were corrupted on SIPR. [Encl (6, 9)]

19. (U) Mr. [redacted] gave the entirety of the brief, but was unable to display the slides for the final two-thirds. [Encl (9)]

20. (U) Mr. [redacted] felt that all the pertinent range safety information was adequately covered. [Encl (9)]

21. (U) The CHV CO, the Lead Test Engineer, [redacted] and CSSQT Project Officer, [redacted] also felt that the brief substantively covered all relevant safety information. [Encl (6, 7, 11)]

22. On 15 Nov 13, NAWCWD Point Mugu had a [redacted]. This occurred due to [redacted] [Encl (9, 12)]

23. The loss of carrier on 15 Nov 13 [redacted] [Encl (12, 13)]

24. (U) The NSWC PHD Test Director stated he has worked with BQM-74s for 30 years, and in that time, participated in hundreds of tests, and approximately 100 'zero CPA' presentations. [Encl (4)]

25. (U) In that time, he has never seen a failure of this magnitude. [Encl (4)]

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26. (U) While 'zero CPA' presentations are not uncommon, it is somewhat unusual for NAWCWD Point Mugu to present four targets at the same time or do a 'quad presentation.' [Encl (17)]

27. (U) The final version of the test plan (change seven) was not available to the test conductor until the day prior to the start of CSSQT. [Encl (9)]

NAWCWD Point Mugu View Point

28. (U) On 16 Nov, the Target Control Conductors, MCC Operator, BCC Operator, and four assigned Target Controllers were all fully trained and qualified for their respective positions. [Encl (14)]

29. (U) The test conductor is overall responsible for coordination and execution of range events, and the single range person interacting real-time with the ship. [Encl (9)]

30. (U) There was no dedicated range safety person in the Control Room at Point Mugu on 16 Nov 2013. [Encl (15)]

31. (U) Integrated Frequency De-confliction System (IFDS) is used for frequency management at Point Mugu. [Encl (16)]

32. (U) IFDS read-out for 16 Nov indicates an unresolved frequency conflict. [Encl (16)]

33. (U) The unresolved conflict was not a valid conflict due to geographic separation and altitude differences of competing units. [Encl (16)]

34. (U) Transmission Quality (TQUAL), roughly indicating signal quality between the drone and the SNTC was monitored throughout the event. [Encl (13, 17)]

35. (U) TQUAL was at or about 100% for the duration of the track- ex, indicating good link status. [Encl (13, 17)]

36. [redacted] [Encl (6)]

37. The planned scenario called for [redacted] [Encl (17)]

38. Both sets of targets were [redacted] [Encl (17)]

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39. (U) Extra briefing time was put in at the control center because the exercise was to be a quad presentation vice a single or double. [Encl (17)]

40. (U) All eight drones went through target systems checks beginning at 0645 on 16 Nov and checked out 'good.' [Encl (17)]

41. (U) The originally scheduled launch time of 0900 was pushed back due to a casualty on the range clearance aircraft and a VIP landing at a nearby airfield. [Encl (9, 17)]

42. A launch time of [redacted] [Encl (17)]

43. [redacted] The initial [redacted] [Encl (17)]

44. Because a period of [redacted] [Encl (17)]

45. The two aircraft being used were [redacted] [Encl (17)]

46. (U) Once the aircraft went airborne, a relay checkout of both aircraft was conducted by Aerial Targets maintenance personnel and the Range, and both airborne relays/aircraft checked out 'good.' [Encl (17)]

47. (U) A surveillance aircraft cleared the range prior to launch of the drones. [Encl (17)]

48. [redacted] The Lead Test Engineer and the Targets Assistant Operations Conductor specifically discussed that in the event [redacted] Encl (17)]

49. (U) All four targets began their launch sequence at 1251, and the Targets Operations Conductor had the targets throttle up and down per procedure. [Encl (12, 17)]

50. (U) SNTC data rate decreases depending on the number of drones per control frequency. [Encl (13)]

51. (U) The four target controllers (RCOs) all experienced sluggishness during target pre-launch checks while the drones were on the pad. [Encl (12, 17, 18)]

52. (U) The Targets Operations Conductor conferred with the SNTC Engineer, [redacted] and it was decided that some latency with this many targets was not unusual and to proceed with the launch. [Encl (12, 17)]

53. (U) T1 and T2 (targets C & D) were being operated from TCC1 and TCC2, respectively. [Encl (19)]

54. (U) The second two drones, T3 and T4 (targets A & B), were being operated on consoles TCC3 and TCC4, respectively. [Encl (12, 17, 18)]

55. [redacted] [Encl (17)]

56. [redacted] [Encl (17)]

57. (U) The first two BQM-74 drones, T1 and T2, were launched at 12:56:00 and 12:56:10, respectively. [Encl (12)]

58. (U) While T3 was preparing to launch, the TCC3 display switched over to the Windows desktop, indicating a "fail-over" to the TCC3 operator. [Encl (19)]

59. (U) The TCC3 operator looked over to TCC5, the designated back-up console, and the T3 display did not appear as he expected it would during a failover. [Encl (19)]

60. (U) At about this same time, TCC4 console froze up as well. [Encl (19)]

61. (U) Shortly afterwards (seconds) the pad reported that the T3 and T4 engines powered down and the chutes deployed. [Encl (17, 19)]

62. (U) Powering down and deploying chutes was the expected recovery sequence for the BQM-74E while it is still on the pad. [Encl (19)]

63. (U) The recovery sequence indicated to those in the control room that both T3 and T4 had a loss of carrier for a period of four seconds. [Encl (12, 17)]

64. (U) On 16 NOV, the Ground Support Equipment on the pad indicated an error code that reflected both drones had experienced a loss of carrier and initiated recovery procedures. [Encl (19)]

65. While the [redacted] [Encl (13, 20)]

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66. (U) The red lights on the BCC indicated a problem with the frequency [redacted] T3 and T4 and their corresponding two backup targets were operating on that frequency. [Encl (20, 21)]

67. The MCC operator noted that [redacted] [Encl (13, 20, 21)]

68. (U) SNTC is not designed to have MCC and BCC displaying different information, as they are receiving the same inputs. [Ref (d)]

69. (U) Post data analysis indicates that T3 and T4 did not, in fact, 'lose carrier' but received a 'command error.' The issue is still under investigation. [Encl (22)]

70. (U) T3 and T4 may have erroneously received a signal from either the BCC or MCC, which initiated the recovery sequence. [Encl (22)]

71. (U) The latency or sluggishness that the T1 and T2 operators experienced with their respective drones improved significantly after T3 and T4 were no longer active. [Encl (18, 23)]

72. Confirmation was made that [redacted] [Encl (6, 30)]

73. (U) T1 and T2 experienced sluggishness on the climb to 20,000 ft. [Encl (12, 17)]

74. (U) T1 and T2 climbed above 25,000 ft before responding to the commands to come back down and level off at 20,000 ft. [Encl (12, 17)]

75. (U) The T1 responded to the TCC1 RCO's third command to come down to 20,000 ft. [Encl (18)]

76. (U) This kind of sluggishness and latency was not perceived to be uncommon with SNTC. [Encl (18)]

77. (U) Once the targets reached 20,000 ft, virtually all latency disappeared, and both targets began flying normally. [Encl (12, 17, 18)]

78. (U) The SNTC data rate decreases when operating in relay mode. [Encl (13)]

79. [redacted] [redacted]. [Encl (12, 13, 17)]

80. The targets switched from [redacted] [Encl (12, 13, 17)]

81. [redacted] [Encl (12, 13, 17)]

82. (U) T2 was further behind T1 than desired, so it 'cut the corner' on the turn in order to close the distance and meet presentation profile. [Encl (9, 12, 17, 19, 52)]

83. Both [redacted] in order to [redacted] [Encl (12, 13, 17)]

84. [redacted] The altitude of [redacted]. [Encl (6, 29, 30, 35, 39)]

85. (U) Once in LAC, RCOs only make minor adjustments to the right and left to keep the target on course toward the ship; altitude is automated by the drones' radar altimeter. [Encl (18)]

86. (U) All SNTC control sluggishness was resolved once drones commenced presentation. [Encl (12, 13, 17, 18, 23)]

87. (U) Target presentation for T1 and T2 appeared nominal. [Encl (12, 13, 18, 23)]

88. [redacted]. [Encl (50)]

89. (U) Drones are manually issued commands to end presentation profile by hitting a toggle switch on the TCC, in this case, 'escape left.' [Encl (12, 13)]

90. [redacted] [Encl (6, 12)]

91. The Test Operations Conductor instructed [redacted]. [Encl (12)]

92. Between [redacted] [Encl (12, 13, 18)]

93. (U) Upon hearing this, the TCC1 RCO hit the 'escape left' command at approximately 13:13:38. [Encl (12, 13, 18)]

94. (U) T1 did not respond when the TCC1 RCO hit the escape left switch. [Encl (12, 13, 18)]

95. (U) TCC1 failed when RCO issued the escape command, on either the first or the second time he tried. [Encl (12, 13, 18)]

96. (U) Post data analysis indicates that TCC1 had stopped functioning normally seven seconds prior to escape command but appeared to function normally to those monitoring the system. [Encl (14, 24)]

97. (U) Post data reconstruction indicates that TCC1 actually failed over to TCC3 at 13:13:31. [Encl (24)]

98. (U) Prior to this event, having a TCC 'fail over' but continue to display a running clock and telemetry data was not known to have been possible. [Encl (13)]

99. (U) 'Failovers' are not common occurrences. [Encl (22)]

100. (U) MCC and BCC experienced faulty operations not known until post event reconstruction, whereby each thought they were in control. [Encl (14, 21, 24)]

101. (U) TCC1 attempted multiple control orders to terminate drone presentation profile after his screen switched to the windows homepage. [Encl (12, 13, 18, 24)]

102. (U) Once it became clear T1 was having issues, T2 was ordered to escape left. [Encl (12, 13, 17)]

103. (U) TCC2 executed escape command nominally and T2 transitioned to recovery. [Encl (12, 13, 23, 24)]

104. (U) MCC operator was verbally ordered to "kill carrier" multiple times by multiple personnel. [Encl (13, 17, 18, 19, 21)]

105. The first [redacted] [Encl (12, 13, 19, 24)]

106. (U) The process needed to 'kill the carrier' takes three to five seconds because of how the MCC is designed. [Encl (20)]

107. (U) It is achieved on the MCC by scrolling a finger touch mousepad up to the corner of the screen and unchecking the "radiate to target" radio button. [Encl (20)]

108. (U) Ultimately, the SNTC engineer, [redacted], ran around and asked the MCC operator, "did you kill the carrier?" [Encl (12, 13)]

109. (U) The SNTC engineer confirmed that MCC operator should kill the carrier, and MCC operator did so. [Encl (13)]

110. [redacted] [Encl (24)]

111. [redacted] [Encl (35)]

112. (U) At some point after the TCC1 failed, a screen appeared on TCC3. [Encl (13)]

113. (U) It is unclear when a screen appeared on TCC3, or if what appeared was the controls for T1. [Encl (13)]

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114. (U) The expectation was that if TCC1 failed, it would have failed to either TCC5 or TCC6. [Encl (17)]

115. (U) No one was sitting at TCC3 through TCC6 at the time of TCC1's failover. [Encl (25)]

116. [redacted] The test conductor asked target test conductor to "confirm T1 up and out" when T1 went past the [redacted] [Encl (9, 26)]

117. (U) Test conductor could not understand internal communications from target test conductor during the T1 flight termination process. [Encl (9, 26)]

118. (U) The Targets Assistant Operations Conductor called "loss of carrier" to the Test Conductor multiple times over the net but was not heard. [Encl (17)]

119. (U) Test conductor reported "rogue drone" approximately 16 seconds after impact. [Encl (4, 27, 31)]

120. (U) Test conductor does not recall reporting "rogue drone." [Encl (9)]

<u>CHV viewpoint</u>

121. (U) All CHV CSSQT personnel were trained, qualified, and were the most experienced watch team from previous CSSQT events. [Encl (6, 8, 32)]

122. (U) Net 15 is the internal command and control net for CO, TAO, warfare coordinators and supervisors, including the Missile System Supervisor (MSS). [Encl (51)]

123. (U) CIWS RCS operator communicates with MSS on net 66. [Encl (51)]

124. (U) MSS is the relay between personnel who can issue and engagement orders and CIWS RCS. [Encl (51)]

125. (U) A script is used for rehearsing and conducting CSSQT events. [Encl (51)]

126. (U) The script used for conducting LF-09 was revised to be used for a non-firing event. [Encl (51)]

127. (U) The script used still reflected actions that were only applicable to a live-firing event. [Encl (51)]

128. (U) The script did not include actions to engage a drone with CIWS. [Encl (51)]

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129. It was believed by the CHV Crew that [redacted] [Encl (3, 6)]

130. [redacted] [redacted]. [Ref E, Encl (3)]

131. [redacted] [Encl (3)]

132. (U) The TAO believed that CIWS "recommend fire" without a "rogue drone" call was not an indication of a threat. [Encl (3)]

133. Prior to target presentation, [redacted] [Encl (3, 6, 40)]

134. [redacted] As configured, if CIWS engagement was required, a "kill" or "batteries released" order would be verbally given [redacted] CO, TAO or AAWC [redacted] [Encl (3)]

135. [redacted] Radar prediction tools indicated that Spy radar would be able to detect and track both drones at [redacted] [Encl (35)]

136. (U) The Auto-SM weapons doctrine that was activated did not match what was briefed or approved by the CO. [Encl (33, 34, 35)]

137. (U) Tracks on T1 and T2 did not trip the Auto-SM doctrine that was active. [Encl (3, 6)]

138. [redacted] The NSWCPHD Air Defense engineer directed an erroneous change to Auto-SM doctrine, [redacted] [Encl (36)]

139. [redacted] [Encl (36)]

140. (U) This change to doctrine was made after all rehearsals were completed. [Encl (36)]

141. (U) Other than the CSC, no one on the ship knew that the changes to the Auto-SM doctrine had been made. [Encl (6, 36)]

142. [redacted] Since doctrine did not trip, the CO ordered manual simulated missile engagement on T1 [redacted] [Encl (3, 6)]

143. The CO, TAO and AAWC believed [redacted] [Encl (3, 6, 37)]

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144. [redacted] SPY detected and held continuous track on [redacted] [Encl (39)]

145. [redacted] SPY detected and held continuous track on [redacted] [Encl (39)]

146. [redacted] SPQ-9B detected and held continuous track on [redacted] [Encl (39)]

147. [redacted] SPQ-9B detected and held continuous track on [redacted] [Encl (39)]

148. (U) Surface Radar Controller (SRC) was logged into the Surface Warfare Supervisor (SWS) sub-mode. [Encl (38)]

149. (U) SRC stated that he did not drop any air contacts at any time during the tracking event. [Encl (38)]

150. Data extraction indicates the [redacted] [Encl (35, 39, 52)]

151. [redacted] [redacted]ge. [Encl (3)]

152. (U) The CIWS RCS operator, AAWC and MSS watched drone flight on the Phalanx thermal imager. [Encl (37, 40, 41)]

153. [redacted] CIWS detected the target at [redacted] [Encl (35, 42)]

154. [redacted] CIWS transitioned the target to track at [redacted] [Encl (35, 42)]

155. CIWS gave a recommend fire at [redacted] [Encl (35, 42)]

156. (U) CIWS RCS operator announced "recommend fire" in CIC a second or two after "rec fire" was displayed. [Encl (40)]

157. (U) MSS did not hear "recommend fire" announcement. [Encl (41)]

158. (U) MSS did not relay "recommend fire" on Net 15. [Encl (40)]

159. (U) Neither the CO nor TAO heard any personnel announce "recommend fire" because it was not announced on net 15 nor were they physically close enough to hear the announcement in person. [Encl (3, 6)]

160. (U) The AAWC heard "recommend fire" announcement approximately three to four seconds prior to drone impact. [Encl (37)]

161. (U) The AAWC did not have time to order CIWS engagement. [Encl (37)]

162. (U) Key personnel in CIC (CO, TAO) believed that they had fired a 5"/54 round at the time of T1 impact. [Encl (3, 6)]

163. (U) No personnel in CHV heard "rogue drone" passed over the primary circuit. [Encl (3, 6, 30)]

164. (U) FC2 [redacted] was the only ship's force personnel in computer central at the time of impact. [Encl (43)]

165. (U) Five civilian personnel were also in computer central at impact. [Encl (43)]

Perspective of the JPJ

166. (U) The JPJ TAO and AAWC heard "rogue drone" call on primary circuit at approximately 13:14:25. [Encl (26, 28, 29)]

167. (U) They heard the CHV call out they'd been hit at 13:14:33. [Encl (27, 28, 29)]

168. (U) Both calls occurred well after the T1 had impacted the CHV. [Encl (28, 29, 35)]

Damage Control On Board the CHV

169. (U) The BQM-74E drone struck CHV in compartment [redacted] [Encl (44)]

170. (U) The drone penetrated the watertight bulkhead of [redacted] Computer Central. [Encl (44)]

171. (U) The drone fragmented/disintegrated in the course of impacting/penetrating the hull, [redacted] [Encl (45)]

172. (U) The impact and/or remaining fuel resulted in Class A and C fires [redacted] Class B fire was never called or identified by any of the damage control teams). [Encl (44)]

173. (U) Upon impact, the five civilians in the spaces exited and made their way to the HELO hanger where the mustered for accountability purposes. [Encl (7, 43)]

174. (U) The only service member in the space, FC2 [redacted] put his foul-weather coat over his head and exited through the main space access ([redacted] the hatch closer to where the fire was breaking out. He suffered burns on his hand in the course of his egress. [Encl (6, 43)]

175. (U) At the time of the impact (1314 PST), the Damage Control Training Team was meeting in [redacted] headed by the Executive Officer, CDR [redacted] [Encl (44)]

176. (U) Those in the meeting initially believed the impact to have been the 5"/54 gun firing. [Encl (46)]

177. (U) Shortly after the impact, BM2 [redacted] entered the spaces and informed the meeting that there was a fire. [Encl (44)]

178. (U) At approximately 1317 LTJG [redacted] the Damage Control Assistant (DCA) announced "white smoke in [redacted] notifying the crew of the casualty and ordering smoke boundaries set. [Encl (44)]

179. (U) The CO and the CSO were the first responders to the site of the impact in the PORT Break and put CO2 on the fire. [Encl (6, 44)]

180. (U) Inside the ship, DCC [redacted] HT1 [redacted] and HT2 [redacted] arrived [redacted] with CO2 bottles and Self Contained Breathing Apparatus (SCBA) donned and found the spaces filling up with smoke. [Encl (44, 46)]

181. (U) DCC [redacted] checked the door for heat and communicated via hyrda radio that it was very hot. [Encl (44, 46)]

182. (U) After three tries the correct code was entered [redacted] door, and DCC [redacted] and HT1 [redacted] entered the spaces with fire retardant coveralls, CO2 bottles and a Naval Firefighting Thermal Imager (NFTI). [Encl (44, 46)]

183. (U) They engaged one small Class A on the starboard side of [redacted] to their right, and discovered a large probable Class A/C fire to their left between the [redacted] Cabinets [redacted] which forced [redacted] and [redacted] to back out of the space. [Encl (44, 46)]

184. (U) Once out of the space, DCC [redacted] assumed team leader and ordered electrical isolation and securing ventilation. [Encl (44, 46)]

185. (U) While this was going on, the XO and CHENG arrived in Central Control Station (CCS) and the XO ordered DCA to set Condition II Damage Control (DC.) [Encl (44, 47)]

186. (U) At approximately 1325, the CO announced over the 1-MC that a drone had hit the ship, ordered general quarters, said that there was a fire in Computer Central and that he "needed agent on the fire NOW." [Encl (6, 44, 46)]

187. (U) Upon hearing this, DCC ordered the assembled Flying Squad number one hose team, headed up by EMC [redacted] on the NFTI, into the spaces to engage the fire. [Encl (44, 46)]

188. (U) The hose team engaged a series of class A and C fires, though it soon became apparent that additional class C fires may have sprung up due to the water. [Encl (44, 46)]

189. (U) EMC [redacted] assumed on scene electrician and secured the breakers that were arcing and sparking in [redacted] He also secured the chill-water valves. [Encl (44)]

190. (U) While the number one hose team entered the spaces from emergency escape hatch of the [redacted] the Port Break responders continued to put CO2 on the fire from the outside. [Encl (44)]

191. (U) The number two hose team assembled outside the Port Break and began to put spray water into the spaces. A third hose team also arrived, which included FC2 [redacted] [Encl (44)]

192. (U) At approximately 1327, the scene leader reported that the class A and class C fires appeared to be out. [Encl (44)]

193. (U) Shortly afterwards, firefighting efforts by all three hose teams were ordered secured to allow overhaul to continue. [Encl (44)]

194. (U) In the time that followed, de-smoking and ventilation efforts began as individuals in the spaces were rotated in and out as their oxygen tanks ran out. [Encl (44)]

195. (U) Steps were taken in accordance with the Main Space Firefighting Doctrine and Engineering Casualty Control doctrine to secure machinery and heat sources. [Encl (44)]

196. (U) The CO ordered a muster at 1335 and ordered full power to the engines to afford maximum maneuverability and equipment redundancy. A second muster was ordered sometime later. [Encl (6, 44)]

197. (U) By 1432 the (second) muster was complete, all personnel were accounted for, and the Computer Central spaces were determined to be gas free by the atmospheric tests. [Encl (6, 44)]

198. (U) For the next six hours, the CHV crew continued de-smoking and de-watering efforts, and the spaces were secured and monitored for new hot spots. [Encl (6, 44)]

Post Event

199. (U) NAWCWD personnel took immediate action to collect and preserve physical evidence and all associated data to include personal statements. [Encl (15)]

200. (U) NAWCWD Sea Range Communications Branch conducted multiple Bit Error Rate testing on SNTC T-1 circuits commencing 19 NOV with no detectable errors. [Encl (49)]

201. (U) NAWCWD Sea Range Communications Branch continues to investigate communications systems infrastructure to determine root cause of abnormalities in SNTC. [Encl (49)]

202. (U) NAWCWD Threat Target Systems Department initiated an engineering investigation to determine root cause of observed SNTC malfunctions. Investigation is ongoing at the time of this report. [Encl (14)]

203. [redacted] Post event data analysis indicates that if CIWS had engaged T1, it most likely would have been successful. [Encl (42)]

204. CIWS would have [redacted]

205. (U) As of 16 Dec 13, the expected monetary costs of repairing the CHV is $30.5 million. [Encl (48)]

Opinions

Overview

1. (U) The failure of the SNTC hardware/software controlling the interaction with the BQM-74E target drone and the TCC was primary cause of the loss of control of the target drone. At the time control was lost, the drone was unfortunately perfectly positioned to continue its course and hit CHV. Human errors, organizational flaws, and a misplaced confidence in the control and notification systems at Point Mugu and aboard CHV precluded available measures from being taken in time to prevent the drone from hitting the ship. [FF 58-70, 94-97, 100, 101, 104-109, 126-129, 136-143, 150, 157-161]

2. (U) The anomalous nature of this event contributed to the false confidence and slow identification and reaction times of both range personnel and CHV crew. No one interviewed on the ship or at the range could point to a prior instance of "rogue drone" being called or of an instance where a ship needed to engage target drone for its own safety in nearly 30 years (though it appears there was an incident in 1995 where a target drone was engaged). In hindsight, this confidence was misplaced, especially in light of the many problems experienced

with SNTC, both since its introduction and during the day of the exercise. [FF 24, 94-99, 104-109]

Missile Range

3. (U) Abnormalities in SNTC, especially TCC1, resulting in the inability to execute drone control at the end of the tracking presentation ultimately resulted in the lead target impacting the ship. [FF 73, 93-96, 99-101, 112-115]

4. (U) System conflict between MCC and BCC, determined by post event engineering analysis, may have contributed to the inability to execute drone control at the end of the tracking presentation. [FF 65, 68, 70, 95, 112-114]

5. (U) The frequency spectrum that SNTC operates in is a congested electromagnetic environment and susceptible to interference that can result in difficulties controlling drone flight operations. [FF 22, 23]

6. (U) It does not appear that frequency interference contributed to the loss of control of T1 on the day of the incident. [FF 31-33]

7. (U) Operator displays on SNTC components, specifically MCC and TCC, are not adequate to inform operators that the system may not be operating correctly. [FF 35, 94-98]

8. (U) The flight profile of a zero CPA profile leaves very little response time for target control personnel to take immediate actions in issuing flight control orders in the event of an emergency. [FF 88, 155, 160]

9. (U) Delays inherent in the design of the control system in the BQM-74 upon "killing carrier" make "killing carrier" an inadequate emergency response procedure in close-aboard ship presentations. [FF 88, 104-109]

10. (U) The information presented in the pre-fire brief regarding drone "loss of carrier" did not include additional time delay of three to four seconds for the operator to order the action or that "loss of carrier" itself required four consecutive seconds of no signal. [FF 14, 106]

11. (U) The pre-fire brief did not adequately describe the "killing carrier" sequence that would be utilized as an emergency action to order drones to recovery if they were unresponsive to normal operator control inputs. [FF 12, 14]

12. (U) The target operation conductor was not able to take timely action in communicating "rogue drone" to the operation test conductor when target control issues became evident. This resulted in the

inability of the operation test conductor to communicate to the ship in a timely manner. [FF 116-120]

13. (U) Even without getting confirmation from the target operation conductor, the operation test conductor could have made the "rogue drone" call as soon as the possibility of loss of control occurred to him. [FF 116-120]

14. [redacted] Had the test conductor made the "rogue drone" call upon seeing the drone proceed across the [redacted] This would have been adequate to engage the drone. [FF 88, 105]

15. (U) The MCC operator had adequate time to affect the flight of T1 by "killing the carrier" upon failover of TCC1. He failed to do so in time to prevent impact. [FF 104-110]

16. (U) Due to the control, display, and frequency interference problems, SNTC is perceived by the range personnel to be a very problematic control system, particularly when compared to previous systems. [FF 22, 35, 50, 51, 58-60, 73, 94-98, 100, 101, 106, 112, 114]

<u>CHV</u>

17. (U) The script that was used for rehearsals and the actual event was incomplete and not accurate. It erroneously reflected actions that were only applicable to a live firing event and lacked the expected sequence of orders that would be necessary to engage a rogue drone with CIWS. This is indicative that the possibility that it may be necessary to take defensive action did not appear to have been a high-priority concern of the CO or TAO for this tracking exercise. [FF 126-128]

18. [redacted] Although Spy & SPQ-9B held track on T2 continuously [redacted] [FF 143-147, 150]

19. [redacted] The failure of doctrine to trip did not directly affect the ship's ability to defend itself from the drone. However, it did occupy their minds during the [redacted] [FF 138, 140, 141-147, 150]

20. (U) Since the CIWS RCS operator announced CIWS "recommend fire" externally and MSS did not pass the alert on Net 15, neither the CO

nor TAO were able to hear the report. Therefore, they did not know the drone was continuing inbound and could not manually issue the engagement order. AAWC was the only person who had weapons release authority but did not have time to issue an engagement order. [FF 156-161]

21. (U) Based on previous tracking presentations, drone tracks would coast and appear to be inbound to the ship even after turning outbound. This belief, combined with the failure of the range to issue a "rogue drone" call prior to impact ultimately resulted in the failure to see the threat and take defensive action. [FF 119, 130-132, 151]

22. (U) The CO and key members of the crew took heroic and effective damage control actions, which directly minimized the extent of damage. [FF 169-198]

Recommendations

1. (U) I recommend taking appropriate administrative action with the CO regarding the pre-test preparations of CHV, specifically the degree of reliance on a "rogue drone" call from the range.

2. (U) I recommend NAWCWD take appropriate administrative action with the test conductor and the MCC operator.

3. (U) I recommend that NAWCWD continue the engineering investigation in the case of abnormalities in SNTC to determine root cause and implement appropriate corrective action.

4. (U) I recommend NAVAIR evaluate SNTC as a system. Specifically, that they evaluate whether the proposed SNTC Engineering Change Proposals (ECPs), if implemented, will be sufficient to address the many interface, frequency, and control issues that presently create safety concerns.

5. (U) I recommend that NAWCWD Point Mugu reevaluate the organization and manning of the control room during drone exercises to facilitate effective and timely communication and decision making with regards to the safety of the ship, particularly in zero CPA presentations.

6. (U) I recommend that NAVSEA conduct technical analysis / modeling and simulation to determine risk to ships in the event a drone is engaged using CIWS. Results need to be incorporated in future test plan requirements.

7. (U) I recommend NAVAIR conduct technical analysis to determine if a "kill switch" that takes immediate action to terminate drone flight should be developed / implemented when presentation requirements

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dictate flight profiles close aboard to ships, and that if possible, the ship itself be able to initiate the sequence.

8. (U) I recommend NAVSEA investigate methodology be implemented to continue zero CPA drone presentations to meet testing requirements to include a minimum offset for ship safety wherever possible.

9. (U) I recommend that future NAWCWD range safety briefs better inform shipboard personnel into the design limitations and associated delays in response inherent in target control systems and actions to be taken in the event of system malfunctions or abnormal operations.

10. (U) I recommend NAVSEA review the process of writing, revising and distributing of the test plan be examined to ensure clarity and adequate time for incorporation into execution.

11. (U) I recommend that lessons learned from this event be incorporated in school house training pipelines and future range safety briefs where applicable.

[redacted]