



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
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WASHINGTON, DC 20380-1775

IN REPLY REFER TO
5830
ACMC
JUN 18 2020

MEMORANDUM

From: Assistant Commandant of the Marine Corps
To: File

Subj: CONSOLIDATED DISPOSITION AUTHORITY'S FINAL REPORT ICO 1ST
MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS 28 APRIL 2016 AND
6 DECEMBER 2018 AND ANY RELATED MATTERS

1. On December 6th, 2018 the Marine Corps suffered a tragic loss when six aircrew died in a midair collision off the coast of Japan. After reviewing the initial investigations, I appointed the longest serving aviator in the Marine Corps as a Consolidated Disposition Authority (CDA) to conduct a comprehensive review of the 2018 mishap and a similar mishap that occurred in 2016. The severity of this tragedy required our highest level review to ensure no stone was left unturned. A critical examination was required to determine what caused the mishap, to identify any contributing factors, and to ensure appropriate accountability. The Commanding General, III Marine Expeditionary Force (III MEF), reinforced the need for an institutional review in his endorsement letter of the 2018 mishap command investigation when he observed, "Organizational and resource management decisions by senior leaders of Marine Aircraft Group 12, 1st Marine Aircraft Wing (1st MAW), III MEF, and the United States Marine Corps contributed indirectly to the mishap." The goal of the CDA review, as with all mishap investigations, is to ensure the Marine Corps is doing everything possible to prevent this type of event from ever happening again.

2. Upon appointment, the CDA convened a CDA Review Board (CDA-RB) comprised of twelve experts from the F/A-18, MV-22, C-130, maintenance, medical, and legal communities with a combined total of more than 250 years of service, 33 combat deployments and 22,300 flight hours. The CDA-RB's tasks were to ensure the specific causal factors of the mishap were captured, and to ensure any larger institutional factors were identified and addressed. The CDA-RB started by examining the institution as a whole, proceeded down through the organizational echelons of command, and concluded with a close examination of the specific details of the mishap. Through this process, the CDA-RB discovered critically important new information, which led to a clearer understanding of the 2018 mishap's causal factors and the institutional and organizational context surrounding it.

3. Of note, the CDA-RB determined the previous 2018 mishap command investigation (CI) did not capture a completely accurate picture of the event. The CDA-RB determined portions of the CI contained a number of inaccuracies. Specifically, the CI incorrectly concluded medication may have been a causal factor in the mishap, the mishap pilot was not qualified to fly the mission, AN/AVS-11 night vision devices contributed to the mishap, and a similar mishap in 2016 had not been properly investigated. These conclusions are not supported by the evidence and are addressed in detail in the CDA-RB report. While the 2018 CI contains a few

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inaccuracies, the CDA-RB does confirm the CI's conclusions related to organizational culture and command climate as contributing factors to the mishap.

4. The CDA-RB found four interconnected causal factors that led to the 2018 mishap. First, the flight lead (F/A-18, call sign Profane 11) requested, and received approval for, an un-briefed, non-standard departure from the tanker (C-130, call sign Sumo 41). This departure placed the mishap pilot (F/A-18, call sign Profane 12) on the left side of the tanker. A standard departure would have placed both F/A-18s on the right side of the tanker. Second, Profane 11 chose an authorized, but not optimized, lighting configuration. After tanking, Profane 11 placed his external lights in a brightly lit overt setting, while the C-130's lights remained in a dimly lit covert setting. These circumstances set the conditions for Profane 12 to focus on the overtly lit Profane 11 aircraft, instead of the dimly lit tanker. Third, Profane 12 lost sight of the C-130 and lost situational awareness of his position relative to the tanker resulting in a drift over the top of the C-130 from left to right. Fourth, Profane 12 was unable to overcome these difficult and compounding challenges created by the first three factors. As a result, when Profane 12 maneuvered his aircraft away from Profane 11, he moved from right to left and impacted the right side of the tanker's tail section. This collision resulted in the death of six aircrew and the loss of two aircraft. It must be noted, this specific set of circumstances would have been incredibly difficult for any pilot, let alone a junior, or less proficient pilot to overcome.

5. In addition to the four causal factors, a number of institutional and organizational contributing factors were identified. It is important to note these contributing factors, if eliminated, may have reduced the probability of occurrence or severity of outcome. However, they are not causal, and even if eliminated, they would not have prevented this mishap from occurring.

6. Institutionally, the Marine Corps is addressing four key areas: manning, training, operations, and medical policies.

a. Marine Aviation is in the process of transitioning our TACAIR platforms from the F/A-18 and AV-8B to the F-35. This is an incredibly complex process, which involves three different training pipelines for our aircrew. The Deputy Commandant for Aviation is reviewing how the Marine Corps assesses the performance of aircrew as they move through their respective training pipelines, and how those aircrew are assigned to their specific platforms and duty stations once they complete training. Additionally, the Deputy Commandant for Manpower and Reserve Affairs changed Marine Corps assignment policies so the most talented first tour aviators are assigned to the most challenging forward deployed squadrons, including those in the Western Pacific. This has not been the case in the past.

b. The F/A-18 Training and Readiness manuals, Standard Operating Procedures and applicable Aerial Refueling directives require revision, alignment, and standardization. This action will require coordination across the services and Allied Nations.

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c. Recent coordination with allied Japanese Search and Rescue (SAR) partners has been vastly improved and procedures will continue to be revised. Additionally, the required fixes for identified survival equipment shortcomings are underway.

d. We are requesting Naval Aerospace Medical Institute review its medication and fatigue governing directives. A review of the medication governing directives will provide clarification on who has medication approval authority and who bears responsibility for medication accountability. A review of the fatigue governing directives will optimize fatigue management and help manage the many risks associated with night operations.

7. The CDA-RB also discovered organizational contributing factors at the Wing, Group, and Squadron levels related to their risk management processes, each requiring improvement. The turbulent and rapidly changing geo-political environment in the Pacific at the time of the mishap contributed to shortened planning and decision timelines and ultimately incomplete oversight of the Squadron's readiness and risk mitigation efforts.

8. The CDA-RB made 42 recommendations to address 17 institutional and 5 organizational contributing factors. I have carefully reviewed these recommendations and have directed they be addressed with the following 11 actions:

a. Validate Naval Standardized Score requirements for TACAIR assignments and adjust any assignment policies if required.

b. Change manning policies to include the consideration for not only a Marine's Military Occupational Specialty, but also their aviation designations and qualifications when making aircrew and maintainer assignments.

c. Update and synchronize all F/A-18 Training and Readiness manuals, Standard Operating Procedures, and all publications that govern aerial refueling.

d. Convene a SAR Working Group to examine Japanese SAR capabilities and agreements, and make any required changes to ensure a clear understanding of theater SAR capabilities, policies and procedures.

e. Procure and field an automatic aircrew electronic location device.

f. Request a Department of the Navy Aviation Sleep Management Study and adjust any aviation operations policies if required.

g. Request Department of the Navy provide updated guidance and policies on performance-enhancing drugs, controlled medication, and over the counter medication. Ensure adequate training is received by all Naval Aviators and appropriate Medical Personnel.

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h. Request revision of the Marine Corps mishap cost assessment process to allow for timely and impartial cost estimates.

i. Headquarters Marine Corps Safety Division, in concert with the Naval Safety Center, shall improve information management and safety training across the Naval Aviation Enterprise to more effectively capture lessons learned and standardize the publication of these lessons to the fleet.

j. Update Class A Mishap Command Investigation Officer assignment policies to ensure Investigating Officers have the required background, experience, and training to conduct a thorough, impartial, and complete investigation.

k. Improve Marine Corps Information Management and Knowledge Management processes and access to a tailored SharePoint site to improve the sharing of mishap safety information.

9. In addition to the above directed actions, the Marine Corps is also engaged in a number of institutional initiatives focused on improving aviation safety and operational readiness.

a. Replacement of legacy safety program with a safety management system modeled on the system used by the Federal Aviation Administration.

b. The implementation of an Aviation Safety Awareness Program now in use by all aviation units to improve the ease of reporting hazards and near miss events.

c. Directing more TACAIR resources to Iwakuni to increase and ultimately sustain readiness at a consistently high level.

d. The Deputy Commandant for Aviation has endorsed a Maintenance Capacity Model currently in use by 1st MAW to establish a unit's maintenance capacity as the pacing factor for operations, thus improving operational readiness, aircraft availability, and ultimately increasing aircrew flight hours.

e. Both III MEF and 1st MAW have improved the operational readiness assessment processes used to measure the costs and benefits of participating in all regional exercises.

10. I am directing the Director of the Marine Corps Staff to take the lead on coordinating all required actions to ensure they are properly tracked and accomplished. Regular updates on progress will be provided to me directly.

11. Marines train to be most ready when the Nation is least ready. To fight and win in combat, Marines must train in every clime and place, both day and night. Training often comes with inherent risks that must be recognized and mitigated. Though we cannot eliminate all risk, it must be mitigated to an acceptable level to ensure mission continuation.

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12. This CDA report, the 2018 CI, and the numerous staff actions supporting the many additional institutional initiatives detailed above provide a complete and comprehensive review of the failures that led to this tragic mishap. We now have a clear understanding of what happened and why. I am confident my directed actions will correct the deficiencies and address the institutional contributing factors found in the CDA-RB report. Finally, the appropriate level of individual accountability has been, or is in the process of being adjudicated.

13. Our Marines are our most precious resource and the loss of these six aircrew continues to be felt across our Corps. It is our sincere hope the directed actions will go a long way in mitigating future risk. The six Marines who perished in this mishap made the ultimate sacrifice while serving their fellow Marines and our great Nation. They will never be forgotten.

A handwritten signature in black ink, appearing to read "G. L. Thomas". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

G. L. THOMAS



UNITED STATES MARINE CORPS
FLEET MARINE FORCE ATLANTIC
U.S. MARINE CORPS FORCES COMMAND
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NORFOLK, VIRGINIA 23551-2400

IN REPLY REFER TO:
5800
CMFC
MAR 03 2020

From: Commander
To: Assistant Commandant of the Marine Corps

Subj: DESIGNATION AS CONSOLIDATED DISPOSITION AUTHORITY FOR TWO
1ST MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS ON 28
APRIL 2016 AND ON 6 DECEMBER 2018 AND ANY RELATED MATTERS

Ref: (a) ACMC Consolidated Disposition Authority Designation
Memo of 23 Sep 19
(b) MCO 5800.16 Ch 1
(c) Manual for Courts-Martial (2019 Ed.)
(d) MARCORSEPMAN
(e) JAGINST 5800.7F CH-2

Encl: (1) Consolidated Disposition Authority Final Report on
the 1st Marine Aircraft Wing Aviation Mishap
Incidents on 28 April 2016 and 6 December 2018

1. On 23 September 2019, I was appointed as the Consolidated Disposition Authority (CDA) for the subject aviation mishaps and any related matters (reference (a)).

2. On 3 October 2019, I appointed a CDA Review Board (CDA-RB) to assist me in my duties as the CDA. The CDA-RB was directed to conduct a comprehensive review of the subject aviation mishaps along with all other relevant matters such as causal or contributing factors to these mishaps, command climate, command culture, and command action.

3. The CDA-RB members were selected from across the Marine Corps and Navy for their experience and expertise in aviation, medical, legal, maintenance and public affairs. Among the twelve board members, they have over 250 years of service, 22,300 flight hours (3,080 of which were in combat) in the F/A-18, KC-130, MV-22, MC-130P, 33 combat deployments, and numerous tours and deployments in the western Pacific. The CDA-RB provided an unprecedented opportunity to take an impartial and holistic look into every action, policy, and practice that may have been an antecedent, contributing, or causal factor in these mishaps.

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4. The CDA-RB adopted a unique investigative approach by first identifying and defining Institutional Contributing Factors, then Organizational Contributing Factors, and only then, Individual Causal Factors. This approach and follow-on actions allowed me to fulfil my CDA responsibilities in accordance with references (b) through (e).

5. The enclosure is my CDA final report. It contains 22 Institutional and Organizational Contributing Factors, holds accountable those that should be held accountable, and generates 37 Recommendations that cut across manning, training and operations, safety, medical, and mishap investigations (JAGMAN) for the Institution's consideration. The report is sent in its entirety.

6. I firmly believe this report is a clarion call to improve our practices, and can serve as a seminal document to assist in guiding our force development efforts. The Marine Corps should use this final accounting to take action, and by doing so, reestablish the trust of the American public and with the brave men and women who serve our Nation. It is also my most sincere hope that it brings a modicum of understanding and closure for

(b) (6)



R. F. HEDELUND



**CONSOLIDATED DISPOSITION AUTHORITY FINAL REPORT ON THE
1ST MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS ON
28 APRIL 2016 AND 6 DECEMBER 2018**

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**CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
1ST MAW AVIATION MISHAPS OF 28 APRIL 2016 AND 6 DECEMBER 2018**

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Executive Summary

Since our very first flight on 17 February 1917, Marine Aviation has proven time and time again an ability to adapt to changing environments. Our success in adaptation is due to our unwavering commitment to learning...from each flight, from each mistake, and from each mishap.

The Naval Aviation Safety Program's primary objective is to prevent mishaps by identifying and eliminating hazards before they cause injury or damage. One of James Reason's Twelve Principles of Error Management states human fallibility can be moderated but it can never be eliminated. Today's aircraft are complex systems, and when you summate that with human fallibility, mishaps are bound to occur. A mishap is a failure of prevention and invokes the Naval Aviation Safety Program's secondary response, an investigation to find the hazards which precipitated the mishap, and to recommend remedy to prevent recurrence.

At approximately 0144 Japan Standard Time (JST) on 6 December 2018, an F/A-18D from VMFA(AW)-242 impacted the starboard side of a KC-130J from VMGR-152. The impact led to the deaths of (b) (6)

(b) (6)

Three Manual of the Judge Advocate (JAGMAN) Command Investigations (CI) were associated with the 6 December 2018 mishap: (1) a required JAGMAN CI into the 2018 mishap; (2) an optional JAGMAN CI (completed in May 2019) into a 2016 Class C mishap between VMFA(AW)-242 and VMGR-152; (3) a JAGMAN CI into allegations of officer misconduct in VMFA(AW)-242 that had nothing to do with the 2018 mishap. This report will focus only on the 2018 and 2016 Mishap CIs.

The 2018 Mishap CI was not impartial in its focus, thorough in its scope or accurate in its findings. Together, these two CIs failed to fully identify or develop the findings and contributing factors that led to the 2018 mishap. Because of this, we lost trust with the American people, the families of those who perished, and the young men and women who fly our aircraft.

The Marine Corps requires a more comprehensive accounting of the tragic 2018 mishap; an accounting that identifies Causal Factors from the Institution to the individual, and provides recommendations that are comprehensive, appropriate and implementable.

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On 23 September 2019, Lieutenant General Robert Hedelund, the longest-serving aviator in the Marine Corps, was "designated as [the] Consolidated Disposition Authority (CDA) for two 1st Marine Aircraft Wing (1ST MAW) aviation mishap incidents on 28 April 2016 and 6 December 2018 and any related matters."¹

As the CDA, Lieutenant General Hedelund "may initiate any appropriate investigations and take any appropriate administrative or disciplinary actions. This designation also includes the authority to follow any logical leads and adjudicate cases that result from any investigation into command climate, command culture, and command action ... Furthermore, as CDA [Lieutenant General Hedelund is] responsible ... for the disposition and/or initial administrative processing of any officer misconduct case or cases that may arise from any investigation."²

On 3 October 2019, Lieutenant General Hedelund appointed a CDA Review Board (CDA-RB) to "conduct a comprehensive review of these 1st MAW aviation mishaps along with all other relevant matters such as causal or contributing factors to these mishaps, command climate, command culture and command actions."³

The CDA-RB members were selected from across the Marine Corps and Navy for their experience and expertise in aviation, medical, legal, maintenance and public affairs. Among the twelve board members, they have over 250 years of service, 22,300 flight hours (3,080 of which were in combat) in the F/A-18, KC-130, MV-22, MC-130P, 33 combat deployments and numerous tours and deployments in the western Pacific.

The composition of this CDA-RB has provided the Marine Corps an unprecedented opportunity to take an unfettered look into every policy and practice that may have been an antecedent, contributing or causal factor to the tragic 2018 mishap.

The current aviation safety investigative practice, both in military and civilian aviation, begins with searching first for individual mistakes/actions that were causal to the mishap. Once those causal factors are identified, the investigation transitions up the chain of command, and culminates with Institutional contributing factors.

¹ DESIGNATION AS CONSOLIDATED DISPOSITION AUTHORITY FOR TWO 1ST MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS ON 28 APRIL 2016 AND 6 DECEMBER 2018, ACMC MEMORANDUM dated 23 September 2019.

² Ibid.

³ APPOINTMENT OF U.S. MARINE FORCES COMMAND CONSOLIDATED DISPOSITION AUTHORITY REVIEW BOARD CMFC MEMORANDUM dated 3 October 2019.

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The CDA-RB utilized an approach and framework for accident investigation put forth in *Increasing Learning from Accidents: A Systems Approach Illustrated by the UPS Flight 1354 CFIT Accident* which posits:

"Traditionally, accidents have been thought of as resulting from a chain of failure events, each event directly related to the event that precedes it in the chain...the biggest problem with such a chain-of-events model is what it omits...there is no structured process for making sure that systemic causal factors are not missed...The goal of accident analysis should be...to identify all the flaws in the safety controls that allowed the events to occur, to understand why each of these controls was not effective, and to learn how to strengthen the controls and design of the safety control system in general to prevent similar losses from occurring in the future."

The CDA-RB adopted a unique investigative approach by first identifying and defining Institutional Contributing Factors, then Organizational Contributing Factors, and only then, Individual Causal Factors. It is vitally important to understand the difference between contributing factors and causal factors.

Contributing factors are defined as actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. Contributing factors do not, cannot, show the degree of contribution; **no Institutional Contributing Factors could have existed that evening, and a mishap still could have occurred.**

Causal factors are errors that can be directly tied to the mishap. The CDA-RB required detailed diagrams of the scenario in question in order to analyze the final few minutes of the mishap. However, the best re-creations that could be made from the data recovered from the aircraft involved could only re-create their individual telemetries and were not of a high-enough positional fidelity to re-create their relative formation positions. As this is of key importance to reviewing the midair collision between SO41 & PE12, this information had to be derived and interpreted from the source data rather than simply re-created using software. This interpreted information was then used to create 14 Storyboards, beginning on page 103.

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This CDA report contains 22 Institutional and Organizational Contributing Factors, four Causal Factors, and generates 37 Recommendations for the Institution's consideration that cut across manning, training and operations, safety, and medical. A brief sampling of our major findings in each area follows:

1. Manning

- a. The AV-8B pipeline assignments control measure is outdated and inadvertently transfers unidentified and unmitigated risk across the entire tactical aircraft (TACAIR) community. Originally aimed at preventing AV-8B aircraft mishaps in the 1990s, this control measure's efficacy has never been validated.
- b. Marine Corps manning practices have unintentionally detailed well below average first-tour aviators in disparate proportions (and thereby pooled) in our most challenging flight environment and at our only forward-based TACAIR squadron, VMFA(AW)-242.
- c. Above average second/third-tour aviators are not assigned to VMFA(AW)-242 in the same proportional quantity as east coast and west coast F/A-18 squadrons.

2. Training and Operations

- a. Training and Readiness (T&R) Manuals need revision. Current versions are too cumbersome to determine proficiency, performance standards, and sortie completion requirements. The 2018 Mishap CI, and subsequent narratives, have incorrectly surmised that the mishap flight did not meet the T&R requirements and/or possess the proper flight lead designations to execute AAR-2202 on 6 December 2018. **In fact, (b) (6) met all T&R requirements and (b) (6), (b) (7)(C) held the appropriate designations to execute AAR-2202 on 6 December, 2018.**
- b. Air-to-Air refueling governing directives lack clarity with regards to departure routing, formations, and lighting configurations. Additionally, the F/A-18 T&R Manual is not aligned with air-to-air refueling governing directives. **This was causal to the 2016 and 2018 mishaps, and must be addressed for safer operations around the tanker.**
- c. The DoN lacks a policy on Search and Rescue (SAR) response time requirements in Japan, leading to the unknowing

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- acceptance of unidentified and therefore, unmitigated high-risk flight operations in the Iwakuni working areas.
- d. Marine Aviation Weapons and Tactics Squadron One (MAWTS-1) Night Vision Devices (NVD) Manual and the F/A-18 T&R Manual should direct that aircrew symbology shall be blanked while refueling with AN/AVS-11s.

3. Medical

- a. CNAFINST 6410.1 and CNAF M-3710.7 need to be updated to clearly define who, in all Naval units, possesses the authority to approve the use of performance maintenance medications.
- b. Violations of the performance maintenance medications policy was not likely a Contributing Factor in the 2018 mishap. The violation of the over-the-counter medication policy could have played a more contributory role in the mishap. The unauthorized use of performance maintenance medications and over-the-counter medications were indicative of aircrews' concerns with their sleep cycle and circadian rhythm, and in hindsight, could have been better addressed in the lead up to the Unit Level Training (ULT) Exercise. **This was not causal, but potentially contributory to this mishap.**
- c. CNAFINST 6410.1 should provide clearer guidance on accountability and disposal instructions for all performance maintenance medications.
- d. Flight Surgeons need to understand and emphasize the importance of constraining the duration of medication usage for aviators.
- e. Current guidance for aviation fatigue management leaves a large capabilities gap between what is recommended and what is practical, forcing unit commanders and individuals to invent their own coping mechanisms for ensuring flight readiness.

4. Safety

- a. Mishap accounting methods and processes are ambiguous and prevent the Marine Corps from Institutionally harvesting every lesson learned from near or actual mishaps.
- b. Mishap Recommendations (MISRECS) contained in Safety Investigation Reports (SIRs) are not easily accessible and thereby shielded from the FMF because of their privileged

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nature. This prevents all lessons learned from near mishaps and actual mishaps from being pushed to the FMF, thereby causing unnecessary and unmitigated risk being carried by the FMF.

- c. The Marine Corps lacks a standardized lessons learned process to brief mishap recommendations across the Type/Model/Series (T/M/S). This lack of standardization detracts from the FMF learning all of the lessons/risks identified in SIRs/JAGMAN CIs.
- d. Chapter II of the JAGMAN must provide specific direction regarding when it is necessary to appoint multiple member investigations for Class A aviation mishaps, and what level in the chain of command Investigating Officers (IOs) should be sourced from. It took a team of 12 independent CDA-RB members with diverse backgrounds to fully assess the Institutional, Organizational, and Individual Factors that caused/contributed to the 1st MAW mishaps.

Closing out the CDA final report is a Cause Map to visually depict the linkages between the Institutional and Organizational Contributing Factors and Causal Factors. The Cause Map provides a visual explanation of why the 2018 mishap occurred and reveals the system of causes and interactions that led to the mishap.

Where possible and appropriate, the CDA-RB has attempted to "show our math" and provide an assessment of the confidence in the data we utilized to formulate our understanding of the causal complexity of this mishap. Where we are uncertain, we attempt to bind our uncertainty, and let the reader know when we are doing so.

Our aim was to have this final accounting unemotionally enumerate every contributory and causal factor, allowing the Institution to hold accountable those that should be held accountable, and provide appropriate, workable and implementable recommendations for the Institution to consider going forward.

In doing so, the Marine Corps will reestablish the trust of the American public, with the brave men and women who fly our aircraft, and it is our most sincere hope, brings a modicum of understanding and closure for the (b) (6)

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**CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
1ST MAW AVIATION MISHAPS OF 28 APRIL 2016 AND 6 DECEMBER 2018**

Consolidated Disposition Authority Review Board (CDA-RB)

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On 3 October 2019, Lieutenant General Hedelund appointed a CDA-RB to "conduct a comprehensive review of these 1st MAW aviation mishaps along with all other relevant matters such as causal or contributing factors to these mishaps, command climate, command culture and command actions."⁶

The CDA-RB members were selected from across the Marine Corps and the Navy for their experience and expertise in aviation, medical, legal, maintenance and public affairs. Among the board members, they have over 250 years of service, 22,300 flight hours (3,080 of which were in combat) in the F/A-18, C-130, MV-22, MC-130P, and have served on 33 combat deployments.

The CDA-RB travelled to Okinawa and Iwakuni Japan, as well as Naval Air Station (NAS) Patuxent River to conduct interviews and reconstruct the mishap in the Naval Air Systems Command (NAVAIR) simulator. The CDA-RB conducted 46 days of individual research and study, convened eight times via video teleconference, and convened for 28 days at Naval Support Activity Hampton Roads. When complete, the CDA-RB interviewed 35 individuals from 1ST MAW, MAG-12, VMFA(AW)-242, VMGR-152, MAWTS-1, Carrier Air Wing Five (CVW-5) based in Iwakuni, Japan, and the 18th Fighter Wing (based in Okinawa, Japan).

⁴ DESIGNATION AS CONSOLIDATED DISPOSITION AUTHORITY FOR TWO 1ST MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS ON 28 APRIL 2016 AND 6 DECEMBER 2018 MEMORANDUM ACMC dated 23 September 2019.

⁵ Ibid.

⁶ APPOINTMENT OF U.S. MARINE FORCES COMMAND CONSOLIDATED DISPOSITION AUTHORITY REVIEW BOARD CMFC MEMORANDUM dated 3 October 2019.

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Over the course of the investigative process, the CDA-RB was provided unfettered access across the Marine Corps. The support we received from board member selection to responses to information requests was nothing short of incredible. We would also like to commend the many great (but disparate) efforts at HQMC and within III MEF, 1ST MAW, MAG-12, VMFA(AW)-242 and VMGR-152 to cull lessons learned from this tragic mishap and institute control measures to mitigate risk and reoccurrence.

CDA-RB Approach and Framework

The CDA-RB strictly adhered to the laws, regulations, and policies protecting privileged and personal information.

The CDA-RB utilized an approach and framework for accident investigation put forth in *Increasing Learning from Accidents: A Systems Approach Illustrated by the UPS Flight 1354 CFIT Accident* which posits:

"Traditionally, accidents have been thought of as resulting from a chain of failure events, each event directly related to the event that precedes it in the chain...the biggest problem with such a chain-of-events model is what it omits...there is no structured process for making sure that systemic causal factors are not missed...The goal of accident analysis should be...to identify all the flaws in the safety controls that allowed the events to occur, to understand why each of these controls was not effective, and to learn how to strengthen the controls and design of the safety control system in general to prevent similar losses from occurring in the future...

Behavior is controlled not only by engineered systems and direct management intervention, but also indirectly by policies, procedures, shared value systems, and other aspects of organizational culture. All behavior is influenced and at least partially "controlled" by the social and organizational context in which the behavior occurs...

In this approach, safety is treated as a control problem, not a failure problem...focus...on why the controls were not effective in this case and how they can be improved for the future."

Make no mistake, the aircrew in the 2018 mishap made poor decisions and did not comply with multiple controls in pre-flight and in execution that ended in tragedy. The 2018 Mishap

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CI primarily focused on squadron and aircrew mistakes, missing key Institutional, Organizational, and Individual Contributing/Causal Factors that created the context in which squadron/aircrew decisions (causal factors) were made.

Current CI practices begin with individual mistakes/actions, transition up the chain of command, and culminate with the Institution contributing factors.

In contrast, this CDA-RB begins with the Institution, works its way down the chain of command, and culminates in the individual mistakes/actions that caused the mishap. The CDA-RB posits our approach and framework allows for a better understanding of the environment in which 1ST MAW, MAG-12, VMFA(AW)-242, VMGR-152 and the individual aircrew were making decisions. We postulate this approach will best meet the assigned tasking of "conduct a comprehensive review of these 1ST MAW aviation mishaps along with all other relevant matters such as causal or contributing factors to these mishaps, command climate, command culture and command actions."⁷ It will also provide a final accounting.

⁷ DESIGNATION AS CONSOLIDATED DISPOSITION AUTHORITY FOR TWO 1ST MARINE AIRCRAFT WING AVIATION MISHAP INCIDENTS ON 28 APRIL 2016 AND 6 DECEMBER 2018 ACMC MEMORANDUM dated 23 September 2019.

2018 and 2016 Mishap Command Investigation Overview

2018 Mishap Command Investigation

The 6 December 2018 Mishap Command Investigation (CI) was completed on 24 June 2019, and identified 423 Findings of Fact distributed across 10 categories, posited 9 Opinions distributed across five categories, and offered 12 Recommendations.

The First Endorsement of the 2018 Mishap CI was by the Commanding General, 1ST MAW, who concurred with the facts, opinions, and recommendations of the IO with the exception of Recommendation (4). Recommendation (4) of the 2018 Mishap CI was "appropriate administrative action be taken against Col Palmer, MAG-12 Commanding Officer, for failures to effectively lead planning and then fully supervise execution in order to assure the safety of all concerned."

The Second Endorsement of the 2018 Mishap CI was by the Commanding General, III Marine Expeditionary Force (III MEF), who concurred with the IO's facts, opinions and recommendations as modified by the Commanding General, 1ST MAW with the following three comments:

1. The multiple, compounding latent and active failures which resulted in this tragic mishap have been brought to light by this investigation and subsequent endorsement.

2. Organizational and resource management decisions by senior leaders of Marine Aircraft Group 12, 1ST Marine Aircraft Wing, III Marine Expeditionary Force, and the United States Marine Corps contributed indirectly to this mishap.

3. 1ST Marine Aircraft Wing faces significant challenges in manning, maintaining and training its squadrons. As a Marine Corps, we must do better to ensure every forward-based squadron is at the highest level of combat readiness, with highly trained crews prepared for the trials of conflict and war.

A Placemat Summary of the 2018 Mishap CI follows on page 15.

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2016 Mishap Command Investigation

A night aerial refueling mishap between VMFA(AW)-242 and VMGR-152 occurred on 28 April 2016. An Aircraft Mishap Board (AMB) was convened in June 2016. **A CI was not explicitly required by the JAGMAN, nor was it conducted in 2016 as erroneously reported in the 2018 Mishap CI.** On 23 January 2019, the CG of 1ST MAW ordered a CI be conducted into the 2016 Mishap; that CI was completed on 30 May 2019, and is referred to as the 2016 Mishap CI.

The 2016 Mishap CI identified 137 Findings of Fact distributed across 18 categories.

The 2016 Mishap CI posited 13 Opinions distributed across five categories.

The 2016 Mishap CI offered four Recommendations.

The First (and only) Endorsement of the 2016 Mishap CI was by the CG of 1ST MAW, who disapproved eight Findings of Fact, modified two Findings of Fact, added 28 Findings of Fact, disapproved one Opinion, modified three Opinions, added 15 Opinions, modified one Recommendation and disapproved one Recommendation.

A Placement Summary of the 2016 Mishap CI follows on page 15.

The 2018 Mishap CI focused on factors that were not germane to the mishap and failed to identify key contributing factors. The 2018 CI also contained many inaccuracies which has led to many differing - and false - narratives being cast by the FMF and the American public. Before we identify the Institutional Contributing factors, we must dispel key inaccuracies and multiple false narratives contained in both the 2016 and 2018 CIs.

2016 Mishap Command Investigation

Causal Factor: MP lost spatial awareness in the low light level on the night of 28 April 2016 while wearing AW/AVS09 Night Vision Goggles (NVGs) which caused the F/A-18D to be flying to impact the tanker's right refueling basket, further to wedge the tanker's right refueling hose between the leading edge of the F/A-18D's right wing and LAU, and ultimately shear off the refueling hose.

Note: CI Completed 30 May 2019, SIR completed 28 Nov 2016

CONTRIBUTING FACTORS

Limited proficiency and experience of the MP (10.0 NVG hours prior to 28 April 2016)

Low light level environment

Resultant poor depth perception while using NVGs

Significant blooming of the MFL's lights which amplified MFL's movement as the MFL departed from the KC-130's right echelon as the MP had just settled into the re-join. Given the event description and training objectives as a section lead work-up, the MFL should have passed TAC lead back to the MP, thus enabling the MP to continue the sortie as the lead aircraft focusing on flying his jet rather than overloading the MP's bucket.

ADDITIONAL FACTORS / POSSIBLE FACTORS

Supervision. VMFA(AW)-242's insufficient monthly, weekly, and daily flight schedule planning and Operational Risk Management (ORM) contributed to the mishap. VMFA(AW)-242 leadership failed to: (1) adequately address the concerns expressed in the Quarterly Training Plan through appropriate ORM; (2) properly plan for the air-to-air refueling mission (AAR-2202 (Night Aerial Refueling)) when it was not included in the daily flight schedule; (3) schedule AAR-2202X (Night Air-to-Air Refueling - Initial) on the weekly nor daily schedule which resulted in insufficient ORM to be conducted for the mishap event. As VMFA(AW)-242 monthly flight schedules turned into weeklies and subsequently into daily schedules for execution, VMFA(AW)-242 leadership failed to identify potential currency and proficiency risks. For MF event, the review of weekly and daily schedules by Operations, DoSS, and the CO was inadequate as all levels of supervision failed to identify that the MF would be the MP's first night aerial refueling in the fleet. The aircrew portion of an effective Risk Assessment Worksheet (RAW) identifies potential currency and proficiency risks to unit Pilot Training Officers, Weapons System Training Officers, and Schedulers to ensure timely and appropriate risk mitigation. Flight Leads should be fully enabled by the command in the execution of events affected by dynamic environmental considerations (light levels, weather, etc.) which effect aircrew performance no matter the experience level. Specific to this incident, mitigation measures should have been implemented 72 hours ahead of the planned sortie rather than handing a yet to be identified risk to the flight lead to be deciphered during event planning the day prior to or the day of the mission. Mishap Reporting. The significant amount of time that passed between 29 April 2016 Class C flight mishap and this investigation created challenges for those interviewed to accurately recall events and reporting timeline specifics. Marines interviewed provided various descriptions of the Class C flight mishap based on each individual's situational awareness, vantage point, and memory. The incident cost determination was convoluted - incident costs should have initially been estimated at the worst case (highest cost) and then reduced as corrective maintenance and associated supply details developed. The stand-up of the joint VMGR-152 and VMFA(AW)-242 Aviation Mishap Board (AMB) was not timely. However, once initiated the AMB efficiently prepared and released the VMFA(AW)-242 - VMGR-152 Air-to-Air Refueling Class C Mishap (FM) Safety Investigation Report (SIR). All required reports associated with the 28 April 2016 Class C Flight Mishap were ultimately released and given time, were effectively clarified to the chain of command.

RECOMMENDATIONS

- 1. VMFA(AW)-242 conduct a comprehensive review of night aerial refueling procedures and best practices as well as internal planning methodology inclusive of Operational Risk Management (ORM) policies and procedures and scheduling quality assurance.
2. VMFA(AW)-242, MAG-12, and 1st MAW review deliberate Operational Risk Management (ORM) tools available within the USMC tactical fixed-wing communities to develop and implement a Risk Assessment Worksheet (RAW) that meets VMFA(AW)-242 requirements and needs.
3. No further investigation is required into circumstances associated with the VMFA(AW)-242 F/A-18D and VMGR-152 KC-130J mid-air collision of the coast of Japan on 28 April 2016.
4. As no negligence existed nor was found during the investigation of the VMFA(AW)-242 F/A-18D and VMGR-152 KC-130J mid-air collision off the coast of Japan on 28 April 2016, no administrative action is required.

ENDORSEMENTS

1ST MAW

"MAG-12" should replace "VMFA(AW)-242" in recommendation 1.

Recommendation 4 disapproved.

2018 Mishap Command Investigation

Causal Factor: MP2 subsequently lost situational awareness and impacted the empenage (rear portion) of Sumo 41. MP2's flight control inputs caused the mishap aircraft to collide with stabilized formation leader, Sumo 41. The collision damaged the KC-130J elevator control surfaces to the point that Sumo 41 was uncontrollable. Sumo 41 pitched nose down and impacted the water at high speed. The collision damaged the F/A-18D to the point that Profane 12 was uncontrollable and the crew ejected.

Significant Contributing Factor 1 - MP2's lack of proficiency with NSAAR

- A.1. Insufficient contacts for initial NSAAR 2202.
A.2. Insufficient contacts for initial AAR 2201.
A.3. Erroneous chaining of M-SHARP
A.4. Less than the minimum flight hours
A.5. VMFA(AW)-242 leadership subsequently failed to identify that MP2 was not NSAAR 2202 qualified on 5 Dec 2018 because MP2 only completed one out of six requisite nighttime contacts with the fuel drogue for NSAAR 2202.

Significant Contributing Factor 2 - Inadequate supervision by multiple levels within VMFA(AW)-242

- B.1. Lack of experience & seniority.
B.2. MP1 failed his supervisory responsibilities.
B.3. MWSO2 failed his crew responsibilities.
B.4. MSOPSO failed his fundamental responsibilities as the training manager, chief instructor pilot, and director of flight operations
B.5. MSCO failed his supervisory responsibilities.

Significant Contributing Factor 3 - (b) (6)

Significant Contributing Factor 4 - Unprofessional command climate at VMFA(AW)-242

- Prescription drug consumption, adultery, sexually explicit call signs, orders violations, and failures in following fundamental principles of professional aviation training and operations.

Inappropriate Distribution of Flight Schedules. The use of the messaging application "WhatsApp" is not an appropriate means to distribute information regarding squadron operations such as the flight schedule.

Lack of Organic SAR Capabilities. The lack of organic search and rescue (SAR) at MCAS-I is problematic. If MCAS-I had organic SAR capabilities they could have been integrated into the flight mission for more immediate response following the mishap

Use of NCVD, ANVS-11. Headquarters Marine Corps Aviation's failure to recognize and mitigate the risk of TACAIR NSAAR (with goggles down in close formation) set the preconditions for this mishap. This known risk was compounded by the MP2's lack of experience with night vision goggles and the low light level.

Missing Mishap Investigation. If the mishap that occurred in 2016 had been investigated as required, remedial measures could have been properly implemented to prevent future similar mishaps, like this one.

The addition of un-briefed, unnecessary, and non-standard tanker arrivals and departures elevates risk and does not have an associated benefit to training and readiness capabilities. They are, therefore, unnecessary risks and conducted solely for the purposes of thrill and entertainment.

- 1. Appropriate administrative and/or disciplinary action against (b) (6), MWSO2 & (b) (6), (b) (MP1).
2. Appropriate administrative action against LtCols Compton, (b) (6), (b) (7)(C) for their collective failures to lead, train, supervise, set the example, and ensure the safety of others in the conduct of flight operations.
3. Admin action against (b) (6), (b) for violating the T&R by erroneously certifying MP2 as both AAR T&R 2201 and NSAAR 2202 qualified w/o meeting the criteria of six daytime & nighttime contacts
4. Admin action against Col Palmer, CO, MAG-12, for failure to effectively lead planning and then fully supervise execution in order to assure safety for all concerned
5. 1ST MAW conducts annual full spectrum SAR exercises with all available host nations and joint assets to ensure that capabilities, capacities, limitations, and lines of communications are well known and current.
6. 1ST MAW develops a memorandum of understanding with the Government of Japan to define roles and responsibilities associated with SAR operations.
7. 1ST MAW requests the Deputy Commandant Aviation (DCA) create organic SAR capability for MCAS-I to ensure Marines are protected while training.
8. 1ST MAW requests the DCA reevaluate the current policy allowing the conduct of TACAIR NSAAR with night vision goggles down.
9. 1ST MAW requests the DCA develop an aviation community specific Risk Assessment Worksheet (RAW) and an associated Marine Corps Order that directs the use of the RAW.
10. 1ST MAW requests the DCA conduct fleet-wide aerial refueling standardization professionalism training.
11. 1ST MAW requests Naval Air Systems Command with the Commander, Operational Test & Evaluation Force to reevaluate the NVCD (ANVS-11) and provide detailed fleet information about the limitations of this system.
12. 1ST MAW requests the Commanding General, Training and Education Command, conduct a one-time review of M-SHARP chaining integrity for all T/M/S and T&R Manual

1ST MAW

4. Non-concur. There are insufficient findings to support a showing that the MAG-12 Commanding Officer failed his duties to effectively lead planning and then fully supervise execution... Fatal aviation mishap resulted from individual decisions and squadron level procedural failures

III MEF

13. CG 1ST MAW thoroughly assess his risks to mission and Marines and to make recommendations aimed at significantly improving safety and performance throughout 1ST MAW

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2016/2018 Mishap CI Review

2016 Mishap CI

Though untimely, it is the CDA-RB's opinion that the 2016 Mishap CI was well researched, well written, and captured the pertinent facts and attendant circumstances surrounding just the 2016 mishap.

CG, 1ST MAW's Endorsement disapproved eight Findings of Fact, modified two Findings of Fact, added 28 Findings of Fact, disapproved one Opinion, modified three Opinions, added 15 Opinions, modified one Recommendation and disapproved one Recommendation. It is the assessment of the CDA-RB that the 1ST MAW Endorsement (dated 30 May 2019) was written with knowledge of the pertinent facts and attendant circumstances of the 2018 mishap, thereby leading to inaccurate connections being established between the 2016 and 2018 mishaps.

2016 Mishap CI Inaccurate Findings of Fact

1. CG, 1ST MAW Endorsement added Finding of Fact 151 which stated: "the MP was not "current" to execute AAR-2202." In fact, while the Mishap Pilot was not previously qualified in night aerial refueling, he was qualified to conduct an initial AAR-2202 due to the presence of required instructors in the mishap flight.
2. CG, 1ST MAW Endorsement added Finding of Fact 152 which stated: "the MP and mishap flight lead (MFL) were not authorized to conduct night aerial refueling missions because the daily flight schedule did not include AAR-2202". **In fact, there is no requirement in CNAF M-3710.7 for a 'training code' to be annotated on the flight schedule, and therefore the MP and MFL were authorized to conduct night aerial refueling.**

2018 Mishap CI

The 2018 mishap IO disclosed to the CDA-RB that he was uncomfortable investigating possible contributing factors at the MAG and MAW level. The IO stated he did not receive illegal or undue command influence, and did not disclose his concerns to the chain of command, most notably the convening authority who appointed him as IO. The IO made numerous mistakes over the course of the 2018 Mishap CI.

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The 2018 Mishap CI Opinions and Recommendations were erroneously focused or factually incorrect. This shortfall allowed for a false narrative to be derived and propagated. There are many contributing factors that range across the Institution, Organization and Individual that were missed by the 2018 Mishap CI.

Overall, the 2018 Mishap CI makes five inaccurate or misleading Findings of Fact, and contains major inaccuracies in its Opinions and Recommendations on 2016 reporting requirements and AN/AVS-11's. This report will address the five inaccurate Findings of Fact and 2016 reporting requirements below; the report will address AN/AVS-11's under the Training and Operations Section.

2018 Mishap CI Inaccurate Findings of Fact

1. Executive Summary #4 states "Both pilots in Profane 12 immediately ejected and Profane 12 fell to the sea." The factually correct statement is (b) (6), (b) (7)(C) initiated ejection, and (b) (6), (b) (7)(C) ejected from the aircraft due to F/A-18D command ejection sequence." The CDA-RB did not find any evidence of communication between (b) (6), (b) (7)(C) post collision and prior to ejection, or if (b) (6) suffered injuries that incapacitated him in the initial collision. Therefore, the CDA-RB could not determine whether or not Profane 12 was still capable of flying and recoverable after the midair collision, and if (b) (6) was conscious or incapacitated when (b) (6) initiated ejection.

2. Executive Summary #7 discusses the post-mishap toxicology report and states "This suggests that (b) (6), (b) (7)(C) were not medically fit for flight duties at the time of the mishap." The CDA-RB determined that Ambien and/or over-the-counter antihistamine use did not play a causal role in the 2018 mishap, though the language of the command investigation and subsequent endorsement by the CG, 1ST MAW can be read to suggest otherwise.

3. Findings of Fact #163-#167 conclude that (b) (6) did not complete the required six initial contacts in order to log the AAR-2202 code, and was not AAR-2202 qualified on 6 December 2018. It must be noted that (b) (6) was Night Systems Qualified (NSQ) on the night of the mishap, and his flight lead (b) (6), (b) (7)(C) was a qualified Fighter Attack Instructor (FAI) with sufficient qualifications for him to lead, instruct, and evaluate (b) (6) on an initial AAR-2202 tanking sortie. (b) (6) met all T&R requirements and (b) (6), (b) (7)(C)

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held the appropriate designations to execute AAR-2202 on 6 December, 2018.

4. Finding of Fact #45 states "MP2 (b) (6) was cross-controlling his aircraft with steady and increasing pressure on the right rudder with increasing left wing down to maintain ground track placing the aircraft in a slipped condition." Simulator reenactment found 45 pounds of right rudder is much less than anticipated by all the pilots on the review board; approximately 25 pounds is applied simply by "resting" your feet on the rudder pedals, and 45 pounds of rudder is not consistent with a pronounced slipped condition.

5. Finding of Fact #46 states "Profane 12 was asked by Sumo 41 to provide their Bureau number (BUNO) number, and Profane 12 MWSO2 provided the BUNO." The CDA-RB found that MP2 provided the BUNO number.

2018 Mishap CI Major Inaccuracy on Reporting Requirements

The 2018 Mishap CI, under Possible Contributing Factors (page 49) stated: "A Missing Mishap Investigation. If the mishap that occurred in 2016 had been investigated as required, remedial measures could have been properly implemented to prevent future similar mishaps, like this one." **THIS IS CATEGORICALLY FALSE, AND WILL BE COVERED IN THE SAFETY SECTION.**

2018 Mishap Institutional Contributing Factors

Contributing factors are defined as actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. Contributing factors do not, cannot, show the degree of contribution. Zero Institutional Contributing Factors could have existed that evening, and a mishap still could have occurred. The identification of the following contributing factors do however allow for the Institution to "focus...on why the controls were not effective in this case and how they can be improved for the future."

Institutional Contributing Factors are binned into four areas: manning, training and operations, medical, and safety.

Institutional Manning Contributing Factors Overview

The CDA-RB assessed manning as an Institutional Contributing Factor, and placed the manning contributing factors into two bins: (1) AV-8B pipeline and first-tour assignment practices; (2) second/third-tour assignment practices.

The CDA-RB traced Institutional Manning Contributing Factors back to flight school's pipeline selection process. The pipeline selection process details student pilots to their specific platform. Today, student pilots can be sent to fly either the F/A-18, AV-8B or F-35B/C.

The Marine Corps instituted a control measure in 1992 that mandated a minimum Naval Standardized Score (NSS) for selection to fly the AV-8B. The CDA-RB will show how the AV-8B pipeline assignments process is outdated and inadvertently transfers unidentified and unmitigated risk across the entire tactical aircraft (TACAIR) community.

The assignment of a pilot's first duty station is the second Institutional Manning Contributing Factor the CDA-RB discovered. In the case of F/A-18 assignments, first-tour pilots can be assigned to Marine Corps Air Station (MCAS) Beaufort (Beaufort, South Carolina), MCAS Miramar (San Diego, California), or MCAS Iwakuni (Iwakuni, Japan).

The CDA-RB will show how Marine Corps manning practices have unintentionally detailed well below average first-tour aviators in disparate proportions (and thereby pooled) in our

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most challenging flight environment and to our only forward-based TACAIR squadron, VMFA(AW)-242 at MCAS Iwakuni.

To close out our Institutional Manning Contributing Factors, the CDA-RB will show how above average second/third-tour aviators are not assigned to VMFA(AW)-242 in the same proportional quantity as east coast and west coast F/A-18 squadrons.

AV-8B Pipeline Assignment Practices

NSS is a performance assessment tool used during student aviation training at Chief of Naval Aviation Training (CNATRA). It compares relative performance among a peer group of student aviators completing the same training syllabus; it does not rate absolute performance.

Composite NSS is a weighted combination of a student's by-phase NSS to arrive at a measure of a student's overall performance across all phases of flight training. Composite NSS is weighted to have greater emphasis on the higher level skill sets learned in later stages of training. Composite scores are set with an average of 200 in the TACAIR community with a standard deviation of 40.

The pipeline selection process is the point at which student pilots are detailed to their specific platform. Today, a student pilot can be detailed to fly either the F/A-18, AV-8B, or F-35B/C. The Marine Corps instituted a control measure in 1992 that mandated a minimum NSS for selection to fly the AV-8B as a control measure to arrest the alarmingly high and increasing mishap rate in the AV-8B community from 1986-1990.

Calendar year 1990 produced the worst mishap rate for Marine Corps Aviation since 1981.⁸ *The Marine Corps Aviation Mishap Rate Assessment Study*, released in February 1992, was commissioned to "conduct an independent safety evaluation of flight operations and their related support to determine whether 1990 mishaps are the result of an Institutional or systemic problem, or an anomaly. Additionally, this study recommends possible courses of action that could be implemented to eliminate any problems". The report recommended seven actions:⁹

1. Ensure constancy of purpose by committing to the improvement of aviation safety, and adhering to the commitment through institution of a total quality program.

⁸ Marine Corps Aviation Mishap Rate Assessment Study Final Report, February, 1992, page I-1.

⁹ Ibid, page ES-2.

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2. Assess the merit of the Harrier as a mandatory element in achieving the Marine Corps' role in national security. If it is indispensable, then changes in pilot assignment policy, and training management should be implemented.
3. Avoid assigning collateral duties to first tour, inexperienced pilots until they achieve 300 hours in type; closely supervise inexperienced pilots during all phases of flight operations; and, provide formal courses of instruction for instructor pilots.
4. Empower operational level aviation personnel through institution of a total quality program that reaches squadron level.
5. Continue research to define the relationships between aircraft utilization, support resources, and the aviation mishap rate.
6. Conduct continuing periodic reliability trend analysis in conjunction with failure modes, effects, and criticality analyses (FMECA) for each Type/Model/Series aircraft operated by the Marine Corps.
7. Coordinate the process by which squadrons are committed to tasks and the resources allotted to perform those tasks.

The CDA-RB will focus on number 2 above.

During the detailed analysis of Class A Mishap Investigation Reports (MIRs), the 1992 Study Team learned that Harriers were involved in 11 of 29 Class A mishaps across Marine Corps aviation in 1990. The Harrier accounted for 38% of the number of mishaps, but only flew about 10% of the Marine Corps hours.

The study hypothesized "inexperienced pilots contributed more than expected to the Marine Corps aviation mishap rate for the period 1986-1990...The study defined inexperienced pilots as those with less than 750 hours total flight time experience and/or 300 hours experience in type."¹⁰ A summary of the 1992 report's findings with regard to inexperienced pilots states:

1. Inexperienced pilots have contributed more than expected to the high Class A mishap rates for 1986-1990, especially Harrier operations.

¹⁰ Ibid, page II-4.

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2. Lower levels of pilot experience contribute more to unsafe Harrier operations than to other aircraft types.
3. The Royal Air Force (only other country flying the AV-8B) has a more intensive selection and training program for their Harrier pilots which places greater emphasis on pilot proficiency in low level flight operations. They have also enjoyed a much lower mishap rate over a longer period of time.

The Marine Corps asked the 1992 Study Team to develop alternative courses of action to enhance aviation safety and reduce mishap risk. The Study Team postulated

"If the Marine Corps decides that the Harrier's basing capability is indispensable to accomplishing the Marine Corps mission, then changes in pilot assignment policy, and training management should be implemented."

Furthermore, the study postulated "assignment policy mishap risk for Harrier operations can be reduced by changing the policy for assigning new pilots to Harriers. Only the most qualified new pilots should be assigned to Harriers.

Current [1992] Marine Corps officer assignment policy for new pilots is to make assignments based on the needs of the Marine Corps, recommendations from the pilot's training command squadron, and the desires of the individual. Performance in the Training Command as measured by composite score does not presently play a part.

The Study Team's finding about inexperienced pilots in Harrier mishaps is evidence that a change in assignment policy is warranted. The composite score and training command records are the best available measures for judging prior performance of new pilots. The average training command composite score is 200, so that score is suggested as a minimum threshold for initial consideration. Although further research to determine a more accurate score is warranted, more research in this area was infeasible because of time limitations on the study.

As mentioned in the section on service comparisons, the British are very selective about who is allowed to fly Harriers and their mishap rate is considerably lower than the Marine Corps rate.

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Harrier squadron commanders believe that composite scores are a valid indicator of pilot performance and that only new pilots with higher than average composite scores should be assigned to the AV-8B."¹¹

On 2 June 1992, a memorandum from HQMC Aviation to Manpower and Reserve Affairs (M&RA) requested only aviators with a composite NSS score of 178 or higher be assigned to AV-8B pipeline training.

On 7 July 1993, M&RA approved the ASM-31 Memorandum establishing a minimum composite NSS score of 178 for AV-8B pipeline selection, while recommending the AV-8B composite score requirements be reviewed for validity on an annual basis.

On 26 February 2015, a memorandum was sent from the Deputy Commandant for Aviation to the Commanding General, Training Command via the Commanding General of Training and Education Command.

The 2015 memorandum stated "after reviewing the information and data from the study, I have determined that the minimum composite score for AV-8B selection will be increased to 185. This increase accounts for the change to the CNATRA grading systems under the Multi-Service Pilot Training system (MPTS) adopted in 2012. Also, this increase maintains the established exclusion of the bottom 18 percentile aviators from assignment to the AV-8B pipeline." The CDA-RB assumed the study that was referenced in the 2015 memorandum is *The Marine Corps Aviation Mishap Rate Assessment Study*, released in February 1992.

First-Tour Assignment Practices

Today (2020), first-tour F/A-18 pilots are assigned according to the needs of the USMC, minimum AV-8B pipeline NSS requirement, and then preference. On average, MMOA has ordered 55% of the first-tour F/A-18 pilots to the east coast (Beaufort), 35% to the west coast (Miramar), and 10% to Japan (Iwakuni) over the past few years.

A review of the NSS of first-tour pilots from 2016-2019 in the F/A-18 reveals the following distribution between the east coast, west coast, and Japan:

MAG-11 (MCAS Miramar):	Average Composite NSS	201.8
MAG-31 (MCAS Beaufort):	Average Composite NSS	193.7
MAG-12 (MCAS Iwakuni):	Average Composite NSS	169.2

¹¹ *Ibid*, page III-3.

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The Marine Corps places no performance-based restrictions for assignment of first-tour aviators to Japan. The following table displays a snapshot of NSS scores of first-tour aviators present in VMFA(AW)-242 in December 2018.

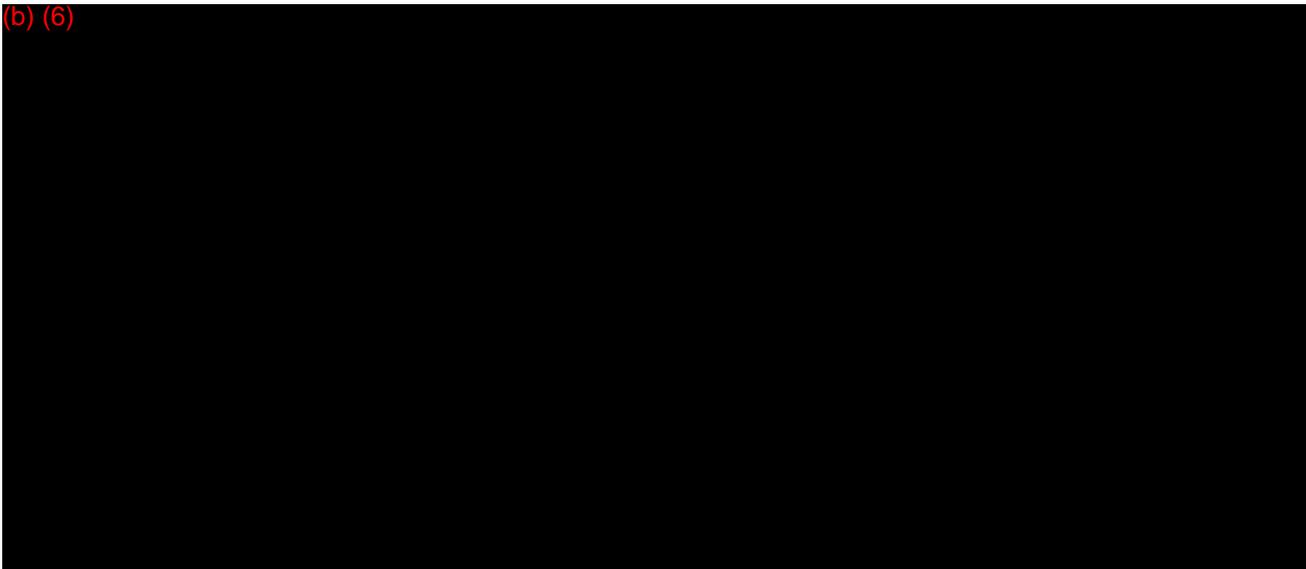
NSS	Last	First
(b) (6)		
169.21 (Average NSS)		

NSS for First-Tour pilots at VMFA(AW)-242

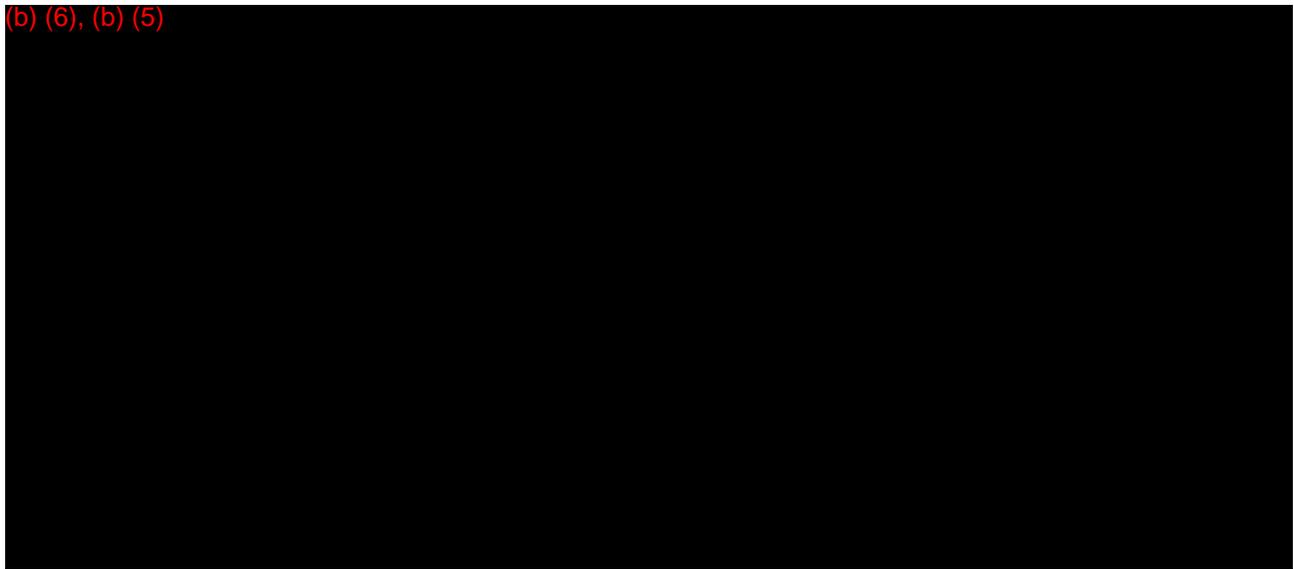
(b) (6)

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(b) (6)



(b) (6), (b) (5)



The CO, VMFAT-101 commented: "I concur unless DCA waives CQ requirement for completion. Begin NATOPS/EP review and INST procedure review. Additional NATOPS + Inst Checks are not required. However successful instrument + EP review sims must be successfully completed."

On 21 February 2017, the Deputy Commandant for Aviation (DCA) waived the requirement for all F/A-18 pilots to complete the Carrier Qualification (CQ) phase at VMFAT-101 (memo next page).

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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
3000 MARINE CORPS PENTAGON
WASHINGTON, DC 20380-3000

ORIGINATION TO:
3500
ASM-32
21 Feb 17

From: Deputy Commandant for Aviation
To: Commanding Officer, Marine Fighter Attack Training Squadron 101

Subj: DEFER CAT I CARRIER QUALIFICATION TO INCREASE PRODUCTION

1. In order to reduce the USMC F/A-18 CAT I production deficit HQMC Aviation directs VMFAT-101 to defer all, but 15 CAT I students carrier qualification phase during each FY through FY19.

2. Due to low USMC F/A-18 readiness at VMFAT-101, late CNATRA production, and USMC accession shortfalls; USMC F/A-18 production is forecasted to be behind by 32 pilots in FY 18.

3. This deferment will reduce the CAT I syllabus by 22 sorties and 22.9 hours. The current 1000 level F/A-18 Training and Readiness syllabus provides 108.1 hours of flight training for CAT I students. This reduction in training time and hours will transfer some risk to the fleet squadrons due to the experience not gained from carrier based aviation.

4. Naval Aviation Production Analysts (NAPP), USMC Training and Education Command (ASB), MMOA-2 and HQMC Aviation have collaborated to determine that this is a feasible course of action to temporarily increase production.

5. This increase in production will provide necessary pilot inventory for a 7523 PMOS community that is at 48% of the target inventory for Company grade officers. Production is expected to increase by four to eight CAT Is per FY of this deferment.

6. HQMC AVN will continue to monitor USMC F/A-18 CAT I production and will cease this deferment at the end of FY19 if inventory and production problems have been solved.

7. VMFAT-101 will coordinate with Training and Education Command (ASB) identifying by name those aviators that received a carrier qualification deferral. This letter will be placed in both the aviation training jacket and NATOPS jacket of each individual deferred.

8. Point of contact for this request is (b) (6) at (b) (6) or (b) (6)

J. M. Davis
J. M. DAVIS

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As a result of this waiver, (b) (6) completed the RPRB recommended simulator and emergency procedure (EP) review only, and was not required to complete the CQ Phase (22 sorties and 22.9 hours). (b) (6) completed the VMFAT-101 syllabus on 25 April 2017 and transferred to VMFA(AW)-242 in June 2017.

(b) (6)

The Navy does have performance-based restrictions for assignment to Carrier Air Wing FIVE (CVW-5) located in Iwakuni, Japan.

COMNAVAIRFORINST 3500.2C is the policy governing detachment and transfer of Navy first-tour aircrew from Fleet Replacement Squadrons (FRS) to deployed Navy squadrons. It states "special consideration must be given to the selection of aircrew reporting to a forward deployed or imminently deploying squadron."

First-tour aircrew reporting to these commands are defined as Priority A (PRI A) aircrew. CVW-5 is located in Iwakuni, Japan, and as part of the Forward Deployed Naval Force (FDNF), is considered to be in a continually deployed status due to the FDNF ready-for-sea requirements. Standards for selection, designation and placement of PRI A first-tour aircrew are as follows:

1. A consistently improving trend of performance throughout the FRS syllabus. No minimum phase or overall grade point average, or class standing is associated with this requirement.
2. No consistently below average performance within an FRS phase during the FRS syllabus, to include repeated signals of difficulty (SOD) in any one phase. Additionally, no major or frequent "headwork" errors; or major breaches of flight discipline.
3. No psychological stress factors during the selection and assignment process (e.g., pending divorce, death in the family, etc.).
4. Strong Field Carrier Landing Practice (FCLP) performance as demonstrated by consistently above average grades (top 50% as compared to the last 100 peer graduates). Minimal opportunities for additional FCLPs in a deployed or imminently deploying squadron dictate that the RP have a high learning curve during the FRS FCLP evolution. CQ performance must be very strong with day and night boarding

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rates of at least 75 percent. CQ GPA must be a minimum of 2.65 during day CQ, 2.60 during night CQ, and a cumulative GPA in the top 50% of peers (as compared to last 100 peer graduates). Additionally, an RP must not have received a signal of difficulty (SOD) during the qualifying CQ Phase (including simulators).

(b) (6)

above if the Marine Corps had similar requirements for first-tour aircrew assigned to forward-based squadrons.

Pipeline and First-Tour Assignment Practices Opinions

1. The CDA-RB opinion is the Marine Corps transfers unidentified, and therefore unmitigated, risk to the rest of the TACAIR community. There was no correlation established between NSS score, inexperienced pilots and Harrier mishap rates established in *The 1992 Marine Corps Aviation Mishap Rate Assessment Study*. There was no data (or analysis) the CDA-RB could uncover that allowed for the Marine Corps to understand the effects of establishing a 178 NSS score for AV-8B pipeline accession would have on the TACAIR community writ large. While not contributory to the 2018 mishap, neither (b) (6) (Mishap Pilot) nor (b) (6) (Mishap Flight Lead) were

(b) (6)

2. The CDA-RB was unable to find evidence of AV-8B composite score requirements being reviewed for validity (as called for in the 1993 Memo) until the 2015 memorandum. If no reviews were undertaken from 1993 until 2015, it is the CDA-RB's opinion that the Institution failed to monitor the environment for changes that affect the nature and/or the impact of the risk mitigation/control measure. The 2015 decision to increase the cutoff score to 185 missed an opportunity to monitor and assess the policy's efficacy. The 2015 memorandum continued the Institution's normalized deviancy of accepting previous policies, thereby transferring unidentified - and unmitigated - risk to the TACAIR community.

3. It is the opinion of the CDA-RB that the western Pacific is the most challenging flight environment in peacetime. Single runway operations and the most percentage of time with precipitation and most percentage of time with instrument conditions both in working areas and at home station, coupled with linguistic challenges, lack of nearby divers, and cultural implications associated with divert decisions, make MCAS Iwakuni the most challenging flight environment.

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By not identifying Iwakuni as the most challenging flight environment, the Marine Corps has not instituted risk mitigation measures in its assignment policy of first-tour aviators. Therefore in practice, current assignment policies have pushed the weakest aviators to Iwakuni in statistically disproportionate numbers. The CDA Review Board has data that shows this is not just confined to the F/A-18, it is true across all forward based squadrons in WESTPAC.

4. VMFAT-101 failed to properly train (b) (6) to the standard required of an F/A-18 pilot. The syllabus (b) (6) (b) (6) executed after his SOD in the Carrier Qualification Phase at VMFAT-101 was insufficient and did not meet the intent/purpose of the recommended syllabus from his RPRB.

(b) (6) final SOD at VMFAT-101 was for headwork during a Field Carrier Landing Flight (he began dumping fuel while enroute from MCAS Miramar to NAF El Centro - he never turned the dump switch to off; his bingo bug, which was set at the fuel required to return to MCAS Miramar, activated and automatically turned off the dump switch).

The RPPRB recommended a syllabus intended to remedy this headwork deficiency through additional simulator and flight events. With the waiver of the CQ Phase at VMFAT-101 (after his SOD and before he was able to complete the recommended syllabus), (b) (6) was not required to complete the CQ Phase, as recommended by the RPRB, (reducing his FRS syllabus by at least 22 sorties and 22.9 flight hours).

Pipeline and First-Tour Assignment Practices Recommendations

Manning 1. For HQMC:

1. Review and assess the minimum composite NSS for AV-8B pipeline selection. Determine if this control measure and associated risk should continue to be assumed/accepted.
2. Determine if the control is adequate given the current/future TACAIR transition.
3. Determine if this is still a viable control measure.
4. Determine the process/policy by which the Marine Corps will monitor the environment for changes that affect the nature and/or the impact of this risk.

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Manning 2. For HQMC:

1. In light of USMC TACAIR consolidation to F-35, reassess minimum NSS for strike pipeline assessment and graduation.
2. In light of USMC TACAIR consolidation to F-35, reassess minimum NSS for FRS completion.

Manning 3. For HQMC:

1. Determine if a minimum performance level baseline should be established for first-tour aviators assigned to forward-based squadrons. If a minimum performance baseline is established, then revise the assignment process and practices for first-tour aviators to spread risk more evenly across Beaufort, Miramar and Iwakuni squadrons.

Second/Third-Tour Assignment Practices Overview

It has been a long and widely-held belief within the TACAIR community that many (not all) second/third-tour assignments to our forward based VMFA are sourced first by volunteers who do not possess the same level of qualifications and designations as do the second/third-tour aviators being assigned to Beaufort and Miramar.

VMFA(AW)-242 has an inordinate amount of below average first tour pilots. Their second-tour aircrew lack the necessary qualifications and designations to mitigate this fact in light of the challenging flight environment and training limitations VMFA(AW)-242 faces.

Second/Third-Tour Assignment Practices

Officer assignments are done in accordance with MCO 1300.8: Marine Corps Personnel Assignment Policy which states officer assignments will be made based on the following order of precedence: needs of the Marine Corps, career progression, overseas control date, and individual preference.

T&R Manuals detail the amount of qualifications, designations, and Weapons and Tactics Instructors (WTI) each squadron should possess. There is no policy or process to assign aircrew by qualification and designation. Additionally, there is no policy to ensure WTIs are evenly/proportionately distributed across Beaufort, Miramar or Iwakuni based squadrons. It is left to each MAG/Squadron to individually recruit or organically "make" their own.

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(b) (6), (b) (7)(C) (Mishap Flight Lead) was a second-tour aviator. (b) (6), (b) (7)(C) as he headed to VMFA(AW)-533 for his first-tour. It was a widely held opinion by many interviewed that (b) (6), (b) (7)(C) aviator when compared to his peers in VMFA(AW)-533, his first squadron. When he departed VMFA(AW)-533, he was a Section Lead; he quickly attained various qualifications and designations upon his arrival in Iwakuni, and was viewed as a good instructor.

The following tables show a comparison of second-tour aviators in VMFA(AW)-242, VMFA(AW)-225 and VMFA(AW)-533 on 6 December 2018, as well as what qualifications and/or designations they possessed when they came to their respective squadron. The CDA-RB would highlight one issue:

1. Overall, there are fewer advanced flight lead qualifications for VMFA(AW)-242 than there are for the other two F/A-18D squadrons depicted.

VMFA(AW)-242			
LAST	PREVIOUS SQDN	QUAL./DESIG. ON ARRIVAL TO SQDN	QUAL./DESIG. ON 06 DEC 2018
	VMFA-314, 232, MATSS, MAWTS-1	WTI, MC, DL, NSI, LATI, FAI	WTI, MC, DL, NSI, LATI, FAI
	VMFA-312	DL, FAI	DL, FAI
	VMFA-314	DL, FAI	MC, FAI, LAT(I), F(A)
	VMFA-323	SL	SL, FAI
	VMFA(AW)-533	DL	DL
	VMFA(AW)-224	DL	DL
	VMFA-122 w/ tour at VT-21 (T-45s)		SL
	VMFA(AW)-533	SL	MC, FAI, LAT(I), F(A)

VMFA(AW)-225			
LAST	PREVIOUS SQDN	QUAL./DESIG. ON ARRIVAL TO SQDN	QUAL./DESIG. ON 06 DEC 2018
	VMFA(AW)-225	DL, MC, FAI, PMCF, WTI, NSI, T(A), F(A)	DL, MC, FAI, PMCF, WTI, NSI, T(A), F(A)
	VMFA-212, 242, 225, 101, 224, 122	DL, MDTI, PMCF	DL, MDTI, PMCF
	VMFA-212, 242	SL (REFRESH REQ'D)	DL, PMCF, F(A)
	VMFA-323	SL (REFRESH REQ'D)	NONE
	VMFA(AW)-242	SL	DL

VMFA(AW)-533			
LAST	PREVIOUS SQDN	QUAL./DESIG. ON ARRIVAL TO SQDN	QUAL./DESIG. ON 06 DEC 2018
	VMFA-115, FAC, 115, MAWTS-1	WTI, MC, DL, SL, LATI, NSI, MDTI, FAI	WTI, MC, DL, LATI, NSI, FAI, F(A), MDTI
	VMFA-312, MWSS, 312	WTI, MC, DL, SL, LATI, NSI, MDTI, FAI	WTI, MC, DL, LATI, NSI, FAI, MDTI
	VMFA-533, FAC	MDTI, DL, SL, FAI, F(A)	MC, WTI, LATI, FAC(A)-I, NSI, MDTI, DL
	VMFA-533, FAC	DL, SL	MC, FAI, F(A), DL
	VMFA-225, FAC	SL	DL, F(A)
	VMFA-122	SL	DL, MC, F(A), FAI
			*1.5 YEARS AT VMFA-122 (ext'd 1st tour)

Designations	Qualifications
SL: Section Lead	NS: Night Systems
DL: Division Lead	ACM: Air Combat Manuevering
MC: Mission commander	LAT: Low Altitude Tactics
MDTI: Marine Division Tactics Instructor	F(A): Forward Air Controller (Airborne)
FAI: Fighter Attack Instructor	T(A): Tactical Air Coordinator (Airborne)
PMCF: Post Maintenance Check Flight	SSFAC(A): Single Seat Forward Air Controller (Airbn)
LAT-I: Low Altitude Tactics Instructor	NATOPS: NATOPS Instructor
WTI: Weapons and Tactics Instructor	INST-E: Instrument Evaluator
NSI: Night Systems Instructor	CRM-F: Crew Resource Management Facilitator
FLSE: Flight Leadership Standardization Evaluator	
TAC(A)-I: Tactical Air Coordinator (Airborne) Instructor	
FAC(A)-I: Forward Air Controller (Airborne) Instructor	
SSFAC(A)-I: Single Seat Forward Air Controller (Airborne) Instructor	

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The Commandant realized the manning shortfalls in the Pacific and has issued guidance in the form of MARADMIN 018/20 which states:

"Commanding Generals, Commanding Officers, Senior Enlisted Leaders, and mentors of every rank should actively mentor and identify our highest quality NCOs, SNCOs, and officers for duty in the Pacific. I need you to incorporate this intent into your outreach efforts at every opportunity. Marines should first consider the opportunities to serve overseas when assignment windows dictate."

Second/Third-Tour Assignment Practices Opinions

1. Overseas aviation assignments are not desired or coveted by most; top choices for aircrew prospective duty stations are west coast, east coast, and then Japan. This is due to:

1. Lack of local ranges to fly the Training and Readiness (T&R) sorties required to generate qualifications, designations or Potential Weapons and Tactics Instructor (PWTIs) workups.
2. Lack of reliable readiness training evolutions throughout WESTPAC due to strategic lift unpredictability.
3. Inability to attain major designation and qualification evaluations overseas (MDTC, FAI workups, etc).
4. While not contributing to this mishap, germane to this discussion is that VMFA(AW)-242 rarely sources maintainers or aircraft to MAWTS or TOPGUN, which detracts from both WTI production and east/west coast VMFAs' readiness generation.

2. Incredibly talented and skilled aviators have been stationed with VMFA(AW)-242. However, due to first-tour and second/third-tour manning practices, VMFA(AW)-242 is challenged to consistently generate qualifications and designations necessary to meet readiness generation requirements. Additionally, when the full impacts of the assignment practices are in effect, it is difficult for VMFA(AW)-242 to know what "good" looks like. All those interviewed post mishap testified to the good instructor and flight leadership abilities of (b) (6), (b) (7)(C) ██████████. However, in relationship to the FMF, (b) (6) ██████████ and on the night of 6 December 2018, made decisions that were causal of the mishap.

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3. In very candid interviews with VMFA-121 leadership (Iwakuni forward-based F-35B squadron), all believe VMFA-121 will soon be in the same position as VMFA(AW)-242 with regards to aircrew quality and readiness generation.

4. MARADMIN 018/20, when viewed in light of the 2018 Manning Contributing Factors detailed above, provides an opportunity to implement impactful and lasting manning policies that provide better controls (mitigate risk) while meeting the Commandant's intent which emphasizes a renewed focus and priority towards III MEF's ability to provide ready, stand-in forces in support of INDO-PACOM and the Pacific Fleet (PACFLT).

Second/Third-Tour Assignment Practices Recommendations

Manning 4. For HQMC: Review and determine if designations and qualifications required by the T&R Manuals should be figured into aircrew assignment policies and practices for forward-based squadrons.

Institutional Training and Operations Contributing Factors

The CDA-RB will propose 19 Recommendations from within the Training and Operations section. These 17 Contributing Factors are binned into four sections: (1) F/A-18 Training and Readiness Manuals; (2) Air-to-Air Refueling (AAR) Operations; (3) Ejection and Search and Rescue (SAR); (4) AN/AVS-11.

Training and Readiness (T&R) Manuals

Governing documents for readiness generation and flight progression include the Navy Marine Corps Publication (NAVMC) 3500.50C dated 5 April 2016 (F/A-18 T&R Manual) NATO STANDARD ATP-3.3.4.2 (ATP-56), and the UNITED STATES ATP 3.3.4.2 Standards Related Document (US SRD). It took the CDA-RB, comprised of multiple former Weapons School Instructor Pilots and former/current squadron Training Officers, an inordinate amount of time to determine if Profane 11/12 was qualified and/or proficient to fly a night aerial refueling sortie the evening of 6 December 2018. USMC Aviation governing documents are complex and have become incongruous. While (b) (6) (Mishap Pilot) was not proficient in AAR-2202, he had met all administrative prerequisites, and (b) (6), (b) (7)(C) (Mishap Flight Lead) possessed all the qualifications and designations to execute AAR-2202 on 6 December 2018.

Determining Qualified and Proficient

The 2018 Mishap CI, and subsequent narratives have focused, incorrectly, on (b) (6) supposed lack of air-to-air refueling qualification and proficiency. Admittedly, codes were improperly entered into (b) (6) record, but that had no bearing on the mishap. The CDA-RB will illustrate (b) (6) progression in Air-to-Air Refueling leading up to the night of the mishap, the confusion in determining proficiency and currency, and show how it was only through coincidence and not proper scheduling that (b) (6) met all the prerequisites to fly AAR-2202. The CDA-RB will then present five recommendations to adjust the F/A-18 T&R Manual for the Institution's consideration.

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The specific requirements to execute an F/A-18 night aerial refueling sortie are contained in NAVMC 3500.50C F/A-18 T&R Manual 5 April 2016.¹²

1. Currency to fly at night (a flight within fourteen days);
2. Have previously executed and maintained proficiency in a daytime aerial refueling event (T&R code AAR-2201);
3. If an aircrew does not have a Night Systems Qualification (NSQ), he or she must fly the event with a qualified Night Systems Instructor (NSI), or Night Systems Low Altitude Tactics Instructor (NSLATI), or formerly designated Night Systems Instructor (High) [NSI(H)].

(b) (6) flew on 27 November 2018, meeting the first requirement. (b) (6) logged T&R code 2201 on 6, 19, 20, and 28 June; 24 July; 20 November 2018. Because three of these events were transoceanic movements, (b) (6) had definitively met prerequisites for proficiency in AAR-2201. (b) (6) achieved his NSQ on 14 July 2017. Therefore, on 6 December 2018, (b) (6), (b) (7)(C) was qualified to instruct (b) (6) in the AAR-2202.

Aircrew must achieve certain performance standards in order to gain proficiency in a T&R event. If those standards are not met, they will not gain proficiency in the event. And, the first time aircrew attempt a T&R event, they are, by definition, not proficient.

Although (b) (6) had met the prerequisites to execute AAR-2202, he was not proficient in AAR-2202. On the only previous flight in which he had executed night aerial refueling, 7 July 2017, he did not execute the six contacts required by the T&R to achieve proficiency.

The 2018 Mishap CI contains multiple misleading statements with regard to (b) (6), (b) (7)(C) execution of AAR-2202 that require explanation. The misleading statements and clarification are below:

In the 2018 Mishap CI, Finding of Fact 166 states (b) (6) (b) (6) was not qualified to conduct NS AAR-2202 on 7 July 2017 because he was not NSQ at the time. However, because his

¹²The NAVMC 3500.50C dated 5 April 2016 was current at the time of the 6 December 2018 mishap. There was a subsequent revision (28 September 2019), but all of the issues identified persist in the updated manual.

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instructor was an NSI on 7 July 2017, (b) (6) met this requirement to execute an AAR-2202 sortie.

(b) (6), (b) (7)(C) stated that (b) (6) only conducted a single contact during his daytime AAR-2201 on 21 June 2017; the T&R states that six contacts are required for completion.

Based on (b) (6) not conducting six contacts for his AAR-2201, he did not meet the minimum requirements to log an AAR-2201 on 21 June 2017. As such, (b) (6) did not meet the T&R prerequisites requirement to conduct the AAR-2202 on 7 July 2017.

(b) (6) erroneously logged both the AAR-2201 and AAR-2202 in MSHARP; AAR-2201 and AAR-2202 codes should not have been logged.

In the 2018 Mishap CI, Findings of Fact 167 & 182 state (b) (6) was neither qualified nor proficient in the Night Systems (NS) T&R code AAR-2202, a basic night aerial refueling sortie. In order to prove that (b) (6) was qualified to execute the AAR-2202 on 6 December 2018 a brief familiarity with the NAVMC 3500.50C F/A-18 T&R Manual is required.

Amongst fleet aviators and instructor pilots confusion exists concerning the delegated level of authority to waive flight requirements for proficiency. This confusion is warranted, due to inconsistent and confusing language throughout different versions and even different chapters within the same version of the T&R Manual.

According to the F/A-18 T&R Manual excerpted below, if aircrew cannot meet performance standards for a training code, "the training code shall not be logged..." The F/A-18 T&R Manual also dictates the requirements for each sortie. If unable to complete the sortie requirements in one sortie, squadrons may complete the requirements in multiple sorties within "normal currency windows defined by unit [standard operating procedures] (SOP)."

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NAVMC 3500.50C F/A-18 T&R Manual 5 April 2016

2.5.12 Sortie Requirements. Sortie requirements state the minimum number of passes, engagements, or maneuvers required to demonstrate proficiency. T&R event requirements are written to allow completion on one sortie. Squadrons who cannot complete all stated requirements in one sortie (e.g., CV squadrons or squadrons limited by range access and regulations) may complete the requirements of an event in multiple sorties as long as the completion sorties are flown in succession and within normal currency windows defined by unit SOP. If an aircrew's currency expires (e.g., a warm up flight is required), or the event requirements cannot be completed on the next scheduled sortie, the event shall be re-flown in its entirety.

2.5.13 Performance Standards. Performance standards are listed for each T&R event description. These are training standards for individual aircrew performance and should be utilized by the evaluator as a guideline to determine the satisfactory completion of each event. If the aircrew did not successfully attain the performance standards, the training code shall not be logged as a completed flight.

NAVMC 3500.50C F/A-18 T&R Manual dated 5 April 2016, page 2-13 defines the requirements for AAR-2202 for aircrew to become proficient in night aerial refueling. The requirement calls for the individual to "perform all AAR procedures to include: tanker rendezvous, observation position, astern position, refueling procedures, and tanker departure. Six contacts required for completion. If proficient, one contact required for completion...the prerequisite is having flown AAR-2201."

(b) (6) did not execute six contacts on the 7 July 2017. According to the NAVMC 3500.50C the instructor in this event did not have the authority to waive or defer this requirement. On 6 December 2018 (b) (6) needed six contacts in order to achieve proficiency in the AAR-2202 code. (b) (6) was not proficient in AAR-2202. However, (b) (6) (b) (6) had completed his NSQ syllabus and the AAR-2202 event itself has no specific instructor requirements. Therefore, (b) (6), (b) (7)(C) was qualified to lead (b) (6) in this event, and (b) (6) had met the prerequisites to fly the event according to the T&R Manual.

The US SRD is utilized by multiple platforms across multi-national services. Understandably, it has specific requirements to keep air-to-air refueling platforms and receivers safe. Unfortunately some of the requirements in the ATP-56 differ from the T&R and cause additional confusion amongst fleet aviators.

According to the F/A-18 T&R Manual, aircrew must execute one contact within 365 days in order to maintain proficiency in F/A-18 aerial refueling. This requirement exists for day and night aerial refueling (AAR-2201 and AAR-2202 T&R codes respectively). This does not align with the tanking governing directive, the US SRD.

The US SRD requires that pilots execute two day contacts and two night contacts per year in order to maintain currency.

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This doubles the requirement from the F/A-18 T&R. The following is an excerpt from the US SRD:

ATP-3.3.4.2. (D) US SRD Appendix 3A

3A.4 Qualification and Currency for receiver pilots .

3A.4.1. Fixed Wing (Tactical) The following minimum initial qualification criteria shall be met by all fixed-wing pilots:

3A.4.1.1. Day. A total of six plugs with a minimum of two initial approaches to the basket. An initial approach is defined as commencing from the echelon position on the tanker and making a successful contact and withdrawal from the basket.

3A.4.1.2. Night. Same requirements as day. Day initial qualifications are to be completed before night qualifications are attempted.

3A.4.1.3. After initial qualification. a pilot will be considered current for deployment involving refueling operations if he has completed a minimum of 2 day and 2 night plugs in the last 365 days. Night currency is not required for day-only operations. Applicable aircraft flight manuals may contain additional currency requirements.

The F/A-18 T&R also has particular T&R codes for tracking strategic tanker requirements as seen in the excerpt below. The RQD-6109 T&R code establishes completion of two contacts day or night with any strategic tanker. The RQD-6109 T&R code establishes proficiency in the AAR-2201 T&R code, or the AAR-2202 T&R code if executed at night.

The RQD-6111 T&R code establishes completion of two contacts, day or night with a KC-135. Completing a RQD-6111 T&R code will re-establish proficiency in both an AAR-2201 and RQD-6109 T&R code. The RQD-6111 code will also re-establish proficiency in an AAR-2202 T&R code if executed at night. Pre-requisites for either code are proficiency in the AAR-2201 daytime aerial refueling T&R code.

NAVMC 3500.50C F/A-18 T&R Manual 5 April 2016

RQD-6109	0.0	545	B.R.M	(NS)	A	1+ FA-18A/C/D
<u>Goal.</u> Track proficiency in day or night strategic aerial refueling.						
<u>Requirement.</u> Two day contacts or two night contacts required for completion.						
<u>External Syllabus Support.</u> KC-10 tanker or similar.						
<u>Prerequisite.</u> 2201						
RQD-6111	0.0	545	B.R.M	(NS)	A	1+ FA-18A/C/D
<u>Goal.</u> Track proficiency in day or night strategic aerial refueling on a KC-135.						
<u>Requirement.</u> Two day contacts or two night contacts required for completion.						
<u>External Syllabus Support.</u> KC-135.						
<u>Prerequisite.</u> 2201						

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US SRD establishes requirements for USMC assets refueling off of USAF tankers. In order to tank off a USAF tanker, naval aviators must be NATOPS, instrument, and AAR qualified.

For transoceanic movements the requirements are more stringent and vary depending on what type of refueling asset is being used for the transoceanic mission and whether the mission is day or night:

- KC-130: Pilots must refuel at least once off a KC-130, KC-135, or KC-10 within 90 days.
- KC-130 Night: Pilots must refuel at least once off a KC-130, KC-135, or KC-10 within 90 days at night.
- KC-135: Pilots must refuel at least once off a KC-135 within the last 90 days.
- KC-135 Night: Pilots must refuel at least once off a KC-135 within the last 90 days at night.
- KC-10: Pilots must refuel at least once off a KC-130, KC-135, or KC-10 within 90 days *and* must have refueled off a KC-10 within 12 months.
- KC-10 Night: Pilots must refuel at least once off a KC-130, KC-135, or KC-10 within 90 days at night *and* must have refueled off a KC-10 within 12 months day or night.

The requirements for AAR per the US SRD and the requirements posed by NAVMC 3500.50C F/A-18 T&R Manual 5 April 2016 do not align and contribute to confusion amongst fleet aviators.

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CDA-RB T&R Manuals Opinions

Three ambiguities in the F/A-18 T&R Manual are relevant to the 2018 Mishap:

1. Performance standards and sortie requirements are insufficiently differentiated.
2. The language in the T&R Manual regarding requirements to fly with an NSI is confounding.
3. There is conflicting guidance between the T&R Manual and the ATP-3.3.4.2. US SRD.

The first ambiguity is difficult to resolve. The T&R manual appears to tie performance standards, rather than sortie requirements, to the logging of T&R codes. The fleet must understand that sortie requirements are required in order to complete a T&R code.

Additionally, evaluators need to assess the performance against the performance standards in the T&R manual. If the aircrew meets the performance standards and completes the sortie requirements, then the code can be logged. The T&R code should not be logged if either of these criteria are not fulfilled as spelled out in the excerpt below.

NAVMC 3500.50C F/A-18 T&R Manual 5 April 2016

2.5.9 Proficiency Accountability. In order to complete a T&R code, aircrew must satisfactorily complete event requirements per assigned Performance Standards. Logging multiple training codes on a single sortie shall be avoided except for the following mission areas:

2.5.10 FAC(A), CAS, AR, SCAR, AI – Required ordnance for these events may be changed based on NCEA availability, range restrictions, or other operational constraints. When scheduling sorties, training officers are allowed to schedule additional training codes based on anticipated ordnance delivery profiles if the Performance Standards are met for the ordnance delivered. For example, aircrew are scheduled for CAS-3103 (Day GP CAS) with the required ordnance (4 Mk-82/83, 250 20mm). The training officer may schedule additional training codes of AS-2303 (Dive deliveries) and AS-2304 (Pops and strafe) in anticipation of conducting attacks that will test those skill sets. Even though all requirements for sortie completion may not be met for those two codes, the aircrew may log the additional codes, as long as the Performance Standards are met (e.g., valid delivery, within required CEP, etc). Exceptions should be made for sorties during which multiple unique training events can be completely accomplished. For example, it is appropriate to log three separate training codes if during the conduct of a sortie the flight completes all of the specific event requirements for a syllabus event. If multiple syllabus events are to be accomplished during a single flight evolution, appropriate planning, briefing, and debriefing time must be allotted to ensure that requisite training objectives can be met. Multiple codes shall also be logged for 5000 and 6000 phase tracking events.

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The second ambiguity arises because of wording in section 2.7.4 of the F/A-18 T&R Manual. The second sentence of the first paragraph reads:

"Until aircrew are complete with the entire NS Qualification syllabus each NS event shall be flown with a pilot or WSO holding one of the following instructor certifications: NSI, NSLATI or a previously designated NSI(H)."

This implies that a pilot can execute night systems events without being NSQ, so long as the pilot is flying with an NSI.

Correspondence with the MAWTS-1 F/A-18 Division confirmed that this is the correct interpretation. However, the 2018 Mishap CI, referencing the fourth sentence of the same paragraph, understandably came to a different conclusion. The fourth sentence of the same paragraph in the F/A-18 T&R Manual reads:

"No other T&R events requiring NVD usage may be executed by aircrew until they have completed all events in the NS stage."

It is important to note, the CDA-RB has conclusively determined neither ambiguity contributed to either the 2016 or 2018 VMFA(AW)-242 mishap.

The third ambiguity deals with conflicting guidance in the F/A-18 T&R Manual and the ATP-3.3.4.2 US SRD. The F/A-18 T&R is less restrictive than the SRD with respect to aerial refueling currency/proficiency intervals. This discrepancy between the F/A-18 T&R and the SRD could reasonably cause confusion. F/A-18 aircrew know and use the T&R manual on a daily basis, but do not interact or use the SRD on a daily basis. If an aircrew used only the F/A-18 T&R Manual, they could mistakenly believe they were current for aerial refueling when they had not met the currency requirements per the SRD.

Institutional T&R Manual Recommendations

The CDA Board believes the F/A-18 T&R Manual should empower squadron-level decision makers to assess a unit's proficiency in particular skills and missions. The CDA-RB makes the following Training and Operations Recommendations:

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Training and Operations 1. The F/A-18 T&R Manual explicitly state where and when performance standards and requirements can be waived or modified. The F/A-18 T&R Manual should not permit squadrons to subjectively assess completion or proficiency where a particular requirement is essential to a skill or mission. Where a requirement merely enhances training, but is *not* essential to the development and proficiency of a skill or mission, authority should be delegated to the lowest level with the capability and knowledge to make a determination.

Training and Operations 2. Due to the complex and unique nature of night aerial refueling, the initial evaluation of an AAR-2202 T&R code shall require an NSI to brief and instruct the event, evaluate the performance, and debrief the event appropriately.

Training and Operations 3. The F/A-18 T&R Manual should explicitly state the non-waiverable, non-deferrable requirements to attain proficiency in a mission. The F/A-18 T&R Manual should also clearly state who - exactly - has the authority waive or defer particular requirements.

Training and Operations 4. Proficiency in the AAR-2201 and AAR-2202 T&R codes should reflect the currency requirements in the SRD. The initial requirement for proficiency should be six contacts and the maintenance requirements should be two contacts required within 365 days.

Training and Operations 5. The US SRD identifies Navy and Marine Corps aircraft refueling from a USAF KC-135 [with a boom drogue adapter (BDA)] as a fundamentally different skill. The USMC TACAIR community has become increasingly reliant on USAF refueling assets, particularly the KC-135 in order to execute real-life missions and combat operations. The F/A-18 T&R Manual should reflect this reality. T&R codes for day and night refueling from a KC-135 equipped with a boom drogue adapter should be incorporated into the basic skills 2000-level T&R syllabus for F/A-18 pilots. The skills should be divided into separate day and night events. The proficiency intervals for the event should reflect the currency intervals in the SRD (six contacts required for proficiency, two contacts per year required to maintain proficiency).

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Air-to-Air Refueling (AAR) Operations

Tanking was not contributory or causal of the 2018 mishap. The key to understanding the contributing and causal factors that led to the 2018 mishap centers on understanding the directives that govern AAR, and how, exactly, the aircrew conducted operations **around** the tanker on 6 December 2018.

AAR is governed by the NATO STANDARD ATP-3.3.4.2 (ATP-56), and the UNITED STATES ATP 3.3.4.2 (D) Standards Related Document (US SRD). Together, these documents establish the procedures for all US and Allied aircraft engaging in AAR. The CDA-RB has identified ambiguities in these documents that led to three of the four causal factors in this mishap.

This section will show how position keeping by Profane 11, coupled with Profane 11's decision to conduct a non-standard departure from the tanker, placed a burden upon Profane 12 that he had difficulty handling. This difficulty was exacerbated by the different lighting configurations between the F/A-18s and KC-130, causing Profane 12 to lose sight of, and collide with Sumo 41.

Position Keeping Around the Tanker

Section 2.16 of the ATP-56 defines the responsibilities of a receiver as:

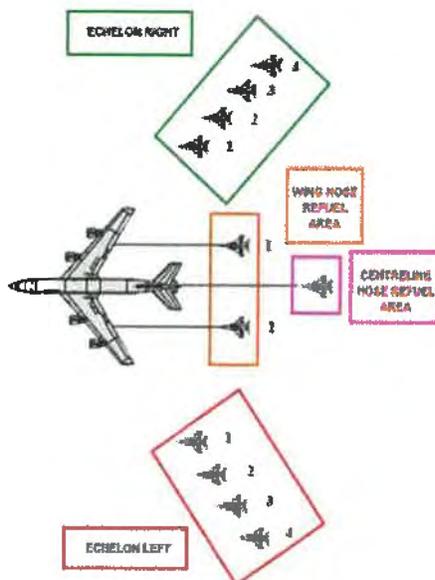
1. Keep the leader in visual or electronic contact at all times.
2. Maintain briefed position at all times.
3. Anticipate corrections/changes and plan accordingly.
4. Monitor all aspects of formation operations and advise the receiver formation leader if an unsafe condition is identified.

All three aircraft involved in the mishap on 6 December 2018 executed procedures that did not adhere to these requirements.

The ATP-56 defines echelon right for tankers with observers as the "position for fixed wing aircraft is level or slightly above the tanker, aft of the tanker wingline and one receiver

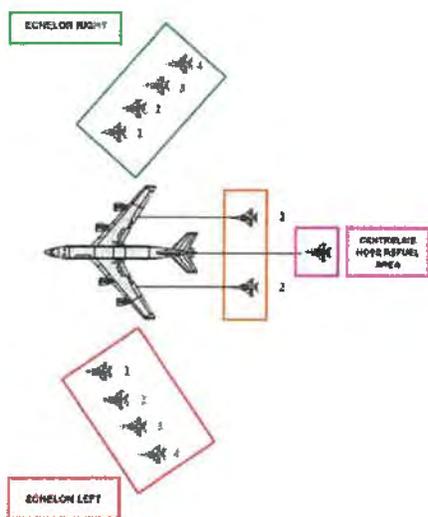
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wingspan outboard of the tanker wingtip." The following depiction is from the ATP-56.



ATP-56 page 37 - echelon position with observers

The ATP-56 defines echelon left and right for tankers without observers as "well forward," so as to be visible to the tanker pilots as indicated in the below diagram.



ATP-56, page 36 - echelon position without observers

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The VMFA(AW)-242 Squadron SOP does not align with the ATP-56 with regards to position keeping in echelon right. Paragraph 2009.2 of the VMFA(AW)-242 Squadron SOP dated 1 May 2018 states:

"During refueling operations, aircraft in the Echelon Left and Echelon Right positions will be acute of the receiver and stepped up on the tanker."

The 2018 SOP re-write was completed as part of the squadron CO's response to the 2016 mishap, and was instituted in order to address receiver movements around the tanker. The squadron SOP contradicts the ATP-56 with regard to the echelon right and left position off of tankers with observers by requiring receiving aircraft to be acute of the receiver vice aft of the tanker's wing-line, and by requiring aircraft to be stepped up in echelon left vice stepped down. By all accounts (aircrew interviews and aircraft data), Profane 11 was stepped up (as much as 150 feet) on Sumo 41, and acute of Sumo 41's wing line. (b) (6), (b) (7)(C) was flying a right echelon position not in compliance with the ATP-56, he was flying a position dictated by the squadron SOP.

This is important because Profane 11's position on Sumo 41 is a Causal Factor in the 2018 Mishap, and will be discussed in depth on page 111 (Cause Map Narrative).

Formations and Departures Findings

Section 2.10 of the ATP-56 prescribes the following for fighter and heavy aircraft leaving the tanker:

"Once refueling is complete, receivers will be cleared to the Echelon Right position. If there are two or more receivers, they should reform using Echelon Right formation, moving sequentially outboard of the tanker with the first receiver remaining closest to the tanker's wing. From this position, they leave the tanker either level with the tanker or climbing."

Section 2.15 of the ATP puts responsibility for the "control and safe navigation of AAR formations" on the commander of the tanker. Sumo 41 owned these responsibilities.

Both the ATP-56 and US SRD describe standard procedures to be used during AAR. Neither document explicitly prohibits any type of tanker departure or flow around a tanker.

While not specifically prohibited, Profane 12's maneuver from left astern back to left echelon after completing AAR is neither a standardized nor accepted procedure. Similarly, departing the tanker with a receiver on both sides as Profane

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flight intended to do, is not a standardized or accepted departure in the ATP-56 or US SRD.

This is important because position keeping and tanker departure is a Causal Factor in the 2018 Mishap, and will be discussed in depth on page 111 (Cause Map Narrative).

Lighting Configuration Findings

The KC-130J is equipped with two lighting capabilities: "overt" and "covert." The "overt" light setting illuminates the following: top and bottom anti-collision lights, wing leading edge lights, navigation lights, formation lights, refueling pod and hose illumination lights, and refueling pod status lights. The "covert" light setting disables the lower anti-collision light and leading edge lights. The covert lighting intensity is adjustable via rheostat that controls wingtip and fuselage navigation lights, formation lights, tail lights, and the upper anti-collision light.

When covert lighting is selected it is possible to have the lighting intensity too low for visibility while wearing NVGs. The aircraft's own lighting settings are difficult to assess by the tanker crew alone - it's incumbent upon wingmen or receivers to request lighting changes if the lighting settings are either too dim or too bright for visual position keeping.

The F/A-18D is equipped with only "overt" lighting capability. It has no "covert" lighting selection. The only choice in light configuration is "overt" or "midnight" (no lights visible).

The MAWTS-1 NVD manual specifically addresses the risks associated with non-similar lighting configurations and visual illusions associated with fixed-wing AAR on NVGs.

The brief for a flight with fixed-wing AAR on NVGs shall include "environmental assessment, visual illusions, lighting package, lack of depth perception, and closure rates" as safety items. The flight brief for the 6 December 2018 mishap flight did not cover any of these considerations.

At the time of the mishap, Sumo 41 had no external lights on (covert lighting); Profane 11 and 12 had full external lights on (overt lighting).

The lighting configuration of both Sumo 41 and Profane 11 is a Causal Factor in the 2018 Mishap, and will be discussed in depth on page 111 (Cause Map Narrative).

Air-to-Air Refueling Operations Opinions

1. Three of four Causal Factors in the 2018 mishap can be linked to tanker operations:

(1) The decision to place Profane 12 on the left side of Sumo 41, forcing Profane 12 to position keep/fly formation off two platforms.

(2) Profane 11's overt lighting configuration while being positioned acute and stepped up on Sumo 41's right side created the conditions for Profane 12 to climb while focusing on an overt lighted Profane 11.

(3) Profane 12 lost sight of Sumo 41 because he became singularly focused on Profane 11 because Profane 12's Night Vision Goggles (NVGs) "degained" (washed out) while flying off of an overt lighted Profane 11, and making it harder to see a covert Sumo 41.

2. The F/A-18 T&R Manual, ATP-56, US SRD, F/A-18 TACSOP and Squadron SOPs are not aligned.

Air-to-Air Refueling Directives and Procedures Recommendations

Training and Operations 6. Add a note to the US SRD that US drogue-equipped refueling aircraft (with the exception of the F/A-18 E/F tanker) fly with aft observers / scanners, and that appropriate echelon positions aft of the aircraft wing-line are appropriate for tanker / receiver safety. Remove the "level or slightly above the tanker" restriction, and leave it to the flight lead to fly the best position to allow for the execution of his/her flight leadership responsibilities.

Training and Operations 7. Add a table to the ATP-3.3.4.2 listing observer equipped refuelers, (this table does not negate the face-to-face brief or other means of tanker/receiver briefing).

Training and Operations 8. Add a note in chapters 2, 3, and 4, of the ATP-3.3.4.2 to cover receiver departure. Prior to tankers clearing receivers to depart, receivers will be reformed and stabilized in the appropriate standardized or approved position.

Training and Operations 9. A panel of users from all USMC tanker receiver platforms convene to determine CONUS and OCONUS standardized lighting configurations.

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Training and Operations 10. The AAR lighting section of the US SRD on page 7-7 should include a lighting table to depict what lights are expected to be on and can be turned off/dimmed.

Training and Operations 11. Add a note in chapter 3B of the US SRD stating: "Several different external lighting configurations for aided and unaided refueling operations exists. No single configuration is a standard solution to all tanking evolutions. If possible, prior coordination of appropriate tanker external lighting configuration with tanker crews is advised. If prior coordination is not possible, receiver aircrew are advised to rendezvous with the tanker cautiously and request any objectionable lights be turned off by the KC-130 crew if airspace allows."

Training and Operations 12. For HQMC, align the F/A-18 T&R Manual with the ATP-56 and US SRD, then ensure the F/A-18 TACSOP and Squadron SOPs are in alignment with the new T&R Manual.

Training and Operations 13. Include a paragraph in the US SRD that prohibits non-essential communication or actions during air-to-air refueling including within the tanker or receiver, and between the tanker and receiver.

Training and Operations 14. Squadron SOPs be reviewed to ensure alignment with all applicable governing directives.

Ejection and Search and Rescue (SAR)

Profane 12 Ejection

After colliding with Sumo 41, (b) (6), (b) (7)(C) initiated an immediate unannounced ejection from Profane 12.

The water temperature in the ITRA-South on 6 December 2018 was between 65 and 72 degrees Fahrenheit. Data from (b) (6) (b) (6) Garmin smartwatch indicated a water temperature of 68 degrees Fahrenheit. Aircrew flying in the ITRA-South the evening of the mishap were not required by OPNAV 3710.7 to wear anti-exposure suits; no one in the Profane flight or Sumo flight was wearing anti-exposure suits.

(b) (6) sustained multiple injuries in the collision/ejection. Specifically, his autopsy report noted bilateral subarachnoid hemorrhages and laxity of the atlanto-occipital joint. Subarachnoid hemorrhage has a high rate of fatality when treated early and aggressively by full capability medical centers. Any delay from onset of the hemorrhage further increases the probability of death.

Atlanto-occipital joint laxity (dislocation) has historically been considered a fatal injury. Recent advances in early detection and surgical treatment have improved prognosis, but only in individuals where immediate recognition, immediate stabilization of the neck, and urgent surgery are available. Survivability of these two injuries in combination is very low.

The CDA-RB did not have access to the Garmin smartwatch raw data, and was only able to make inferences from the data provided to the 2018 Mishap CI. (b) (6) wore a Garmin smartwatch on the night of the mishap, which is issued to F/A-18 aircrew in order to provide an indication of cockpit pressure changes. Normal operation requires the aircrew to initiate recording at the beginning of a flight. The device will then provide a warning to aircrew if cockpit pressurization exceeds certain limits. The Garmin Fenix 3 smartwatch has no function as a SAR device. It is possible to inadvertently begin recording data on the smartwatch if contact is made with the watch.

Data recording began at 0218, 6 December 2018. The heart rate only recorded sporadic and inconsistent indications after an elapsed time of nine hours and eleven minutes (1129 JST). The CDA-RB could not determine if the smartwatch was intentionally activated, or if it was inadvertently activated.

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During the course of the SAR effort and subsequent to the rescue of the Profane 12 crew, questions arose about the reliability of issued Combat Survivor Evader Locator (CSEL) radios and URT-140s beacons.

VMFA(AW)-242 procured off-the-shelf personal location beacons (PLBs) in their survival vests in late 2017. The PLBs require manual activation by aircrew in order to function; they do not automatically activate upon ejection or contact with sea water. Because of these limitations, the PLBs are viewed as additive to the CSEL radio and URT-140.

During a maintenance inspection in October 2018 the Marine Aviation Logistics Squadron (MALS) identified the PLBs as unauthorized gear. VMFA(AW)-242 removed the PLBs from aircrew survival gear. The required paperwork to request authorization for the PLBs was not completed prior to 6 December 2018.

CDA-RB Opinions on the Profane 12 Ejection

1. (b) (6) injury pattern suggests that he suffered blunt force trauma to the head, likely during the unannounced ejection. The CDA-RB Flight Surgeon, in consultation with Naval Aerospace Medical Institute determined the injury pattern is such that it is unlikely that (b) (6) regained consciousness or volitional movement for any extended period of time following the ejection.

Search and Rescue Background

In November 2000, in a letter to the Commandant of the Marine Corps (DCMC Aviation), the 1ST MAW CG supported "the removal of the MCAS Iwakuni USMC Search and Rescue (SAR) capability and the formal integration of MCAS Iwakuni SAR requirements into the Japanese National SAR Plan. Japanese SAR assets were sufficient to address SAR concerns for MCAS-Iwakuni...Japanese SAR assets provide adequate SAR coverage for MAG-12 and transient U.S. aircraft. Per ICAO Annex 12, Japan is responsible for overall SAR coverage throughout Japan...that provide 24-hour coverage (varying between 15 min to 2-hour standby) to all MAG-12 local operating areas." The following page is a copy of the original letter to CMC in 2000.

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1st MAW Letter on Iwakuni SAR Capability



UNITED STATES MARINE CORPS
1ST MARINE AIRCRAFT WING
UNIT 07101
FPO AF 96603-7101

3130
G3
17 Nov 00

From: Commanding General, 1st Marine Aircraft Wing
To: Commandant of the Marine Corps (CMC, Aviation)
Via: (1) Commanding General, IJI Marine Expeditionary Force
(2) Commanding General, Marine Forces Pacific

Subj: REMOVAL OF MCAS IWAKUNI USMC SEARCH AND RESCUE CAPABILITY

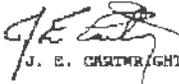
Ref: (a) ICAO, Annex 12

1. 1st MAW supports the removal of the MCAS Iwakuni USMC Search and Rescue (SAR) capability and the formal integration of MCAS Iwakuni SAR requirements into the Japanese National SAR Plan. The deactivation of the MCAS Iwakuni USMC SAR has the concurrence of Marine Corps Bases Japan. Both 1st MAW and Marine Corps Bases Japan recommend MCAS Iwakuni act as the lead agent in developing the POAM for the deactivation.

2. Japanese SAR assets provide adequate SAR coverage for MAG-12 and transient U.S. aircraft. Per the reference, Japan is responsible for overall SAR coverage throughout Japan. There are 127 Japanese SAR vehicles (88 ships/boats and 39 SAR aircraft) within 100 miles of MCAS Iwakuni that provide 24-hour coverage (varying between 15 min to 2-hour standby) to all MAG-12 local operating areas. Japanese weather launch minimums are similar to existing minimums (500' lms visibility for helicopters).

3. The removal of the USMC SAR capability at MCAS Iwakuni will allow the return of approximately 55 Marines to the operating forces. Request the resulting modification to the MCAS Iwakuni manpower structure not result in additional 1st MAW FAF billets to fill MCAS Iwakuni billets previously filled by SAR personnel.

4. 1st MAW concerns may be directed to (b) (6). A detailed brief of implementation, costs and savings is available from (b) (6) OIC, MCAS Iwakuni SAR, (b) (6).


J. E. CHATWRIGHT

Copy to:
CG, MCBJ
CD, MCAS IWAKUNI
AC/S G-3, 1st MAW

Enclosure 70

RECEIVED OPERATIONAL MISHAP REPORTS SECTION

MCAS Beaufort and MCAS Miramar rely upon United States Coast Guard (USCG) or United States Navy (USN) assets to provide SAR capabilities, as the last remaining USMC organic SAR organization ceased operations at Yuma in late 2019. For reference, SAR response time for Beaufort and Miramar is 30 minutes from notification to launch, and CONUS SAR response has less distance to travel to the respective working areas. From Tybee Island, SC Coast Guard Station to W-140C is 120 miles. From San Diego, CA to the farthest point of W-291 is ~150 miles. From Japanese Air Self Defense Force (JASDF) Hamamatsu Air Rescue Specialized Squadron to the ITRA-South is ~200 miles.

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2018 Mishap SAR Recovery Overview

With no prior coordination that MAG-12 assets would be flying in the early morning hours of 6 December 2018, the Japanese Ministry of Defense (MoD) launched the first SAR aircraft, a UH-60 from Hamamatsu Air Rescue 2 hours and 19 minutes after Profane 11 (Mishap Flight Lead) contacted Fukuoka Control to report an emergency.

3 hours and 56 minutes after Profane 11 (Mishap Flight Lead) contacted Fukuoka Control to report an emergency, (b) (6), (b) (6) (Profane 12 Weapons Sensor Officer (WSO)) was rescued from the water.

8 hours and 59 minutes after Profane 11 (Mishap Flight Lead) contacted Fukuoka Control to report an emergency, (b) (6) (b) (6) (Profane 12 Pilot) was spotted by a Japanese destroyer. (b) (6) was rescued from the water 10 hours and 35 minutes after Profane 11 (Mishap Flight Lead) contacted Fukuoka Control to report an emergency.

2018 Mishap Abbreviated SAR Timeline

0147 Japan Standard Time (JST): Profane 11 contacted Fukuoka Control to report an emergency.

0152(JST): The VMFA(AW)-242 Operations Duty Officer (ODO) received a call from the U.S. Air Force Rescue Coordination Center (AFRCC) at Langley Air Force Base (AFB), VA that an emergency beacon had been activated at 0147(JST).

0158(JST): The VMFA(AW)-242 ODO received a telephone call from the AFRCC that a second emergency beacon had been activated.

0247(JST): The Japanese Rescue Coordination Center (RCC) based out of Tokyo notified Iwakuni Air Traffic Control that SAR assets were planning to launch. 0330, 1 hour and 43 minutes after Profane 11's first transmission to Fukuoka Control, the Commanding 5TH Regional Coast Guard Headquarters made a SAR operation request to the Japanese Central Air Defense Force.

0345(JST): Profane 11 landed at MCAS Iwakuni.

0348(JST): VMFA(AW)-242 launched an additional aircraft to assist in the SAR effort. The aircrew reported hearing emergency locator transponders (ELTs), likely from URT-140s, but could not talk to or locate any survivors. The aircraft landed at 0550(JST).

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0406(JST): The Japanese MoD launched the first SAR aircraft, a UH-60 from Hamamatsu Air Rescue, 2 hours and 19 minutes after Profane 11 (Mishap Flight Lead) contacted Fukuoka Control to report an emergency. It started SAR operations upon arrival at the suspected crash site. Over the next hour the MoD launched five additional aircraft: a U-125 from Nyuatabaru Air Rescue at 0408; a UH-60 from Nyuatabaru Air Rescue at 0410; an SH-60 from Air Corps 24 at 0423; an U-125 from Hamamatsu Air Rescue at 0429; and an US-2 from Fleet Air Wing 31 at 0459.

0543(JST): The SH-60 located (b) (6), (b) (7)(C) (Profane 12 WSO) in his raft. The SH-60 transported (b) (6), (b) (7)(C) to Komatsushima, Japan.

0611(JST): MAG-12 operations personnel notified the VMFA(AW)-242 ODO that (b) (6), (b) (7)(C) was recovered.

1046(JST): A Japanese Coast Guard patrol boat located (b) (6) (b) (6) in the water. Immediately an SH-60 from Air Corps 24 proceeded to the site. There was no indication why the Japanese vessel didn't pick up (b) (6)

1205(JST): A JMSDF ship, the SETOYUKI, began rescue operations for (b) (6) and brought him aboard the SETOYUKI at 1222. An SH-60 transported (b) (6) from the SETOYUKI to Komatsushima. From Komatsushima, the SH-60 transported (b) (6) (b) (6) to a civilian hospital in Japan.

1442(JST): (b) (6) arrived at the civilian hospital.

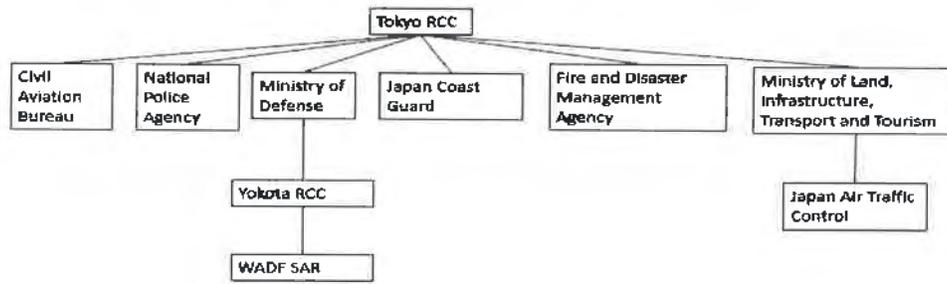
The United States, Japanese and Australian joint and combined forces continued SAR efforts for the crew of Sumo 41 until 11 December 2018.

Host Nation Support

The Government of Japan has multiple civil and defense organizations that contribute to search and rescue efforts similar to the United States. The Tokyo RCC serves as the primary authority for search and rescue operations within Japan. The JSDF also operates its own RCC out of Yokota Air Base. The Japanese Self Defense Force (JSDF) RCC falls under the authority of the Tokyo RCC. There is no USAF Air Operations Center (AOC) in Japan. 5th Air Force maintains a Liaison Element (JACCE) that communicates directly to the JASDF Air Defense Command at Yokota. It has no SAR authorities or capabilities. An overview of the Japanese SAR structure follows.

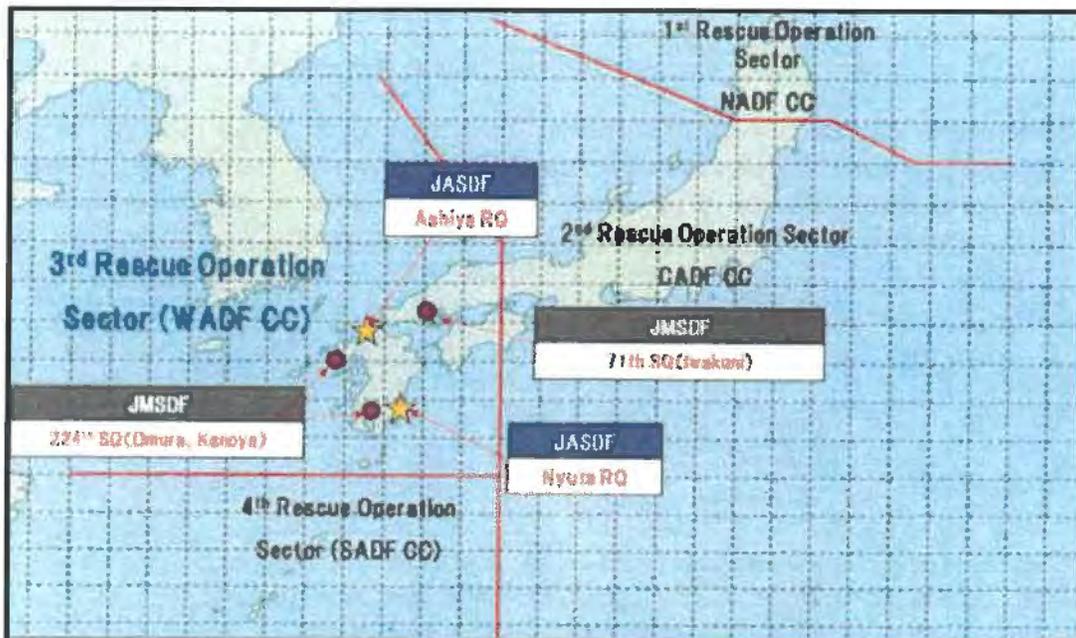
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Japanese SAR Structure



For SAR in waters under the jurisdiction of the Government of Japan, the primary SAR assets are JASDF, Japanese Maritime Self Defense Force (JMSDF), and Japanese Coast Guard (JCG). Japan divides the country into multiple search and rescue areas (SRAs). Most Iwakuni airspace falls under the 3RD SRA. Within the JASDF, the Western Area Defense Force (WADF) is responsible for SAR in the 3RD SRA.

The JASDF operates fighter, reconnaissance, and training aircraft from various air bases on the islands of Japan. In order to protect their people and assets, the JASDF maintains Air Rescue Specialized (ARS) squadrons to provide SAR. When JASDF fighter, reconnaissance or trainer aircraft are conducting operations, JASDF SAR assets from ARS bases provide a 15 minute strip alert, which is usually 0800-1645 JST, Monday-Friday. The WADF has two ARS bases: Nyutabaru and Ashiya. The accompanying diagram below shows the boundaries between the 2ND and 3RD SRA, as well as relevant ARS bases.



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The JMSDF also provides a SAR capability. However, none of the JMSDF SAR units specialize in aviation rescue. The JMSDF operate UH-60s and US-2 aircraft capable of assisting SAR efforts. Three JMSDF bases, as well as US-2s based out of MCAS Iwakuni, have the capability to assist SAR efforts in Iwakuni local air space. JMSDF SAR assets are on 15 minute alert from 0800-1615, and at other times JMSDF SAR assets are on a 1 to 2 hour alert.

The JCG also provides a SAR capability. JCG response times are 15 minutes during duty periods and one hour during non-duty periods. Duty periods for the JCG are 0830-1715. The Japanese Coast Guard operates a variety of fixed wing and rotary wing aircraft.

JASDF SAR Alert Posture(Ashiya, Nyutabaru)

Posture	Number of Aircraft	Time	Application
1 st Alert	U-125 × 1	15 min	Fighter, Reconnaissance, Jet trainer(except T-400) are flying
1 st Alert	UH-60J × 1	1 hour	
2 nd Alert	U-125 × 1, UH-60J × 1	2 hours	Other than above

JMSDF SAR Alert Posture(Iwakuni)

Posture	Number of Aircraft	Time	Application
Ready	US-2 × 1	1 hour	0800~1645
Ready	US-2 × 1	2 hours	Other than above

JMSDF SAR Alert Posture(Omura, Kanoya)

Posture	Number of Aircraft	Time	Application
1 Ready	UH-60J × 1	15 min	0800~1645
2 Ready	UH-60J × 1	2 hours	
1 Ready	UH-60J × 1	1 hours	Other than above
2 Ready	UH-60J × 1	2 hours	

Japanese airborne SAR assets require ceilings above 500 feet. MCAS Iwakuni experiences conditions with ceilings less than 500 feet or visibility less than one and a half nautical mile (NM) (500 - 1 ½) 1.2 percent of the time.

Japanese WADF authorities state the most effective and rapid means to establish communication with the RCC and to get a SAR response is either through air traffic control, or by calling the USAF JACCE who have direct communication with the Yokota RCC. Once the Yokota RCC receives the information they will establish a regional operations center in order to direct JASDF SAR assets within the 3RD SRA. MCAS Iwakuni, subsequent to the 2018 mishap, has established a direct phone line with the regional operations center, should one be stood up.

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CDA-RB Assessment of the 2018 Mishap CI on SAR

Opinion 6 of the 2018 Mishap CI states "the lack of organic search and rescue (SAR) at MCAS-I is problematic. If MCAS-I had organic SAR capability, they could have been integrated into the flight for a more immediate response following the mishap."

By focusing on a lack of organic SAR capability at MCAS Iwakuni, the CDA-RB posits the 2018 Mishap CI failed to recognize the severity or scope of this issue. The 2018 Mishap CI failed to: (1) consider issues with SAR in Japan are not confined to just the Marine Corps, but pertain to the US Navy and even the entire Joint Force; (2) form an understanding of the process by which SAR is executed in foreign countries, specifically, who can negotiate memorandums of understanding/agreement with a host nation; (3) develop an understanding of CONUS SAR response capability for MCAS Beaufort squadrons and MCAS Miramar squadrons and crosswalk that against the fact that all but one of the training areas used by MAG-12 are hundreds of miles away and well off the coast of Japan.

Recommendation 5 of the 2018 Mishap CI states "1ST MAW conduct annual full spectrum SAR exercises with all available host Nation and Joint assets to ensure the capabilities, capacities, limitations and lines of communication are well known and current." This recommendation has been enacted upon and resulted in multiple actions by MAG-12, 1ST MAW, and MCAS Iwakuni.

MCAS Iwakuni-based units (MAG-12, MCAS Iwakuni, CVW-5) and JSDF units [WADF, and Fleet Air Wing 31] established a Bilateral SAR and Flight Training Working Group. The working group established a direct communication link between the WADF and MCAS Iwakuni allowing for instantaneous information transfer. The working group has also coordinated two SAR exercise dates.

On 26 February 2020, Japanese SAR flight crews conducted demonstrations and training for US aviators. Aircraft from the JASDF based in Nyuatabaru and JMSDF based in Iwakuni participated.

In March 2020, the WADF and MCAS Iwakuni will execute a bilateral simulated SAR response. The exercise will involve F/A-18s from MAG-12 and U-125As and UH-60s from JASDF units based in Ashiya. The event will exercise communications pathways and procedures from the moment the emergency develops until a dummy survivor is safely returned to MCAS Iwakuni.

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Additionally, MAG-12 produced a Hazard Report (HAZREP) following the 2018 mishap that directed changes to pre-mishap plans for all aviation units onboard MCAS Iwakuni. The HAZREP delineated specific communications pathways to be used in order to rapidly notify SAR support, and has been continuously updated in the form of a Read and Initial for all aircrew.

All in all, III MEF, 1ST MAW and MAG-12 have taken every available action within their authority, but the fact remains SAR response is no different today as it was on the morning of 6 December 2018.

Search and Rescue (SAR) Opinions

1. III MEF, 1ST MAW and MAG-12 have aggressively implemented every change to SAR response within the scope of their authority. These changes have improved understanding of capabilities, capacities, and limitations of the Japanese SAR Plan, clarified communication pathways for more efficient functioning under duress, established working groups to increase SAR response capabilities and implemented multiple exercises to rehearse SAR operations.
2. The Japanese SAR Plan does not provide adequate SAR response to MCAS Iwakuni units operating in the local training ranges, especially outside the hours of 0800-1645. The Department of the Navy (DoN) should reassess the risk to MCAS Iwakuni tenant flying units with regards to SAR operations.
3. The Department of the Navy lacks a defined SAR response time for peacetime operations (similar to the "Golden Hour" in combat operations). If the DoN/Joint Force establishes a SAR response requirement, a bilateral effort between the US and Japan will be required.
4. MAG-12 and CVW-5 squadrons lack a clear real-time understanding of the SAR alert status.
5. A location device that functions automatically could have sped up SAR operations leading to a likely earlier recovery of the Profane 12 aircrew.

Search and Rescue (SAR) Recommendations

Near-term (March 2020 to June 2020):

Training and Operations 15. DoN/Joint Force in conjunction with the Japanese, establish an electronic means by which DoN/US Joint Forces can know real-time Japanese SAR alert status. Additionally, explore the capability for the DoN/Joint Force flying units to request windows outside of normal working hours to have Japanese SAR assets on 15 minute alert (for major US exercises).

Training and Operations 16. DoN or Joint Force convene a SAR Operational Planning Team (OPT) to review CONUS/OCONUS SAR capabilities and capacities. Assess/determine if a SAR response time requirement needs to be established. If so, define the SAR response time requirement. Also explore the assignment of Service Liaison Officers (LNOs) where necessary to coordinate empowered Service, USFJ and Japanese responses. While beyond the purview of the CDA-RB, perhaps the JACCE would be the best place to start for this coordination.

Mid/Long-term (July 2020 to February 2021):

Training and Operations 17. NAVAIR continue procurement of location devices for incapacitated aircrew. These devices should be automatically initiated, easily identifiable by SAR crews, and highly reliable. Additionally, these devices should be easily manipulated between 'combat' and 'training' roles.

Training and Operations 18. If a SAR response requirement is established, convene a bilateral SAR OPT between the US and Japan to establish how best to meet the new US requirement. The CDA-RB envisions this could be met by repositioning Japanese SAR assets, or by hiring contract SAR capability and positioning it where it could meet the requirement.

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AN/AVS-11

The 2018 Mishap CI inaccurately identified AN/AVS-11s as being an Institutional Contributing Factor to the 2018 Mishap.

The 2018 Mishap CI opined "Headquarters Marine Corps Aviation's failure to recognize and mitigate risk of TACAIR NSAAR (with goggles down in close formation) set the preconditions for this mishap".¹³

The CDA-RB strongly disagrees with this opinion.

The 2018 Mishap CI made two recommendations related to AN/AVS-11s: (1) "1st MAW requests the Deputy Commandant Aviation (DCA) reevaluate the current policy allowing the conduct of TACAIR NSAAR with night vision goggles down"; (2) "1st MAW requests Naval Air Systems Command with the Commander Operational Test & Evaluation Force to reevaluate the NVCD (ANVS-11) and provide detailed fleet information about the limitations of this system".¹⁴

The CDA-RB strongly disagrees with both recommendations.

The Operational Test (OT) Quick Reaction Assessment (QRA) best summarizes the advantages AN/AVS-11 brings to Marine Corps TACAIR crews: "the combination of night vision and injected helmet video provided enhanced situational awareness, lethality, and survivability over legacy AN/AVS-9 NVGS." Two shortcomings of the AN/AVS-11s are well researched and have very easy real-time fixes; the following will detail why the CDA-RB endorses the use of AN/AVS-11s, and the small changes we recommend to make them even more efficient and safe to employ while tanking.

CDA-RB AN/AVS-11 Findings

The AN/AVS-11 provides the ability to magnify ambient light (night vision) and the ability for the crew to 'see' Joint Helmeted Mounted Cuing System "JHMCS" symbology including attitude reference and targeting symbology.

The AN/AVS-11 was evaluated by both the Developmental Test (DT) and OT communities in a series of evaluations between 2008

¹³COMMAND INVESTIGATION INTO THE FACTS AND CIRCUMSTANCES SURROUNDING THE AVIATION MISHAP OF AN F/A-18D FROM MARINE ALL WEATHER FIGHTER ATTACK SQUADRON 242 AND A KC-130J FROM MARINE AERIAL REFUELER TRANSPORT SQUADRON 152 ON 6 DECEMBER 2018 OFF THE COAST OF JAPAN, Opinion 8, page 49.

¹⁴COMMAND INVESTIGATION INTO THE FACTS AND CIRCUMSTANCES SURROUNDING THE AVIATION MISHAP OF AN F/A-18D FROM MARINE ALL WEATHER FIGHTER ATTACK SQUADRON 242 AND A KC-130J FROM MARINE AERIAL REFUELER TRANSPORT SQUADRON 152 ON 6 DECEMBER 2018 OFF THE COAST OF JAPAN, Recommendations 8 and 11, page 50.

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and 2009, with a final memo from NAVAIR 1.0 in 2014 stating, "... no additional operational testing is required to further validate the JHMCS NVCD system's capability."

The DT report stated, "The average optical acuity attained for the Mini-QuadEye (MQE) (AN/AVS-11) using the Hoffman box was between 20/25 and 20/30, while the average attainable optical acuity for AN/AVS-9 was 20/25...During ground and flight testing in an actual outdoor environment, however, no apparent difference in maximum attainable focal clarity between MQE and AN/AVS-9 was detected."

"Within the scope of this test, the MQE system performance demonstrated excellent potential for increasing the capability of the F/A-18A+/C/D/E/F in the night strike fighter mission and will be satisfactory upon the correction of the Part I deficiency." Part I deficiency only related to F/A-18F aircraft. Additionally, and most relevant, "Aerial refueling was accomplished with KC-10, KC-135 and KC-130 aircraft to extend these night missions...Night tanking was most optimally performed with the MQE in the down position and injection symbology blanked."

The DT report addressed aerial refueling and recommended "Aircrew must be day and night tanker current before tanking with injected symbology. Night tanking currency may be attained with MQE and symbology blanked."

The OT QRA stated, "Aircrew noted inferior NVD performance under low light and low contrast conditions. Also, aircrew observed bright light sources bloomed and obscured scene detail more than what is experienced with the AN/AVS-9 NVGs."

However, the benefits of the AN/AVS-11 were listed as many. "The use of the JHMCS-NVDC (AN/AVS-11) provided improved tactical situation awareness..." and, "The combination of night vision and injected helmet video provided enhanced situational awareness, lethality, and survivability over legacy AN/AVS-9 NVGS."

Training for the AN/AVS-11 is provided in a series of PowerPoints authored by the Aeromedical Safety Officer (AMSO) at MAWTS-1. In these slides, the differences between the two goggles is illustrated, and the limitations of the AN/AVS-11 are discussed in depth. There is, however, no specific training on the use of the AN/AVS-11 during aerial refueling.

There is a known issue with the AN/AVS-11 in that the symbology occasionally inverts. The image of the outside world

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remains correct...only the injected symbology inverts. Since first fielding the AN/AVS-11s in 2013, there have been 14 reported HAZREPs citing symbology inversion. These HAZREPs span the entire F/A-18A-F and EA-18G community and account for countless hours of night operations.

CDA-RB AN/AVS-11 Opinion

1. The use of AN/AVS-11 was not causal or contributory to the 2018 mishap.

CDA-RB AN/AVS-11 Recommendations

Training and Operations 19. MAWTS-1 NVD Manual and F/A-18 T&R Manual include the instruction that pilot symbology shall be blanked while refueling with AN/ANV-11s.

Institutional Medical Contributing Factors

Aircrew in VMFA(AW)-242 made every effort to have Performance Maintenance Program (PMP) medications (specifically Ambien for sleep regulation) authorized for use during in the lead up to the 24/7 Unit Level Training Exercise (ULT). The use of PMP medications was not authorized by the 1ST MAW CG.

Two of the mishap aviators had a PMP (Ambien) substance and other sedating substances in their urine / blood. The 2018 Mishap CI failed to properly explain the possible effects this illegal use had upon the 2018 mishap.

In this section, the CDA-RB will identify the confusion with interpreting the applicable medical governing directives, clearly articulate the illegal use of PMP medications by the mishap aircrew was not causal but possibly contributory, and provide recommendations to ensure our findings and recommendations eliminate confusion and loopholes to make for safer implementation of the PMP in the future. Additionally, the CDA-RB will examine fatigue management, the root of the aircrews' concerns leading up to the mishap flight, and provide a recommendation to commission an Aviation Sleep Management Study to assist in optimizing the transition from day to night sorties with data-backed methods of fatigue management.

Governing Directives

The governing instruction for the Performance Maintenance Program (PMP) is NAVMED P-6410, which was last issued in 2000. CNAF issued an amplifying instruction in 2003 titled CNAFINST 6410.1.

NAVMED P-6410 is an extensive instruction on performance maintenance, which includes recommendations for Navy air wings, squadrons, and flight surgeons on strategies for managing fatigue. The unit naming conventions are Navy centric, and the strategies are broad that include policies on sleep hygiene, shift work, fatigue monitoring, as well as use of pharmaceuticals for managing fatigue and sleep-wake cycles.

NAVMED P-6410 does not provide any specific requirements for authorization for use of stimulant or sedative medications. It does provide guidance on dosing intervals and side effects.

CNAFINST 6410.1 references the NAVMED P-6410 and provides amplifying guidance. CNAFINST 6410.1 specifically states: "The use of stimulants or sedatives to manage fatigue in the

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operational setting is only appropriate during combat operations or circumstances of exceptional operational necessity."

CNAFINST 6410.1 specifies authorization for use of these medications is contingent upon:

1. The recommendation of a flight surgeon familiar with the personnel and operational tempo of the unit involved.
2. Squadron Commanding Officer or Detachment OIC approval.
3. The concurrence of the Air Wing Commander or designated Naval Aviation 0-6 or above Immediate Superior in Command (ISIC); or for those squadrons or detachments operating from a ship or shore base without a Naval Aviation 0-6 or above ISIC, concurrence of the appropriate Type Wing Commander.

CNAFINST 6410.1 directs the flight surgeon to: "issue the stimulant in amounts required for no more than two flights at any time. Sedatives will not be carried within an airplane to preclude inadvertent use. Document the issuance of all medications with an SF-600 entry in the member's medical record. All unused medications must be collected at the conclusion of periods of combat or sustained operations. Maintain strict accountability for all controlled medications."

CNAF M-3710.7 (Paragraph 8.3.3) states "Commanding Officers, in consultation with their Flight Surgeons (FSs) and Aviation Physician Assistants (APAs), are authorized to use any of the strategies described in the guide when mission requirements and operational risk management indicate use would be appropriate."

CNAF M-3710.7 (Paragraph 8.3.2.5.1) directs "Unused quantities of performance maintenance drugs (amphetamines or sleeping pills) shall be returned to the FS, APA or medical clinic for purposes of strict accountability."

Officers in VMFA(AW)-242 made an effort to have use of PMP medications (specifically Ambien for sleep regulation) authorized for use during the Unit Level Training (ULT).

Mishap aircrew had a PMP (Ambien) substance and other sedating substances in their urine / blood. Given the half-life of these substances, the positive tests are consistent with use of these medications within the previous 48 hours, more likely within the previous 24 hours.

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Governing Directives Opinions

1. The 2018 Mishap CI revealed violations of NAVMED P-6410 and CNAF M-3710.7 by (b) (6), (b) (7)(C) (Mishap Flight Lead) and (b) (7)(C) (Mishap WSO).
2. There is an inconsistency between CNAF M-3710.7 and CNAFINST 6410.1 with respect to the situations in which PMP medications may be used. CNAF M-3710.7 indicates that PMP medications would be authorized "when mission requirements and operational risk management indicate use would be appropriate." CNAFINST 6410.1 states that PMP medications are "only appropriate during combat operations or circumstances of exceptional operational necessity."
3. The 2018 Mishap CI indicated confusion as to which commander had the authority to authorize the use of Ambien and associated performance management drugs. CNAFINST 6410.1 utilizes the term "Air Wing Commander" to indicate the Navy CAPTAIN (O-6) Air Wing Commander. In MAG-12, "Air Wing Commander" was interpreted to be the CG, 1ST MAW. There was no written policy at the MAW or MAG level to pull the authority from the MAG Commanding Officer up to the Commanding General, 1ST MAW.

Governing Directives Recommendations

Medical 1. Update CNAFINST 6410.1 and CNAF M-3710.7 to clarify the commander authorized to approve the use of Performance Enhancing Drugs (PEDs). The CDA recommends the Marine Air Group Commander retain the authority to authorize the use of PEDs.

Medical 2. Update to CNAFINST 6410.1 to provide clearer guidance on methods to "maintain strict accountability for all controlled medications," and also provide clearer guidance on where the use of PMP/PEDs would be appropriate.

Prescribed and Over-the-Counter Medications Findings

CNAF M-3710.7 (Paragraph 8.3.2.5) states "use of over-the-counter drugs by flight personnel is prohibited unless specifically approved by a FS".

Current policies on the use of over-the-counter medication use are clear and consistent between CNAF M-3710.7 and BUMED (ARWG Chapter 19).

(b) (6), (b) (7)(C) received prescriptions for cold medications on 29 Oct 2018. He was not prescribed diphenhydramine at that time.

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The order date and order expiration date for (b) (6), (b) (7)(C) Ambien prescription was 31 May 2018 and 20 June 2018, respectively.

The 2018 Mishap CI, Findings of Fact 199 states: "MP1's (b) (6), (b) (7)(C) Ambien prescription expired on 4 June 2018."

The 2018 Mishap CI, Findings of Fact 202 states: "On 13 July 2018, (b) (6) prescription of zolpidem [Ambien] to MWSO2 (b) (6), (b) (7)(C) expired."

The order date and order expiration date for (b) (6), (b) (7) (b) (6), (b) (7) Ambien prescription is listed as 8 July 2018 and 13 July 2018, respectively. The assessment and plan for the encounter written by (b) (6) noted that the prescription was to facilitate (b) (6), (b) (7)(C) sleep during a 10-day trip to Australia.

Prescribed and Over-the-Counter Medications Opinions

1. There is no defined expiration date of a prescription. In the Armed Forces Health Care Longitudinal Tracking Application (AHLTA) (electronic health record system), an "Order Expiration Date" is listed, but this is a date after which the prescription would not be filled, not a date after which the medication cannot be used. Medical providers must be more precise with aircrew regarding the end-use date of any medication.

2. (b) (6), (b) (7)(C) had a detectable level of Ambien in his urine. However, Ambien in the urine will not cause sedation. (b) (6), (b) (7) (b) (6), (b) (7) did not have a detectable level of Ambien in his blood, but did have zolpidem phenyl-4-carboxylic acid, the metabolite of Ambien, in his blood. This metabolite, however, was physiologically inactive and would not produce sedation. As such, there is no basis to conclude that that (b) (6), (b) (7)(C) Ambien use was causal or contributory to the 2018 mishap.

(b) (6), (b) (7)(C) violated policy by using a PMP medication without approval. He obtained the medication for management of jet lag while in a non-flying status. If he had reported sleep difficulties to his flight surgeon while in a flying status, he would have been grounded until sleep disruption resolved and he was off medications. Whether the medication was obtained during a period where PMP meds were authorized or for the treatment of jet lag, all governing instructions required him to return any unused medication to his flight surgeon.

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3. (b) (6), (b) (7)(C) did not have a detectable level of Ambien in his blood or urine. He did have the metabolite of Ambien, zolpidem phenyl-4-carboxylic acid, in his urine. This metabolite, however, was physiologically inactive and would not produce sedation. As such, there is no basis to conclude that (b) (6), (b) (7)(C) Ambien use was causal or contributory to the 2018 mishap.

(b) (6), (b) (7)(C) violated policy by using a PMP medication without approval. He obtained the medication for management of jet lag while in a non-flying status. If he had sleep difficulties while in a flying status, he would have been grounded until sleep disruption resolved and off medications. Whether the medication was obtained during a period where PMP meds were authorized or for the treatment of jet lag, all governing instructions required him to return any unused medication to his flight surgeon.

4. (b) (6), (b) (7)(C) had a detectable level of diphenhydramine (Benadryl) in both his blood and urine. It is unknown if the level of Benadryl detected would have caused sedation because response to Benadryl can be unpredictable (it has been reported to produce both sedation and stimulation in various subjects). Studies have demonstrated, however, that if present, the sedating effects can persist well past the dosing interval. As such, it is unknown if (b) (6), (b) (7)(C) Benadryl use was causal or contributory to the 2018 mishap.

(b) (6), (b) (7)(C) further violated policies by using an over-the-counter antihistamine while on flight status and within 24 hours of flying.

Prescribed and Over-the-Counter Medications Recommendations

Medical 3. The Officer In Charge of Naval Aerospace Medical Institute (NAMI) must ensure flight surgery training and flight surgery updates emphasize the importance of constraining the duration of medication usage. Flight surgeons should emphasize the purpose for the medication, the duration of allowed use and the implication on "Up or Down" status with respect to the use of the medication to the aircrew. This discussion should be clearly documented in the electronic health record.

Fatigue Management

The effects of insufficient sleep are well-known and well-documented. From Dr. Shattuck's 2019 paper studying the effects of sleep deprivation in military operational environments, "The Role of Sleep in Human Performance and Well-Being", sleep deprivation:

"impairs real-world decision making; tasks which involve unique and unfamiliar circumstances, necessitating a wide range of other complex skills (e.g., assess difficult and rapidly changing situations; assess risk; anticipate the range of consequences; keep track of events-update the big picture; be innovative; develop, maintain, and revise plans; remember when events occurred; control mood and uninhibited behavior; show insight into one's own performance; communicate effectively; and avoid irrelevant distractions)."

Although fatigue was not considered a causal factor in the 2016 or 2018 mishaps, the CDA-RB investigated multiple ways in which fatigue and circadian rhythm adjustment may have contributed to an operational culture of using medications to compensate for poor sleep planning.

Additional operational guidance can be found in the NAVMED P-6410 from January 2000, "Performance Maintenance During Continuous Flight Operations". Although written as a guide for Navy flight surgeons (and is generally referenced for its guidance on prescription management), it also encapsulates combat-tested best practices for unit commanders and individuals to manage their sleep in order to optimize performance. Among these is a statement to the effect that "we manage maintenance, fuel, weapons, and other resources - we should consider wakeful alertness a key resource to be managed, as well".

This has been a hard lesson learned for the US Navy Surface Warfare community, who are working with the Naval Postgraduate School's (NPS) "Crew Endurance" lab to develop data-backed methods of fatigue management to help prevent surface ship collisions. These lessons are being rolled out to the Surface Warfare community via recommendations for changes to watchbills to better accommodate circadian rhythm changes and guides for operational commanders to better manage their Sailors' sleep/wake performance.

Fatigue Management Opinion

1. Current guidance for aviation fatigue management leaves a large capabilities gap between what is recommended and what is practical, forcing unit commanders and individuals to invent their own coping mechanisms for ensuring flight readiness. For example, guidance from CNAF M-3710, section 8.3.2.1.2, "Circadian Rhythm" details how to adjust from a day to night work cycle. The CNAF M-3710 recommends a period of four weeks for adaptation - this is not practical in an operational flight squadron.

The remainder of the section in the CNAF M-3710 refers the reader to the previously discussed NAVMED P-6410 guide for flight surgeons, a document that is not regulatory. Although better guidance is included here, the NAVMED P-6410 still recommends a full two weeks for circadian rhythm adjustment from day to night shift, and leaves specifics of how to transition a unit's circadian rhythm up to the unit commander. More research is needed to determine the level of risk a unit commander is accepting by flying a night schedule with various durations allowed for circadian rhythm adjustment.

Fatigue Management Recommendation

Medical 4. HQMC commission an Aviation Sleep Management Study through the Naval Postgraduate School that leverages lessons learned from the Surface Warfare/NPS "Crew Endurance" lab efforts. The results of this study should assist in optimizing the transition from day to night sorties with data-backed methods of fatigue management.

Institutional Safety Contributing Factors

The CDA-RB identified three issues within safety, two of which are Institutional Contributing Factors, and one issue that revealed itself post mishap. The two Institutional Contributing Factors are: (1) mishap reporting; (2) mishap recommendation completion and tracking. The post mishap issue that requires addressing deals with the assignment of Investigating Officers.

Investigations Overview

The Navy and Marine Corps utilize a concurrent investigation methodology for events that cross a defined mishap threshold (defined by cost of damage). In the case of Class A mishaps, three separate lines of inquiry are taken: (1) an Aircraft Mishap Board (AMB); (2) a JAGMAN Command Investigation; (3) a Field Flight Performance Board (FFPB). All three may occur simultaneously but are conducted independently of each other.

Aviation Mishap Board Safety Investigation Report

The safety investigation is conducted by the Aviation Mishap Board (AMB) whose output is the Safety Investigation Report (SIR). The governing policy for this investigation is OPNAVINST 3750.6S, the Naval Aviation Safety Management System (SMS).

The purpose for conducting a safety investigation, as described in the SMS, is distinct from the JAGMAN or the FFPB. A safety investigation is conducted, "to prevent recurrence." When necessary to overcome a reluctance to speak or speculate, the AMB may extend a promise of confidentiality (privilege) to involved personnel.

Facts gathered under privilege and the opinions and recommendations derived from the privileged material preclude the public release of the SIR. A public release would break the promise of privilege and erode the trust and confidence of the AMB process in future investigations.

The AMB uses facts to form opinions whenever possible. To generate the most comprehensive set of recommendations, the AMB is given the discretion to form opinions using a lower standard of proof than that required in the JAGMAN.

The AMB may deliberate and form opinions based on privileged information and opinions of parties whereas the FFPB and JAGMAN may not.

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A Safety Investigation Report (SIR) is produced by the AMB, and contains recommendations known as mishap recommendations (MISREC). Per the SMS, a MISREC is an action item resulting from mishap causal factors and hazards identified in a SIR after a mishap. MISRECs are generated solely to prevent recurrence of a similar event in the Naval Aviation Enterprise. SIRs are endorsed sequentially by the mishap unit's chain of command and those assigned action in the recommendation section.

Chapter 10 of the SMS describes the process to track and implement mishap recommendations, referred to as the Mishap and Hazard Recommendation Tracking Program (MISTRAC). All MISRECs are monitored in the MISTRAC system. MISRECs are closed when the action agency reports the specified action has been completed.

When assigned corrective action via MISREC, the action agency or command must complete the assigned items unless relieved by the Controlling Custodian (CC) or higher authority. The Naval Safety Center (NSC) monitors corrective actions from the generation of MISRECs through completion. It is important to note that the NSC maintains the MISTRAC system and monitors MISRECs to aid aircraft CCs, but does not exercise operational or administrative control within the CC chain of command. It is the CCs who are responsible for tracking and implementing MISRECs assigned to agencies within their subordinate chain of command.

Twice a year, on 1 March and 1 September, NSC provides a listing of all open recommendations to all action agencies. This listing includes a summary of the recommendations, the complete endorsement sequence, and all transactions to date.

Action agencies and commands must notify the CC and NSC of any changes to their assigned recommendation or action item. Within 30 days of the final endorsement, the action agency must submit their MISREC or Hazard Recommendation (HAZREC) within WESS (Web Enabled Safety System) Aviation Mishap Reporting System (WAMHRS).

The justification box in WAMHRS must acknowledge the assigned recommendations or action item, describe the plan to accomplish it, indicate the start or completion dates, and provide the name and the phone number of their point of contact.

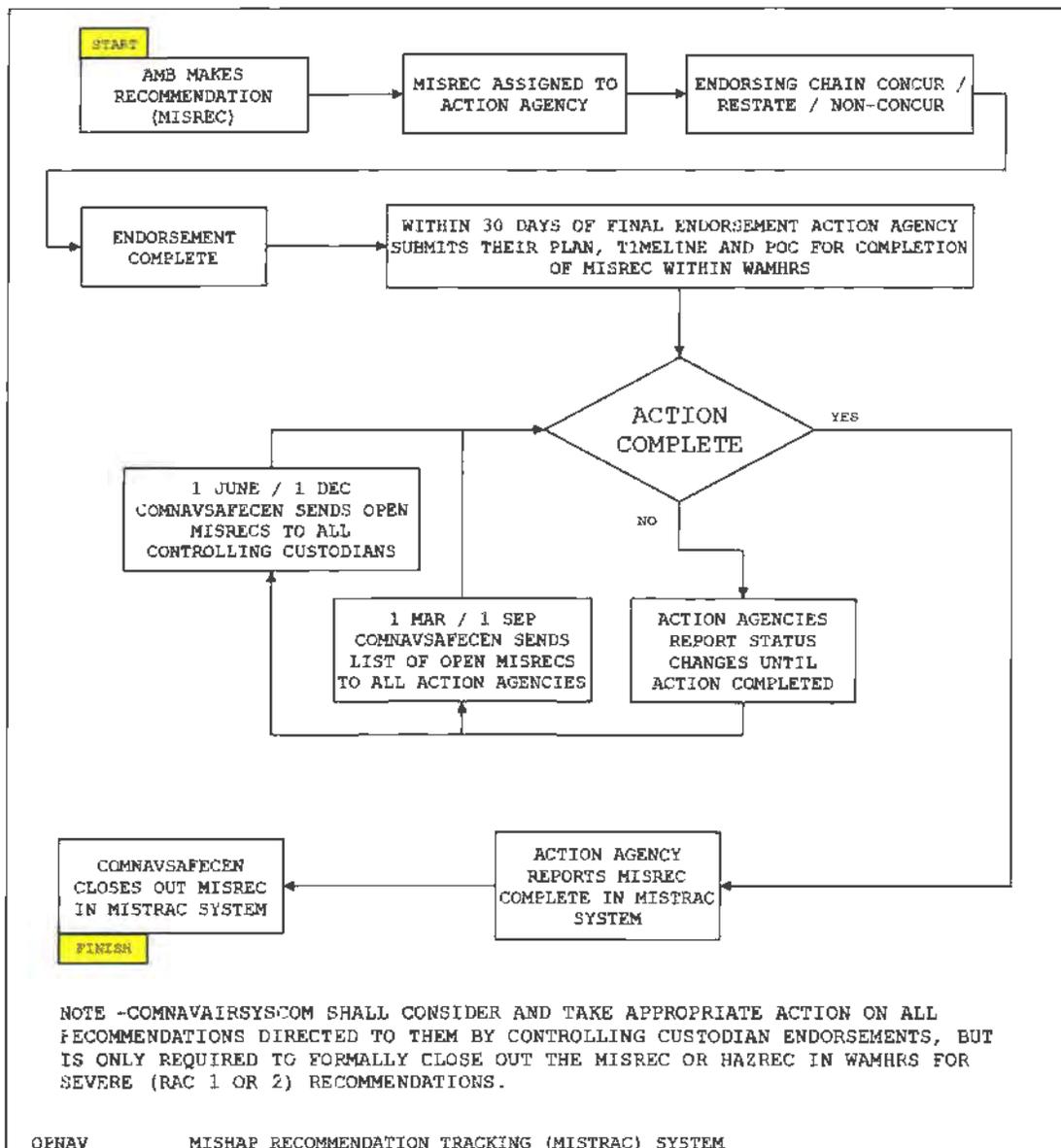
Action agencies report all status changes until the action is complete.

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NAVAIR shall consider and take appropriate action on all recommendations directed to them by CC endorsements. NAVAIR is only required to formally close out the MISREC or HAZREC in WAMHRS for severe recommendations (Risk Assessment Codes (RAC) 1 or 2).

NSC sends a similar list to all CCs on 1 June and 1 December. CC responsibility includes supervision of MISREC completion and communication with the NSC regarding status of MISRECs.

Although recommendations relating to action items on MISRECs and HAZRECs may be initiated by any concerned agency; opening, closing, and reopening of individual records is the exclusive prerogative of NSC.



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JAGMAN Command Investigations (CI)

The administrative investigation's governing instruction is JAGINST 5800.7F, Manual of the Judge Advocate General (JAGMAN). The investigation may be a preliminary inquiry or a CI and is referred to colloquially as the "JAGMAN." This investigation is the official and releasable (portions releasable via Freedom of Information Act (FOIA)) record of the event that is supported by facts. The standard of proof required for inclusion of information in the JAGMAN is a preponderance of evidence, i.e., more likely than not. Investigators may not speculate unless their inferences are supported by evidentiary enclosures or observations. JAGMAN investigators have full access to the same factual evidence as the safety investigation as well as any information the JAGMAN IO collects.

Aviation mishap CIs function to search out, develop, assemble, analyze, and record all available information relative to the mishap under investigation. The findings of fact, opinions, and recommendations provide the basis for actions designed to improve command actions, mitigate risk, publish "lessons learned" to the fleet, and allow for fully informed administrative and disciplinary decisions.

Field Flight Performance Board (FFPB)

An FFPB is an informal administrative board convened immediately after an adverse flight event occurs to determine the suitability of aircrew for continued aviation service. The Marine Corps ACTS Manual (MCO 1000.6) provides policy guidance on the conduct of FFPBs. The FFPB is non-punitive in nature and does not require a preponderance of evidence, but may consider and include in the record any matter of reasonable authenticity relevant to the case.

2016 Mishap

Using the 2016 Mishap CI, background information from OPNAVINST 3750.6S and non-privileged entries in WAMHRS, the CDA-RB was able to reconstruct the 2016 SIR type, class, cost, and reporting timeline as prescribed by the OPNAVINST 3750.6S.

2016 Reporting Requirements

The JAGMAN mandates a command investigation of aviation mishaps that cross the Class A threshold. In the case of Class A mishaps, the order allows a 60-day aperture for the convening authority to appoint an IO. Paragraph 0204.d.1 provides specific guidance on when a CI is not required.

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When events do not meet the Class A threshold, a CI is not required if the event is, "likely to be of little interest to anyone outside the immediate command or that the event will be adequately investigated under some other procedure (e.g., a mishap investigation...)."

OPNAVINST 3750.6S, defines a MIDAIR collision as "a collision between aircraft or UAV when intent for flight exists. This includes mishaps resulting from collision between aircraft or UAV when intent for flight exists. Includes inadvertent contact during formation takeoffs and air-refueling operations."

On 28 April 2016, the right wing of the F/A-18D inadvertently cut the right hose and basket from the KC-130J after refueling was complete and the section was departing the tanker. The nature of this contact and location of the cut on the hose supports the CDA-RB inference that the F/A-18D unintentionally passed approximately ten feet or less aft/below the KC-130J fuselage.

According to OPNAVINST 3750.6S, a Near Midair Collision (NMAC) occurs when aircraft pass close-by one another in the air and, as a result, the pilot-in-command feels the safety of the aircraft or UAV was in jeopardy. The following criteria are used to determine when to report: (1) A collision was avoided by chance rather than by a conscious act on the part of the pilot; (2) a collision would have occurred had no action been taken; (3) two aircraft inadvertently passed within 500 feet of each other.

A NMAC with a critical severity Risk Assessment Code (RAC 1 or 2) is a mandatory HAZREP submission and is due within 24 hours of the occurrence.

VMFA(AW)-242 did not submit a HAZREP for the 2016 mishap.

Mishap Cost Estimate and Classification

In April 2016, DOD cost thresholds for mishaps were equal to or in excess of Class A/\$2,000,000, Class B/\$500,000, Class C/\$50,000, and Class D/\$20,000.

OPNAVINST 3750.6S states: "parts, labor, repair costs and environmental damage repair are used as a methodology to determine the scope of the incident and determine when mishap thresholds are met. Therefore, there are no 'free' parts such as those that are removed from a stricken aircraft to replace damaged parts."

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Use 'as new' cost for any parts acquired from salvage for repair. When a component, including engines, is economically repairable and sent to an intermediate level or higher maintenance facility, and planning and estimate (P&E) information is not available, calculate the cost of repair by computing 15 percent of the item's initial cost - not the turn in cost. Report man-hours spent removing and replacing the damaged part."

Following the 2016 mishap, VMFA(AW)-242 replaced the following parts on F/A-18D BUNO 164653. The CDA-RB calculated cost is as follows:

- (1) AIM-9X fins, \$271(100%)/\$41(15%)
- (2) Aileron, \$139,140(100%)/\$20,871(15%)
- (3) Aileron Shroud, \$27,851(100%)/\$4178(15%)

Following the 2016 mishap, VMGR-152 replaced the following parts on KC-130J BUNO 166763 as a result of the mishap. The CDA-RB calculated cost is as follows:

- (1) Refueling Nozzle, \$2,752(100%)/\$413(15%)
- (2) Refueling Basket, \$9,391(100%)/\$1,409(15%)
- (3) Refueling Hose, \$10,181(100%)/\$1,527(15%)

OPNAVINST 3750.6S states "for intermediate and organizational level repair, use \$24 per man hour for labor costs. Report direct man-hours spent removing and replacing damaged components."

Following the 2016 mishap, the combined VMFA(AW)-242/VMGR-152 labor hours attributable to the mishap were 70 organizational-level and intermediate-level directed maintenance man hours (DMMH). 70 DMMH @ \$24/hr = \$1680.

Using 100% (worst case) figures to cost the 2016 mishap, the CDA-RB calculated the event cost of the F/A-18D (\$167,262), the KC-130J (\$22,324), and the combined labor of (\$1680) at \$191,266.

Using 15% (best case) figures to cost the 2016 mishap, the CDA-RB calculated the event cost of the F/A-18D (\$25,090), the KC-130J (\$3,349), and the combined labor of (\$1680) at \$30,119.

The best case assessment of \$30,119 was initially used in determining the cost threshold of the 2016 mishap.

On 27 May 2016 the NSC advised MAG-12, VMFA(AW)-242 and VMGR-152 that none of the replaced parts were eligible for the

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15% discount therefore the 2016 event was a Class C with a reportable cost of \$190,306 and it was appropriate for an AMB to convene with membership from both squadrons.

Mishap Notification Timeline Review

Timeline of 2016 mishap safety investigation initial notification through endorsement follows.

2016 MIDAIR SAFETY REPORTING TIMELINE				
Days Allowed	OPNAV 3750.65	Event	ACTUAL	Days Taken
	28-Apr-16	2016 Midair Occurs	28-Apr-16	
1	Due in WAMHRS NLT 24 Hours After Occurrence	Class-C Initial Notification (IN) or Serious HAZREP Submission in WAMHRS	Class-C IN Received 16 Jun 16	49
30	Due in WAMHRS NLT 30 Days from IN unless CC extends	242/152 AMB Submits SIR in WAMHRS for NSC Quality Assurance (QA)	SIR Received by NSC QA on 13 Jul 16	27
n/a	Undefined. 10 days or less is average.	SIR In QA at NSC by TMS Analyst	SIR released for endorsement on 27 Jul 16	14
15	Endorsers have 15 days to endorse in WAMHRS	VMFA-242 First Endorsement	Submitted in WAMHRS 17 Aug 16	21
15	Endorsers have 15 days to endorse in WAMHRS	VMGR-152 Endorsement	Submitted in WAMHRS 2 Oct 16	46
n/a	Ref 3750.65 CH 9.904	AMB Reconvened (MAG-12 or Higher)	Reconvened on 4 Oct 2016	2
15	Endorsers have 15 days to endorse in WAMHRS	VMFA-242 Second Endorsement	Submitted in WAMHRS 11 Oct 16	7
15	Endorsers have 15 days to endorse in WAMHRS	MAG-12 Endorsement	Submitted In WAMHRS 9 Nov 16	29
28	CC has 28 days to endorse in WAMHRS	MARFORPAC Endorsement (out of typical sequence)	Submitted in WAMHRS 16 Nov 16	7
15	Endorsers have 15 days to endorse in WAMHRS	1st MAW Endorsement	Submitted in WAMHRS 27 Nov 16	11
n/a	Undefined. 10 days or less is average.	NSC Final QA Class-C SIR & Endorsement	Released via WAMHRS 28 Nov 16	1
Total		Summary & Statistics		Total
134	OPNAVINST 3750.65. Specified 134 days for the chain of command to complete the SIR and endorse it, 214 days were taken. A 15 day allowance was applied for NSC QA, this resulted in an average of 64 days. The delay in initial reporting (48 days) and squadron/MAG endorsement period exceedances (51 days) account for 49% of the total time it took to release the report and endorsements.			214 (199)

2016 Mishap and Investigations Opinions

1. The 2018 Mishap CI, under the possible contributing factors (page 49) stated: "If the mishap that occurred in 2016 had been investigated as required, remedial measures could have been properly implemented to prevent future similar mishaps, like this one." This statement is highly speculative, and technically wrong.

Recall from page 70-71, the JAGMAN mandates a command investigation of aviation mishaps that cross the Class A threshold. In the case of Class A mishaps, the order allows a 60-day aperture for the convening authority to appoint an IO. Paragraph 0204.d.1 provides specific guidance on when a CI is not required.

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When events do not meet the Class A threshold, a CI is not required if the event is, "likely to be of little interest to anyone outside the immediate command or that the event will be adequately investigated under some other procedure (e.g., a mishap investigation...)."

In the days subsequent to 28 April 2016, VMFA(AW)-242 and MAG-12 believed the event did not meet Class C mishap reporting criteria. It is therefore a logical conclusion by VMFA(AW)-242's Commanding Officer that this was of little interest to anyone outside the immediate command.

Additionally, the event was investigated by an AMB and the resultant SIR was submitted in November 2016, which met the requirement in the JAGMAN that the event would be "adequately investigated under another procedure." **To be clear, submission of the 2016 Class-C mishap SIR negated the requirement for a JAGMAN CI.**

2. Fleetwide, a safety reporting culture will not be fully realized until a tangible benefit of the safety reporting process and its associated workload can be delivered more rapidly to the fleet after a mishap or "close call" occurs. After numerous interviews, the CDA-RB is convinced that the current perception of safety reporting is that it's a "black hole." Reporting requires a tremendous amount of work, and fleet users see little to no benefit in return. Additionally, safety award systems and corresponding administrative actions provide considerable disincentives to reporting mishaps. The prevailing sentiment among many is to report only when absolutely necessary.

3. Maintaining the extreme sanctity of privilege has limited our ability to share information and learn from mishaps. We, as an Institution, effectively manage classified multimedia material; there has to be a way to successfully manage privileged multimedia data as well. Privilege exists solely as a vehicle for accelerated improvement and to facilitate open, honest introspection. The current model of SIR distribution does not prevent malicious leaks of privileged information as seen with the 2018 mishap SIR, but it has slowed and diluted the impact that accelerated learning from each RAC 1 or 2 event could provide.

4. Reports remain difficult to access. The NSC greatly improved fleet access to its report database through fielding of the JASPER system in the WAMHRS. Despite this improvement, the search interface is not intuitive and remains difficult to navigate; many search functions are not available to the fleet

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user. Additionally, cross-service requests are not available within WAMHRS and must be directed up the safety chain to the corresponding Service Safety Center. This is an issue for similar aircraft platforms flown across different services, such as the USMC KC-130J and the USAF MC-130J.

5. The most common SIR recommendation (brief to all aircrew) is also the least effective at preventing recurrence of mishaps. The recommendation to brief an SIR or HAZREP "to all aircrew" or "to all maintainers" has become a cliché in naval aviation safety reporting. It lacks teeth as a recommendation, is not tracked up-line or down-line, and is so commonplace that there are now more events to brief than there is time available.

6. The NSC 2018 Annual Report states "in 2018, the timely completion of the endorsement process for safety investigation reports and the implementation of mishap and hazard recommendations (MISRECs and HAZRECs) both left much room for improvement. The slow endorsement process and delayed implementation of MISRECs/HAZRECs - some for multiple years - incurs continued risk to safety and operational readiness."

Using non-privileged data, the CDA-RB determined MISREC/HAZRECS are not easily tracked at the Squadron, Group, Wing, Controlling Custodian, or Service Headquarters level in MISTRAC. The figure below shows the outstanding MISRECs for the 2018 report.

"OPEN" or "OPEN ACTION ONGOING" Aviation MISRECS 2-25-2020												
Consolidated TYCOM	Currently DUE	Date of Mishap Occurrence**										
		FY20	FY19	FY18	FY17	FY16	FY15	FY14	FY13	FY12	FY11	FY10
NAVAIR	300	0	44	53	110	42	19	12	4	6	4	6
CMFP	38	0	4	3	8	12	2	6	2	1	0	0
CNAP	11	0	2	3	5	1	0	0	0	0	0	0
CNIC	4	0	2	2	0	0	0	0	0	0	0	0
CNAF	11	0	0	6	4	1	0	0	0	0	0	0
CNAL	1	0	0	1	0	0	0	0	0	0	0	0
CNAFR	1	0	0	1	0	0	0	0	0	0	0	0
CNATRA	1	0	0	0	0	1	0	0	0	0	0	0
ALL Others*	59	2	10	10	10	16	6	5	0	0	0	0
	426	2	62	79	137	73	27	23	6	7	4	6

*This column includes all mishap action agencies to include USAF and USA
Date of mishap not final report endorsement.

With the assistance of the NSC to ensure privileged information was not violated, the CDA-RB uncovered that the 2016 Mishap SIR had five recommendations accepted throughout the endorsing chain. **As of 6 December 2019, all five recommendations contained in the 2016 SIR remain open.**

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The quantity of MISREC/HAZRECs that are not closed brings into question the justification and expenditure of time/resources for conducting a safety investigation in the first place. **MISRECs that are not acted upon are essentially identified but unmitigated risk continuing to be carried by the FMF. To capitalize on lessons learned from safety investigations, the current state of MISREC/HAZREC management must be improved.**

7. As the NSC fields a new safety reporting system, Risk Management Information (RMI), ease of access for fleet users must be the top priority. The current SIR format is difficult to read, even for those who are Aviation Safety Officer (ASO) trained.

8. MSHARP T&R chaining is an issue that has surfaced repeatedly and was examined extensively. **The CDA-RB concludes there is no causal link in the faulty chaining that occurred inside MSHARP to either the 2016 or 2018 mishaps.**

The delay from identification to remedy does, however, illustrate a disturbing trend in safety investigations pointed out in opinion 6 above; **safety recommendations are made but not acted upon.**

2016 Mishap and Investigations Recommendations

Safety 1. HQMC and NSC determine a straightforward and clearly defined metric for mishap costing in order to prevent ambiguity and delayed reporting.

Safety 2. HQMC and NSC establish a process by which information obtained from safety investigations is promulgated to the FMF. The sanctity of privilege is important, but should not prevent lessons learned from being pushed to the FMF.

Safety 3. HQMC and NSC ensure the fleet can easily access all SIRs. Access includes uncomplicated security measures and a well-organized database so a squadron pilot can quickly find and interpret pertinent SIRs.

Safety 4. HQMC and NSC determine an effective method to facilitate the fleet's ability to assimilate lessons learned from past mishaps. An emphasis should be placed on case studies and scenario-based training.

Safety 5. HQMC develop the capability within current/future MISTRAC iterations for CCs to monitor, manage, and close

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MISREC/HAZREC for those generated within their subordinate chain. Recommended entities are listed below:

- a. Naval Safety Center
- b. Deputy Commandant, Aviation
- c. HQMC Safety Division
- d. Marine Aviation CCs

Safety 6. HQMC levy a requirement in MSHARP contract that all MSHARP contractor T/M/S leads read all SIRs submitted from respective platform and institute recommended changes, in MSHARP, within a specified time frame.

JAGMAN Command Investigation Investigating Officer Appointments

Overview

Investigating Officers (IOs) must in practice and appearance be unbiased, objective, and thorough. Actual bias or a perception of bias by the investigator will discourage open dialogue with witnesses and undermine the credibility of the investigation.

Investigating Officer Conflicts of Interest

A conflict of interest has the potential to compromise the impartiality of an investigation because of the possibility of a clash between the person's self-interest, assigned billet, and their investigative duties.

Investigators have a duty to recognize and immediately disclose conflicts of interest to the convening authority, regardless of when the conflict arises. The convening authority, after consulting with the cognizant legal advisor, can take the necessary actions to manage or eliminate the conflict, to include assigning a new investigator or forwarding the investigation to a higher headquarters.

JAGMAN IO and CI Opinions

1. The IOs assigned to the 2016 and 2018 mishaps may have been the best available to 1ST MAW to conduct the respective investigations, but they were not the best qualified to conduct those respective investigations for the Institution. In particular, the 2018 Mishap IO lacked O-6 command and the tactical experience to conduct such a complex investigation.

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JAGMAN Investigating Officer Recommendations

JAGMAN 1. To the maximum extent possible, IOs conducting a Class A mishap CI should be sourced from outside of the chain of command of the mishap unit. This will help ensure investigative independence for the IO and reduce the likelihood of unlawful command influence and conflicts of interest.

JAGMAN 2. IOs conducting a Class A mishap CI must inform the convening authority and cognizant legal advisor if they uncover facts that suggest the convening authority may bear some responsibility for the mishap, directly or indirectly. This will allow the convening authority and legal advisor to determine if the investigation should be forwarded to a higher headquarters for appropriate action.

JAGMAN 3. To the maximum extent possible, IOs conducting a Class A Mishap CI should seek counsel of Subject Matter Experts (SMEs) to ensure the soundness of the IOs opinions and recommendations. This should be codified in the JAGMAN, any IO Handbook, and in the Appointing Order.

JAGMAN 4. The JAGMAN must be more specific on when it is necessary to appoint a team vice an individual. While not possible to convene a team similar to the CDA-RB, the Institution would benefit tremendously by appointing a team of investigators for complex investigations.

Organizational Cultural Factors

We have finished identifying the Institutional Contributing Factors, and now shift to detailing the Organizational Contributing Factors. The CDA-RB will focus its organizational look at 1ST MAW, MAG-12, VMFA(AW)-242, and VMGR-152.

To understand the Organizational Contributing Factors, one must first understand the organizational culture. Organizational culture has been defined as "a pattern of shared basic assumptions learned by [an organization] as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems."

Organizational culture can simultaneously produce good and bad results. The bad results can cause blind zones and lead to normalized deviancy in both commanders and their staffs. Recognition is only one aspect to driving change; the other is a willingness to change.

"Organizational change is difficult to achieve, particularly in an organization with close ties to tradition and a reputation for success. For change to have any hope for success, the upper levels must perceive the need for change and initiate action because only management can change the system without revolution. Even after management recognizes that change is required, an external agent may be required to bring it about successfully."¹⁵

1ST MAW has a unique mission to be prepared to "Fight Tonight." The "Fight Tonight" mantra has dominated operations in the western Pacific for approximately two decades, and for good reason. Being stationed inside the contact layer requires focused and constant attention in order to ensure Marine Corps forces can employ on extremely short notice. In short, 1ST MAW, is a readiness consumer.

In addition to being a readiness consumer, 1ST MAW has a responsibility to generate five forward based flying squadrons in Okinawa and Iwakuni. Neither 2D nor 3D MAW have readiness generation and readiness consumer responsibilities.

2D and 3rd MAW have almost twice as many squadrons to manage as 1ST MAW. 2D and 3D MAW are focused solely on readiness generation and being a force provider. For decades, their sole

¹⁵ Marine Corps Aviation Mishap Rate Assessment Study Final Report, February, 1992, page I-14.

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focus has been on generating and providing squadrons for scheduled or contingency deployments. Their respective staffs are able to focus their policies, processes, and procedures strictly on readiness generation and force provider responsibilities.

A comparison of the Table of Organization of 1ST, 2D, and 3D MAW Headquarters Staff reveals:

MAW STAFFING	Unit	STRUCTURE (T/O)	ON BOARD
OFFICERS	HQTRS 1ST MAW	104	97
	HQTRS 2D MAW	97	88
	HQTRS 3D MAW	96	99
ENLISTED	HQTRS 1ST MAW	309	293
	HQTRS 2D MAW	343	333
	HQTRS 3D MAW	343	347

A comparison of the Table of Organization of MAG-12, MAG-31, and MAG-11 Headquarters Staff reveals:

MAG STAFFING	Unit	STRUCTURE (T/O)	ON BOARD
OFFICERS	HQTRS MAG-12 1ST MAW	25	27
	HQTRS MAG-31 2D MAW	21	26
	HQTRS MAG-11 3D MAW	21	23
ENLISTED	HQTRS MAG-12 1ST MAW	89	98
	HQTRS MAG-31 2D MAW	88	83
	HQTRS MAG-11 3D MAW	76	76

The organizational culture has driven 1ST MAW/MAG-12 to focus on OPLAN generation at the expense of readiness generation. A review of VMFA(AW)-242's poor readiness on 6 December 2018 will demonstrate 1ST MAW and MAG-12 failed to understand all the information that was available to them, and therefore failed to take appropriate measures to mitigate risk for what was a failed squadron.

VMFA(AW)-242 Readiness Generation Challenges

Flight Hours. Many studies have been commissioned regarding degraded readiness in the TACAIR community.

The *2010 Air Wing Training Study: Analyzing Reduced Flight Hours, Safety of Flight, and Tactical Proficiency*, by V. Reid Smith and William D. Brobst (CNA) states:

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"We found that the flight hour distribution for pilot causal factor (PCF) mishaps differs substantially from the background distribution of non-mishap pilots and that it has a strong peak for pilots with 0 to 10 hours in the past 30 days. We also observed the well-established relationship between low pilot career flight hours and higher mishap frequency."

The *2015 Air Wing Training Study: Further Analyzing Low Flying Levels and Effects* by Stevenson, Smith, Rowland, and Brobst (CNA) states:

"Our mishap analysis shows a safety of flight risk for aircrews during low flying periods. In particular, we noted a risk for junior aircrews (with limited career flight hours) with limited recent flight hours participating in relatively complex flight events."

A review of flight hours over the past four years by F/A-18 squadrons across the Marine Corps shows:

TMS	F/A-18						F-35					
	12	31			11			12	13			
GROUP	242	312	115	251	533	224	323	232	225	121	123	211
2016	221.6	142.3	189.0	144.7	470.2	179.8	183.2	202.9	245.2			
2017	210.8	191.1	194.8	193.2	174.3	605.6	243.4	205.4	185.7	166.6		157.2
2018	159.7	270.7	498.4	213.6	201.4	242.0	222.1	221.1	204.5	219.6		177.7
2019	120.7	181.3	257.5	121.3	209.2	191.1	240.0	225.2	176.2	169.7	169.4	220.4
AVG	178.2	196.3	284.9	168.2	263.8	304.6	222.2	213.9	202.9	185.3	169.4	185.1

Over the past four years, only one squadron has fewer average monthly flight hours than VMFA(AW)-242: VMFA-251. In 2016, VMFA(AW)-242 averaged 221 flight hours per month. In 2018 VMFA(AW)-242 averaged only 160 flight hours per month, taking a particularly low dip toward the end of the year and the beginning of FY19 just prior to the mishap.

Of note, VMFA-251, the only squadron analyzed with fewer monthly flight hours than VMFA(AW)-242 (2016-2019), also had a substantial mishap in the administrative environment at night, resulting in the loss of aircraft. This mishap occurred during FY16 during which VMFA-251 averaged only 145 flight hours per month.

A lack of flight hours, particularly less than the 11 monthly flight hours described as below the safety threshold, seems to anecdotally correlate to mishaps. All three mishaps,

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the 2016 and 2018 VMFA(AW)-242 mishaps and the 2016 VMFA-251 mishap involved scripted actions at night in low light level environments. All three pilots had less than two years in the fleet at the time of the mishap.

This does not directly correlate readiness to mishaps, but establishes a profile of mishaps under similar conditions.

A deeper dive into the previous approximately 90 days reveals a squadron who was producing the lowest flight hours within MAG-12.

	VMFA(AW)-242 Squadron Total Hours / (Total night hours)	VMFA(AW)-225 Squadron Total Hours / (Total night hours)	VMFA-121 Squadron Total Hours / (Total night hours)
September	65.1 / (5)	243.3 / (1.5)	122.2 / (6.8)
October	70.5 / (7.2)	225.8 / (83.2)	146.3 / (11.9)
November	83.9 / (5.9)	240.7 / (36.3)	220.5 / (13.1)
December	39.5 / (8.8)	198.1 / (11.4)	118.9 / (0.0)

In assessing the flight time of VMFA(AW)-242, and in particular the mishap pilots, (b) (6) had flown 13.1 hours in the previous 90 days while (b) (6), (b) (7)(C) had flown 33 hours in the previous 90 days, the most of any pilot in VMFA(AW)-242 in that timeframe. The following table below shows the flight time for the previous 30, 45, 60 and 90 days prior to the December 2018 mishap for all VMFA(AW)-242 pilots.

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VMFA (AW)-242 - FA-18D Pilot 30 60 90

Generated on 12/07/2018 0724 UTC-08:00

	LAST FLIGHT	TFT30	TPT30	TFT45	TPT45	TFT60	TPT60	TFT90	TPT90	FYFT	LAST ACMDR	LAST NVG	LAST NIGHT	CURRENT MONTH TFT	LAST MONTH TFT	LAST 30 NVG
Permanent																
(b) (6)	12/05/18	10.2	10.2	14.9	14.9	22.4	22.4	29.9	29.9	14.9	12/05/18	08/21/18	12/05/18	3.4	7.7	0
	12/01/18	18.5	18.5	22.4	22.4	29.9	29.9	38.4	38.4	18.5	12/01/18	08/22/18	08/22/18	1.3	8.6	0
	12/03/18	16.6	16.6	19.9	19.9	26.4	26.4	33.9	33.9	16.6	12/03/18	11/19/18	11/19/18	1.1	7.6	1.2
	12/04/18	6.6	6.6	7	7	7	7	14.6	14.6	6.6	12/04/18	08/23/18	08/23/18	1.2	5.8	0
	12/04/18	11.4	11.4	14.9	14.9	18.4	18.4	25.9	25.9	11.4	12/04/18	12/04/18	12/04/18	1.9	7.3	1.9
	11/29/18	8.3	8.3	10.8	10.8	13.3	13.3	16.8	16.8	8.3	11/29/18	11/14/18	11/14/18	0	6.5	1.5
	11/27/18	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	11/27/18			0	1.4	0
	12/04/18	10.6	10.6	13.1	13.1	15.6	15.6	18.1	18.1	10.6	12/04/18	11/14/18	11/14/18	1.1	5.7	1.5
	11/29/18	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	11/29/18		10/23/17	0	2.8	0
	11/30/18	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	11/30/18	12/06/17	12/06/17	0	4.3	0
	11/20/18	14	14	14	14	14	14	14	14	14	12/05/18	08/23/18	12/05/18	3.4	2.2	0
	11/20/18	6	6	6	6	6	6	6	6	6	11/20/18	08/16/18	08/16/18	0	2.9	0
	12/04/18	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	12/04/18	12/04/18	12/04/18	2	1.5	2
	11/27/18	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	11/27/18	11/27/18	11/27/18	0	8.2	1.5
	11/27/18	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	11/27/18	08/22/18	08/22/18	0	2.1	0
	11/21/18	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	11/21/18	08/23/18	08/23/18	0	3.9	0
	11/29/18	16.3	16.3	31.2	31.2	31.2	31.2	31.2	31.2	16.3	11/29/18	11/01/18	11/01/18	0	7.1	0

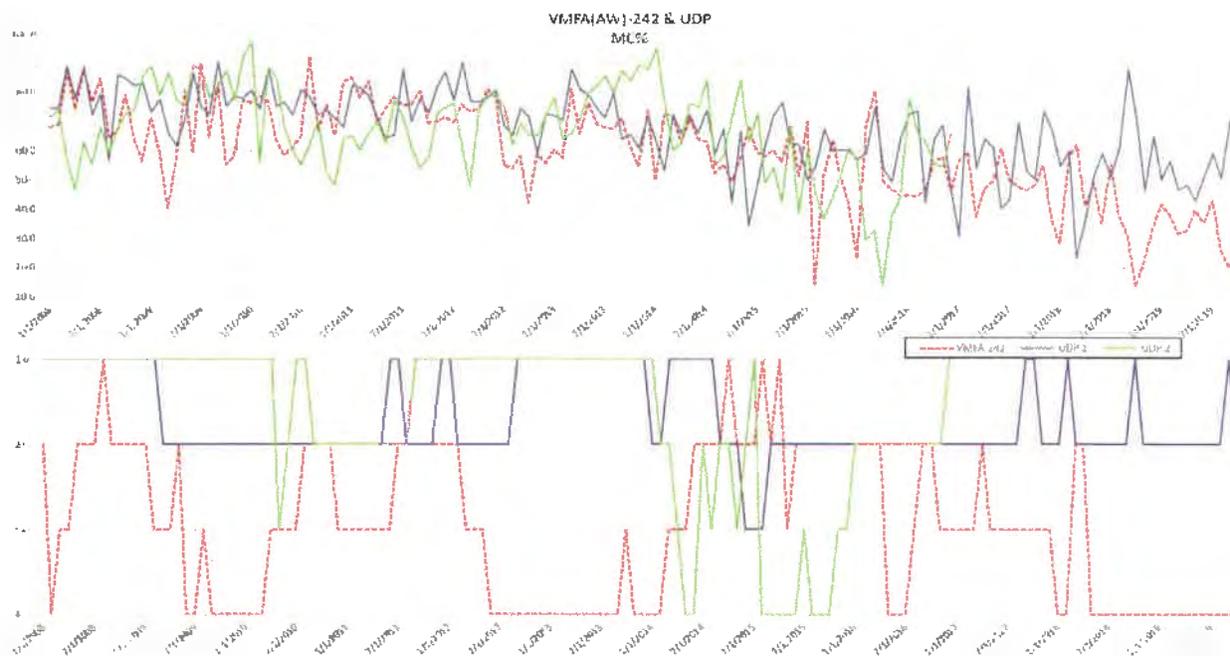
TPT hours in last 30 Days	14.9 - 10	10
TPT hours in last 45 Days	22.4 - 14.9	14.9
TPT hours in last 60 Days	29.9 - 18	18
TPT hours in last 90 Days	58.9 - 30	30

MSIAR 30/60/90 report 13 Dec 18

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Aircraft Availability

The graph below compares VMFA(AW)-242 Mission Capable (MC) and Training Ratings (TR) against the Unit Deployment Program (UDP) squadrons deployed to Iwakuni at the same time. A Placemat sized product is available in Annex C as well.



Mission Capability and Training Readiness 2008-2019

Training-ratings (TR) are defined as the percentage of Mission Essential Tasks trained or flight crews that are operationally ready. TR percentages are as follows from lowest TR to highest:

- 0-54% - T4
- 55-69% - T3
- 70-84% - T2
- 85-100% - T1

With a few exceptions, UDP squadrons achieved steady readiness rates with TRs remaining between T2 and T1 from 2008 to 2014. Conversely, during this same time period, TR for VMFA(AW)-242 was consistently lower than similar type/model/series (T/M/S) UDP squadrons.

From 2015 to September 2019, the mission capable (MC) rate, [gathered from the decision knowledge programming for logistics analysis and technical evaluation (DECKPLATE) database], depicted a steady decline in MC readiness rates for VMFA(AW)-242 as compared to the other UDP squadrons. With the exception of

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several months during this time period, there is a direct correlation between MC readiness rates and squadron TR.

High MC rates are the linchpin for more flight hours, more training, and additional qualifications and designations. The low MC rate seen in the top portion of the graph directly contributes to the low TR rates on the bottom portion of the previous graph for VMFA(AW)-242.

VMFA(AW)-242 Maintainer Manning

The CDA-RB is not concluding or insinuating that maintainer assignment practices is a causal factor in either the 2016 or 2018 mishaps. It is, however, our intent to show that maintainer manning practices resulted in low MC rates which resulted in reduced flight hours in the months leading up to the mishap. **It is a Contributing Factor.**

According to *Investigating Human Error: Incidents, Accidents and Complex Systems* by Barry Strauch, investigators identify the presence of an antecedent in two ways; by identifying an action, situation or factor that influenced the operator's performance during the event, and more importantly, by obtaining evidence demonstrating that the operator's performance was affected by the [REDACTED] A-RB will show in the Cause Map narrative how (b) (6) [REDACTED] low flight hours were a contributing fact [REDACTED] hap.

Though VMFA-242(AW) had more maintainers on hand than required in December 2018, the squadron was severely deficient in the required number of qualified personnel (specifically 6217 and 6257 collateral duty inspectors (CDIs)) as will be seen in the table below.

Throughout his tenure, the Commanding Officer of VMFA(AW)-242 expressed concern through the Defense Readiness Reporting System - Marine Corps (DRRS-MC) regarding aviation maintenance personnel with critical MOSS/qualifications and level of expertise. Though personnel strength met staffing requirements, they did not meet Naval Aviation Maintenance Program (NAMP) qualification requirements.

The NAMP requires grade specific and level of experience for CDIs, CDQARs (collateral duty quality assurance representatives), and QARs (quality assurance representatives). Grade requirements for a CDI are E4 and above. Seat Shop (6287 MOS) did not have team leaders that met grade requirements. Other divisions such as airframes and power line were staffed at above table of organization (T/O), however, the over-staffed Marines were E3 and below. Multiple QARs did not meet the grade

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requirement of E6 and required NAMP specific grade deviation waivers.

A snapshot of the maintenance departments of VMFA(AW)-242, VMFA(AW)-533 and VMFA(AW)-225 maintainers shows VMFA(AW)-242's maintenance department was junior in rank and qualifications to CONUS based squadrons.

VMFA-AW-242 RMC							
MOS	E1 - E4 ON-HAND	E5 - E8 ON-HAND	TOTAL ON- HAND	SFF - REQ/OH	QAR - REQ/OH	CDQAR - REQ/OH	CDI - REQ/OH
6019		1	1				
6042	2		2				
6046	4	6	10				
6048	3	5	8		0 / 1	1 / 2	1 / 2
6217	21	9	30		1 / 1	4 / 3	8 / 3
6257	20	5	25		1 / 1	3 / 3	6 / 1
6287	10	2	12		1 / 0	2 / 2	2 / 3
6317	19	8	27		2 / 2*	1 / 3*	5 / 11*
6337	17	7	24				
6391		1	1				
6531	20	6	26		1 / 1	0 / 1	4 / 5
6591		2	2			0 / 1	
6672	1		1				
TOTAL	117	52	169	4 / 4	6 / 6	11 / 15	26 / 25

*6317/6337 QUALIFICATIONS ARE ROLLED-UP

VMFA-AW-533 RMC							
MOS	E1 - E4 ON-HAND	E5 - E8 ON-HAND	TOTAL ON- HAND	SFF - REQ/OH	QAR - REQ/OH	CDQAR - REQ/OH	CDI - REQ/OH
6019		1	1				
6042	1	1	2				
6046	4	5	9				
6048	4	2	6			1 / 2	1 / 2
6217	18	10	28		1 / 1	4 / 3	8 / 8
6257	16	6	22		1 / 2	3 / 3	6 / 5
6287	6	3	9		1 / 1	2 / 3	2 / 2
6317	14	8	22		2 / 3*	1 / 2*	5 / 14*
6337	11	7	18				
6391		1	1				
6531	16	8	24		1 / 1	0 / 1	4 / 6
6591		2	2			0 / 0	0 / 1
6672	2		2				
TOTAL	92	54	146	4 / 5	6 / 8	11 / 14	26 / 39

*6317/6337 QUALIFICATIONS ARE ROLLED-UP

VMFA-AW-225 RMC							
MOS	E1 - E4 ON-HAND	E5 - E8 ON-HAND	TOTAL ON- HAND	SFF - REQ/OH	QAR - REQ/OH	CDQAR - REQ/OH	CDI - REQ/OH
6019		1	1				
6042	2		2				
6046	7	2	9				
6048	3	3	6			1 / 2	1 / 1
6217	12	13	25		1 / 1	4 / 3	8 / 8
6257	13	6	19		1 / 1	3 / 3	6 / 5
6287	5	3	8		1 / 1	2 / 1	2 / 2
6317	12	7	19		2 / 2*	1 / 4*	5 / 11*
6337	12	5	17				
6391		1	1				
6531	16	6	22		1 / 1	0 / 2	4 / 7
6591		2	2			0 / 1	
6672	1		1				
TOTAL	83	49	132	4 / 6	6 / 6	11 / 16	26 / 34

*6317/6337 QUALIFICATIONS ARE ROLLED-UP

RESOURCE: ADVANCE SKILLS MANAGEMENT SYSTEM, MCC UNIT SNAPSHOT REPORT TAKEN 12/29/2018

Comparatively:

VMFA(AW)-242 enlisted maintenance manpower - 69% E1-E4/31% E5-E8
 VMFA(AW)-225 enlisted maintenance manpower - 63% E1-E4/37% E5-E8
 VMFA(AW)-533 enlisted maintenance manpower - 63% E1-E4/37% E5-E8

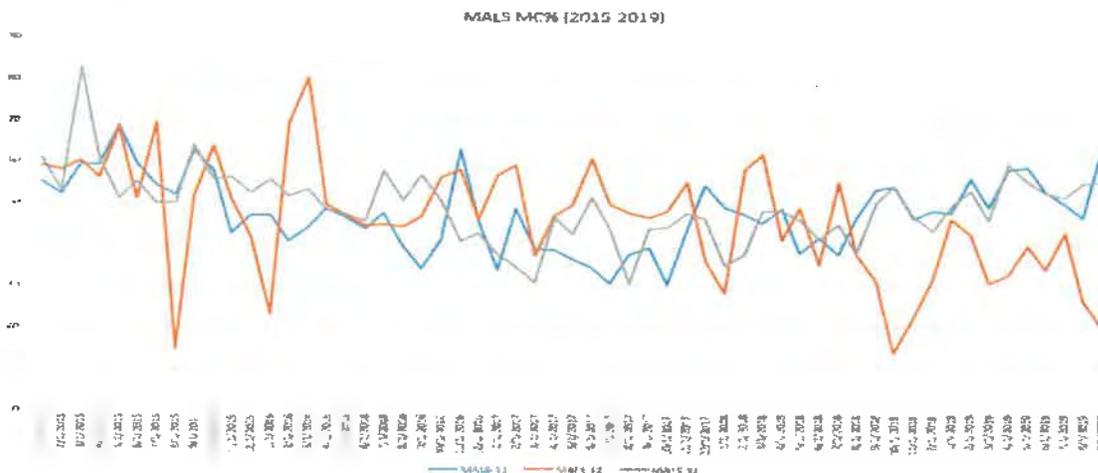
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As depicted on the previous charts, VMFA(AW)-242 had a deficiency of 10 CDIs and 1 QAR. A deficit of 5 CDIs in the Airframes Division and a deficit of 5 CDIs in the Powerline Division was a significant problem. The specific deficits are restated below.

VMFA(AW)-242 Airframes (6257) - 6 CDIs required/1 on hand
 VMFA(AW)-242 Safety Equip (6287) - 1 QAR required/0 on hand
 VMFA(AW)-242 Powerline Mechs (6217) - 8 CDIs required/3 on hand

When comparing VMFA(AW)-242 manning to the two other F/A-18D squadrons, it is evident that within core MOSS (6217, 6257, 6287, 6317, & 6337) VMFA(AW)-242 had 8-12% more junior inexperienced Marines in December 2018.

The comparison between the Marine Aviation Logistics Squadrons (MALS) of MAG-11, MAG-12 and MAG-31 in the graph below (Placemat-size located in Annex C) shows that MC percentage of MALS-12 (Iwakuni) dips and remains below MALS-11 (Miramar) and MALS-31 (Beaufort) from August 2018 to September 2019. This deficit existed despite the fact that MALS-12 has a higher priority for parts than MAG-11 and MAG-31.



MC Percentage for squadrons associated with each MALS

The biggest decline in MC readiness and TR for VMFA(AW)-242 occurred between July and October 2018. This precipitous decline in readiness and associated TR was attributed to the delayed arrival of the squadron's aviation materiel required to support training in Australia as well the unit's subsequent return to home station. The delays/cancellations of USTRANSCOM and 1ST MAW support negatively impacted flight operations, aircrew qualifications, and aircraft availability. Strategic lift uncertainty was (still is) 1ST MAWs number one degrader to readiness generation.

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Exacerbating MC readiness and TRs was the isolation of VMFA(AW)-242 and VMGR-152. There are limited Permanent Change of Address (PCA) options, adding a layer of complexity when assigning qualified Marines to these commands. If an exact match cannot be found, monitors have the latitude to use the "one up/one down" rule when considering grade. Most enlisted assignment monitors desire OCONUS volunteers to keep unit manning as close to Staffing Goal (S/G) requirements as possible.

Overseas suitability screening (OSS) medical denials restrict Staff Non-Commissioned Officer (SNCO) rotations that Primary Military Occupational Specialty (PMOS) monitors struggle to fill. These screening denials can hinder the OCONUS assignments process, mainly for SNCOs with advanced qualifications.

IAW MCO 1300.6, OCONUS tour length is now 36 months with a few exceptions. This has limited Manpower Management Enlisted Affairs (MMEA) ability to send NCOs OCONUS due to Duty Station Incentive (DSI) normally requested with First Term Assignment Program (FTAP) Marines upon their first reenlistment.

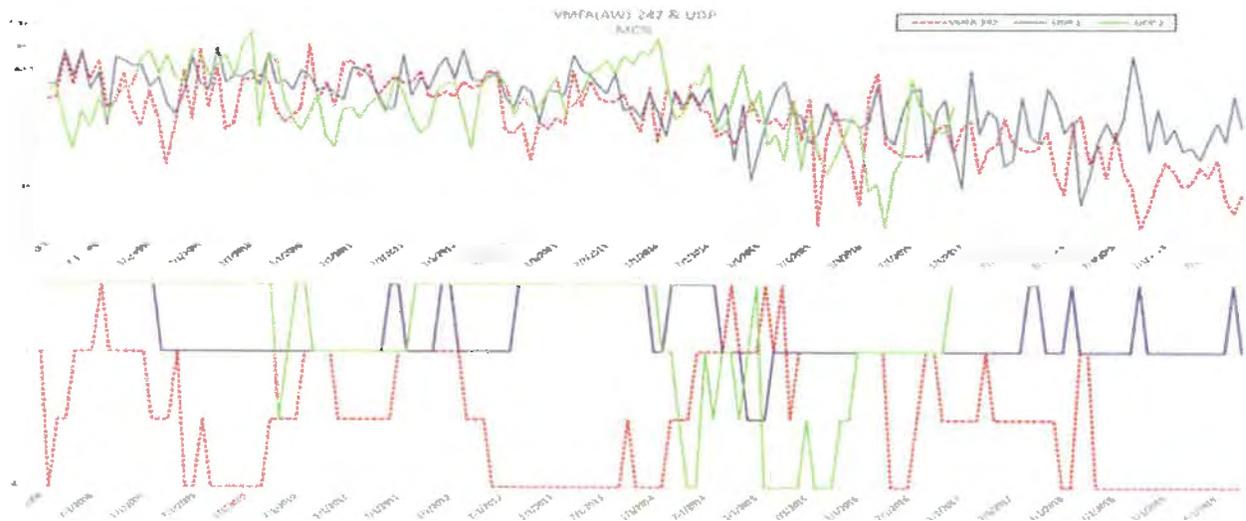
Readiness Reporting Overview

Until January 2008, VMFA-212 was home-stationed in Iwakuni. During this period, VMFA-212 and the two rotating UDP squadrons were either T-1 or T-2 at all times.

In February 2008, VMFA(AW)-242 relocated to MCAS Iwakuni. Since that time, VMFA(AW)-242 has reported T-3 or T-4 for 93 of 141 months, representing 66% of the unit's overall lifecycle. UDP squadrons sustained T-1 or T-2 with few exceptions, primarily in 2013-2014.

The following table, previously displayed, shows the comparative mission capable rates and TR of VMFA(AW)-242 plotted against UDP squadrons in Iwakuni.

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Mission Capable Rates and TR Rates 2008-2019

DRRS Summary

Readiness reports from VMFA(AW)-242, MAG-12, and 1ST MAW from July 2018 to December 2018, reveal the focus of each organization. This supports the earlier assertion that 1ST MAW and MAG-12 were focused on consuming readiness as they made ready for potential contingency support, while VMFA(AW)-242 was focused on readiness generation.

At the squadron level, the CO of VMFA(AW)-242 consistently repeated the unit's lack of qualified personnel at the aircrew and maintainer level. Due to the squadron lacking qualified personnel, squadron readiness levels were degraded.

The MAG CO reiterated the need for qualified personnel across the MAG to sustain combat operations. He also stated that the MAG could undertake portions of the wartime mission for a limited period of time with the current resources on hand.

Finally, the MAW stated it was capable of meeting crisis and contingency requirements and most METs for OPLAN response, although aircraft readiness and lack of qualified personnel continued to present challenges.

Individually, a consistent theme was expressed among the three units. As the comments were forwarded from the squadron, to the group, and then to the wing, the focus shifted towards meeting OPLAN requirements. Below are excerpts from July 2018 and most comments from each level are repeated verbatim each month with a few exceptions.

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VMFA(AW)-242

The VMFA(AW)-242 CO's July 2018 readiness report requested that MMEA allocate additional qualified NCOs to MAG-12 or alternatively, implement three year orders for single, junior Marines. Under the two year order construct, when NCOs executed a permanent change of station (PCS) at the completion of their orders, they took their knowledge, experience, and qualifications with them. The loss of skilled NCOs was not replaced at a sustainable level with new and qualified NCOs. The CO, VMFA(AW)-242 expounded that the loss of skilled NCOs degraded VMFA(AW)-242's ability to manage an aging airframe.

Additionally, VMFA(AW)-242's shortage of qualified aircrew resulted in the degradation of readiness levels. The CO, VMFA(AW)-242 requested that higher headquarters engage with MMOA to ensure VMFA(AW)-242 obtained qualified personnel. The squadron CO specifically identified the lack of a WSO Training Officer and qualified flight leads and instructors as impactful toward unit readiness.

The CO, VMFA(AW)-242 also identified that VMFA(AW)-242 typically operated with three to five fewer crews than UDP squadrons. VMFA(AW)-242's tasking, while identical in mission sets and sortie generation to UDP squadrons, required a longer sustained period of operations. Furthermore VMFA(AW)-242 had to manage the challenges of annual leave, ground training, and other non-flying responsibilities that deployed squadrons typically executed prior to deployment. The CO, VMFA(AW)-242 stated, "the manning problems within VMFA(AW)-242 put the squadron at significant risk through September."

MAG-12

The MAG-12 CO's July 2018 readiness report requested additional resources and training to undertake core and assigned missions for MAG-12 units. The CO, MAG-12 reiterated the impact of the shortage of skilled maintenance NCOs. The CO elaborated that the shortage of skilled NCOs degraded MAG-12 units from maintaining sufficient Ready Basic Aircraft (RBA) to accomplish METs.

The CO, MAG-12 stated that MAG-12 required additional qualified and experienced aircrew and maintainers in order to execute sustained combat operations. The CO asserted that the reduced resource environment meant that MAG-12 could only

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execute a portion of wartime missions for a limited period of time.

Referencing VMFA(AW)-242 specifically, the CO, MAG-12 identified the high turnover associated with the summer PCS season as a risk to VMFA(AW)-242's readiness. The CO did not expect to see improvements in VMFA(AW)-242's readiness until at least September 2018 when the squadron returned from Australia.

1ST MAW

1ST MAW readiness comments from July 2018 expressed the MAW's ability to meet crisis and contingency requirements and most METs for OPLAN response. However, 1ST MAW identified poor aircraft materiel readiness, a shortage of trained aircrew, and high personnel turnover in critical MOSSs as challenges to meeting these requirements. Additionally 1ST MAW identified support from UDP units and other MAWs as crucial in order to complete particular METs and OPLAN responses.

The focus of the comments differ among the units; however, each unit identified challenges with materiel readiness, manning, and training. VMFA(AW)-242's comments focus less on OPLAN requirements and more on shortfalls in flight time and unit readiness, while the higher units focus more on OPLAN requirements. Where 1ST MAW, and to a lesser extent MAG-12, do mention readiness, it is directed more toward its impact on meeting OPLAN requirements. The divergence in DRRS-MC reports does not imply wrong-doing or contribution toward the 2018 mishap.

Exercise VIGILANT ACE

Due to the classified nature of exercise VIGILANT ACE (VA), the CDA-RB was unable to provide specific details in this unclassified report. Exercise VA was initially slated as a Joint exercise that devolved into a MAG-12 led Unit Level Training (ULT) event. The nature of the devolvement of VA created confusion within VMFA(AW)-242, inhibiting both planning and risk mitigation.

The bottom line for organizational culture is there is no entity, program or forum that aggregates the data previously discussed (flight hours, aircraft availability, maintainer manning, and DRRS). This data was available to anyone, from the Institution to the squadron, leading up to the December 2018 mishap.

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Organizational Contributing Factors

The following Organizational Contributing Factors are attributed to 1ST MAW, MAG-12, VMFA(AW)-242 and VMGR-152.

1st MAW

1. The CDA-RB did not find any evidence of 1ST MAW placing any type of pressure, on any unit, to fly in VA if that unit had any concerns with regards to safety or capability.
2. 1ST MAW's OPLAN focus overshadowed or caused a "blind zone" regarding the seriousness of VMFA(AW)-242s readiness challenges and its impact on their capability to conduct VA. Accepting low readiness from VMFA(AW)-242 had become common practice for many years, and in this case, 1ST MAW made no effort to mitigate VMFA(AW)-242's risk in participating in VA.
3. 1ST MAW delayed decisions on VA degradation that impacted flying units' ability to proactively plan flight operations and manage associated risk. Specifically, both 1ST MAW and MAG-12 were laser focused on the risks associated with operating off the Korean Peninsula. Once again, the low readiness of VMFA(AW)-242 was overlooked, accepted, and therefore unmitigated leading up to VA.

MAG-12

1. The CDA-RB did not find any evidence of MAG-12 placing any type of pressure, on any unit, to fly in VA if that unit had any concerns with regards to safety or capability. Far from it. The CDA-RB discovered that the CO of VMFA(AW)-225 informed the MAG-12 CO, Col Palmer, that he no longer felt comfortable flying 24 hour operations, or dropping ordnance in Korea. The CO, VMFA(AW)-225 received no pushback or objection from Colonel Palmer.
2. The same "blind zone" experienced by 1ST MAW was also experienced, to a greater degree and with greater ramifications, by MAG-12. MAG-12s OPLAN focus overshadowed, or caused a "blind zone" regarding the seriousness of VMFA(AW)-242s readiness challenges and capability to conduct VA. MAG-12 made no effort to mitigate VMFA(AW)-242's risk in participating in VA.
3. MAG-12 failed to effectively understand or advocate for the barriers VMFA(AW)-242 faced in readiness generation, and did not fully understand the compounding effects of

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VMFA(AW)-242's low aircraft availability and low flight hours over the past 90 days would have upon the squadron's ability to safely execute VA.

VMFA(AW)-242

1. VMFA(AW)-242 failed to properly assess their inability to safely conduct VA, and therefore, did not push back effectively to prevent tasking that was more aggressive than the squadron was capable of handling.
2. VMFA(AW)-242 did not effectively schedule aircrew based on leadership ability and proficiency.
3. VMFA(AW)-242 fostered a climate that allowed non-standard operations around the tanker.
4. The CDA-RB determined the performance of the VMFA(AW)-242 Aviation Safety Officer(ASO) did not contribute to the mishap. (b) (6), (b) (7)(C) executed the duties and responsibilities of an (b) in a professional manner acting well within his billet and rank prior and subsequent to the 2018 mishap. The CDA-RB assesses his performance of his duties to be above average leading up to the mishap. His relief for loss of trust and confidence by the CG, 1ST MAW was due in large part to an inaccurate 2018 Mishap CI.

VMGR-152

1. Sumo 41's authorization of the tanker departure was the last potential action that could have corrected Profane flights decision to execute what turned out to be a fatal tanker departure. This does not mean Sumo 41 was a causal factor in the 2018 Mishap; they were not. Sumo 41 could have, however, altered the course of compounding factors.
2. Sumo 41's communication was extraneous during the critical phase of tanking operations. The inter and intra communication discipline within the KC-130J and amongst all aircraft was lacking, and led to lower situational awareness as to what was taking place/was about to take place.

2018 Mishap Causal Factors

The CDA-RB possessed unique capabilities and experiences that allowed us to take a unique approach in our investigative process. The following pages contain a narrative of the 2018 mishap, 14 Storyboard Analysis scenes of key moments leading up to the mishap, and a Cause Map.

The narrative will provide background and a chronological sequence of events during the mishap. The CDA-RB suggests the reader not try to extrapolate positioning or infer Causal Factors while reading the narrative; positioning and Causal Factors will be displayed in the Storyboard Analysis scenes that follows the narrative.

In reviewing the 2018 mishap, the CDA-RB required detailed diagrams of the scenario in question in order to analyze the final few minutes of the mishap. However, the best re-creations that could be made from the data recovered from the aircraft involved could only re-create their individual telemetries and were not of a high-enough positional fidelity to re-create their relative formation positions. As this is of key importance to reviewing the midair collision between SO41 & PE12, this information had to be derived and interpreted from the source data rather than simply re-created using software. This interpreted information was then used to create the following Storyboard Analysis.

The Storyboard Analysis begin in scene 1 with Profane 11/12 aerial refueling with Sumo 41, and depicts a view from two angles: a view from behind and an overhead view of Profane 11/12 and Sumo 41 (using Sumo 41 as a fixed reference). Under each Storyboard Analysis is a inter/intra flight communications matrix, and each "scene" includes a CDA-RB narrative to help understand the key actions, mistakes, or focus that was occurring at these particular moments. An estimate of where PE12's pilot was focused during key moments is depicted using a 40-degree field of view triangle corresponding to that allowed by the pilot's AN/AVS-11 night vision device.

The Storyboard Analysis is all to scale, and the view from behind the mishap aircraft contains altitudes and angle of bank for each aircraft as harvested from the respective aircraft recording devices. While the CDA-RB is uncertain as to the exact location of each aircraft in relation to the other aircraft, we are convinced the depictions are accurate enough to provide an understanding of exactly how this mishap unfolded.

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Following the Storyboard Analysis is a Cause Map of the 2018 mishap. Cause Maps are a root cause/root hazard analysis tool adopted by the Marine Corps' Ground Mishap Investigation Course and the Naval Safety Center's Aviation Safety Officer Mishap Investigation Course. The Cause Map is a tool intended to make the problem clearer through a simple, systems-based approach that is visually communicated to the audience. A benefit for investigators and reviewers is that it organizes the evidence and relationships in a way that shows the investigator's work. This in turn allows readers and decision-makers to understand how conclusions were reached and to evaluate the validity and quality of any conclusions in question.

The CDA-RB used a Cause Map to visually depict the losses sustained from the 2018 VMFA(AW)-242/VMGR-152 mishap once the CDA-RB had completed its research and formed recommendations to prevent a similar event from occurring in the future. The Cause Map provides a visual explanation of why the 2018 mishap occurred and reveals the system of causes and interactions that led to the mishap. Suggestions on how to read the Cause Map will be provided just prior to the Cause Map.

2018 Mishap Narrative

On 6 Dec 2018 at approximately 0144 Japan Standard Time (JST), a midair collision occurred between 1xF/A-18D (callsign Profane 12, abbreviated PE12) assigned to Marine All-Weather Fighter Attack Squadron 242 (VMFA(AW)-242) and 1xKC-130J (callsign Sumo 41, abbreviated SO41) assigned to Marine Aerial Refueler Transport Squadron 152 (VMGR-152). A third aircraft (callsign Profane 11, abbreviated PE11), was also assigned to VMFA(AW)-242 and was present but not damaged in the collision.

The F/A-18D section (led by PE11) completed aerial refueling and prepared to depart the refueling area but remained within the scheduled training area (ITRA-SOUTH) when the collision occurred. As the formation positioned for departure from the tanker, PE12 crossed left to right over SO41, then abruptly turned toward SO41 and impacted the KC-130J on its starboard side in the vicinity of the aft cargo door.

The five aircrew aboard SO41 were fatally injured in the impact and subsequent crash. After PE12 struck SO41, PE12's Weapons Systems Officer (WSO) commanded aircraft ejection. Parachute deployment for both PE12 aircrew occurred successfully. The PE12 WSO was rescued by the GOJ at 0543 local

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time and sustained minor injuries. The PE12 pilot was located at 1046 and rescued at 1222 local time, but had succumbed to injuries sustained during his ejection and exposure from the prolonged time spent in the water before his rescue.

At the time of the mishap the aircraft were operating under "due regard" and in contact with Fukoka Control. The prevailing conditions at 15,000' MSL in the ITRA-SOUTH were low light level (0.0 LUX / starlight only) with visual flight rules (VFR) on top of an overcast layer from approximately 10,000' MSL to 12,000' MSL.

The mishap aircraft were participating in a Combined Marine Aircraft Group (MAG) ULT exercise that had devolved from the Combined Large Force Exercise VIGILANT ACE (VA). The ULT had decreased in scale and participation as the date of execution approached. Block scheduling (flows) for the ULT exercise flights was coordinated at the MAG operations level through a published set of flows distributed to squadrons the weeks prior. Final notification of the exact times squadrons were to conduct late night flight operations was delivered from the MAG Operations Department on Thursday of the week prior to the mishap.

On the night of the mishap VMGR-152, the parent squadron of SO41, planned to provide aerial refueling support, but had been originally slated by the ULT flows to operate with a different squadron. The original aerial refueling receiver squadron was re-tasked to complete field carrier landing practice and no longer required the tanker from VMGR-152. VMFA(AW)-242, the parent squadron of PE11/12 did expect to fly in this late block, but did not expect or plan to receive aerial refueling support until the evening of the mishap, after the daily flight schedule had been published. On the evening of the mishap the aircraft commander of SO41 called the VMFA(AW)-242 ready room and coordinated the aerial refueling event with the section leader of PE11.

Both takeoffs were scheduled after 0001L to comply with a MEF-directed 24-hour period of national mourning. SO41 and the PE11/12 section originated separately from their assigned duty station of Marine Corps Air Station Iwakuni. SO41 took off at 0030L. PE11/12 took off at 0051L. The PE11/12 section rendezvoused with SO41 in the refueling area at 0057L then conducted unremarkable simultaneous (left & right) aerial refueling with PE11 on the right drogue and PE12 on the left drogue. The refueling track was a left-hand orbit oriented within the ITRA-SOUTH working area. During aerial refueling all

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aircraft maintained a covert lighting configuration. This sequence will be depicted in Storyboard Analysis 1.

At 01:41:28 PE11 completed refueling and requested to detach and move to an echelon right position. The SO41 aircraft commander approved this request. PE11 then moved to right echelon abeam and stepped up of the SO41 wingline. PE 11's altitude fluctuated 50-150 feet above SO41, and changed their lighting configuration from covert ("midnight") to overt lighting while PE12 continued to refuel in the left contact position. This will be depicted in Storyboard Analysis 2 through 5.

Storyboard Analysis 6 begins at 01:42:37 as PE12 disconnected from the left drogue. Aerial observer discussion on the SO41 ICS channel and PE12's WSO both indicated the PE12 detachment from the drogue was likely unintentional.

At 01:42:42 SO41's pilot monitoring contacted PE12 and stated, "PE12 looks like you are complete, approved to echelon right."

At 01:42:47 PE12 contacted SO41 and stated, "Request echelon left if able".

At 01:42:52 SO41 stated, "That's approved, and uh, what are you guys up to tonight?" Flight data from the recovered DFIR indicated that PE12 then increased its altitude to 15,080' MSL and maintained position inside of the formation using radius of turn and 20-30 degrees angle of bank. This is displayed in Storyboard Analysis 7.

During the next 55-65 seconds the formation of three aircraft on line / in spread continued its left turn to the southwest and PE11 coordinated the section's departure and planned a subsequent rejoin to conduct aerial refueling a second time.

At 01:43:32 PE11's pilot requested SO41 turn the formation further left to accommodate the planned non-standard departure. The crew of SO41 verbalized the left turn on tanker common and began a turn toward a heading of 250 degrees.

At 01:44:03 the SO41 left observer stated, "12 moving over top, from left to right".

At 01:44:07 the SO41 left observer called, "six o'clock".

At 01:44:10 the SO41 pilot flying states, "what are they gonna do?" The eyewitness account from PE11 crew and PE12 WSO

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described a sliding RIGHT motion of PE12 from the elevated echelon left position to a position between PE11 and SO41. PE12 then turned back toward SO41 and impacted the starboard aft fuselage of the KC-130J. Radio static and unintelligible voices on the CVR recording indicate the collision occurred at 01:44:16. The sequence of time from 01:43:48 to 01:44:16 is displayed in Storyboard Analysis 8 through 14.

The following information was used in creating these Storyboard Analysis diagrams:

1. Sumo 41 Digital Flight Data Recorder (DFDR) data, pulled from the crash site. Key data used were:
 - a. Altitude (MSL)
 - b. Bank angle (degrees)
 - c. Heading (magnetic)
 - d. Calibrated airspeed (KCAS)
 - e. Time (GMT)
 - f. Cabin pressurization

2. Sumo 41 Digital Cockpit Voice Recorder (CVR) data, pulled from the crash site. Key data used were:
 - a. Channel one ICS (Pilot station, copilot station, "all aircraft" interphone)
 - b. All tuned radio frequencies, particularly "tanker common"
 - c. "Running" clock time

3. Profane 11 Deployable Flight Information Recorder System (DFIRS) data. Key data used were:
 - a. Altitude (MSL)
 - b. Bank angle (degrees)
 - c. Heading (magnetic)
 - d. Calibrated airspeed (KCAS)
 - e. Time (GMT)
 - f. Latitude / Longitude

4. Profane 12 Deployable Flight Information Recorder System (DFIRS) data. Key data used were:
 - a. Altitude (MSL)
 - b. Bank angle (degrees)
 - c. Heading (magnetic)
 - d. Calibrated airspeed (KCAS)
 - e. Time (GMT)
 - f. Latitude / Longitude
 - g. Acceleration data (lateral and vertical)

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The limitations of this data is as follows:

1. Events were manually aligned on the timeline, and are only accurate +/- 0.5 seconds.
 - a. Sumo 41's CVR used a "running clock" that started at aircraft power on - this clock was manually adjusted to the GMT time using the impact noises as a reference point and working backwards.
 - b. Although all aircraft recorded GMT times, they were not aligned to each other within less than a second's accuracy.
 - i. Profane 12's clock was aligned to Sumo 41's clock using the following as a reference: Sumo 41's last written line of DFDR, which still showed steady relative pressure, was cut off mid-write / Profane 12's DFIRS data showed a marked increase in lateral acceleration at the time of impact.
2. Aircraft vertical positions are accurate +/- 20 feet MSL, as recorded to their DFDR / DFIRS data.
3. Aircraft bank angles are accurate within one degree of bank.
4. Aircraft horizontal / relative positions are taken from the following:
 - a. The refueling position is a known state on each side of the KC-130J.
 - b. Tanker hose & basket positions are approximate.
 - c. CVR transcription of aircraft observers' position calls.
 - d. Left and right echelon positions are well described in the appropriate refueling guides and squadron SOPs.
 - e. Witness statements describing receiver motion around the aircraft.
 - f. The fore/aft displacement of Profane 12 as the aircraft crosses Sumo 41's six o'clock position was estimated using the following:
 - i. Average airspeed difference over the final 8 seconds before impact, converted to feet/second.

Keeping these limitations in mind, the following are notes for assisting in understanding the Storyboard Analysis.

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Of particular note:

1. Scene 8 (16:41:12) depicts a procedural refueling position, corresponding to Cause Map box 1 labelled "AIR-AIR REFUELING COMPLETED ~ 60 SEC PRIOR".
2. Scene 10 (16:43:54) depicts the CDA-RB's best estimate of when PE12's pilot went "blind" to the tanker, as both PE11 & 12 begin a climb together. Eventually, the relative altitude of PE12 is such that it would not be possible to see the tanker, even under ideal lighting conditions. This scene corresponds to Cause Map box 2 labelled "PE12 PILOT LOST SIGHT OF C-130".
3. Scene 11 (16:44:04) depicts PE12 moving from the left side of the tanker to the right. This movement was fully understood by the tanker crew; the CDA-RB speculates that the crew of SO41 reasoned this maneuver was part of the setup for the receiver's non-standard departure. This scene corresponds to cause map box 3 labelled "PE12 DRIFTED (R) OVER SO41 FROM INSIDE LEFT TURN".
4. Scene 13 (16:44:11) depicts PE12 making a bid back to the left after initially approaching PE11. The CDA-RB suspects this was when closure on the lead aircraft became apparent as the aircraft's overt lights broke out into more distinct shapes, until this point the "bloom" on the AN/AVS-11 goggles likely prevented PE12's pilot from determining his exact position. Note that PE12's position prevents seeing both PE11 and SO41 in the same 40-degree field of view. This scene corresponds to Cause Map box 4 labelled "PE 12 PILOT TURNED AWAY (L) FROM PE11 AIRCRAFT".
5. Scene 14 (16:44:16) depicts PE12 contacting the right side of SO41, aft of the right paratroop door (as described by witness statements and corroborated by analysis of CVR, DFDR & DFIRS data). This scene corresponds to Cause Map box 5 labelled "PE 12 LEFT NOSE IMPACTED SO41 AFT RIGHT EMPENNAGE".

Graphical depictions of scenes 1 through 14 follow.

16:41:00 - 16:41:30
Storyboard Analysis

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LEGEND:			
ICS (SUMO 41)			
Tanker Common			
System Generated (SUMO41)			
SO41(MPF)	SUMO41 - Mishap Pilot Flying	PE11(MP)	PROFANE11 - Mishap Pilot
SO41(MPM)	SUMO41 - Mishap Pilot Monitoring	PE11(MWSO)	PROFANE11 - Mishap Weapons System Officer (no calls made)
SO41(MLO)	SUMO41 - Mishap Left Observer		
SO41(MRO)	SUMO41 - Mishap Right Observer	PE12(MP)	PROFANE12 - Mishap Pilot
SO41(MACS)	SUMO41 - Mishap Augmented Crew Station	PE12(MWSO)	PROFANE12 - Mishap Weapons System Officer (no calls made)
SO41(SYS)	SUMO41 - System Generated		

- Each numbered square depicts a single scene from two angles—overhead, and from the aft of the aircraft.
- Aircraft and relative distances / altitudes are to scale; fore/aft distances are approximate.
- Horizon, heading, and aircraft movements are depicted relative to SO41.
- Inter-cockpit audio unavailable for both PE11 & 12; dialog is taken from SO41 CVR, which recorded all tanker ICS audio (except the private channel between the left and right observers) and tanker common during refueling operations. MWSO1 & MWSO2 are not heard on tanker common during this period, and their lines were therefore trimmed for space and clarity.

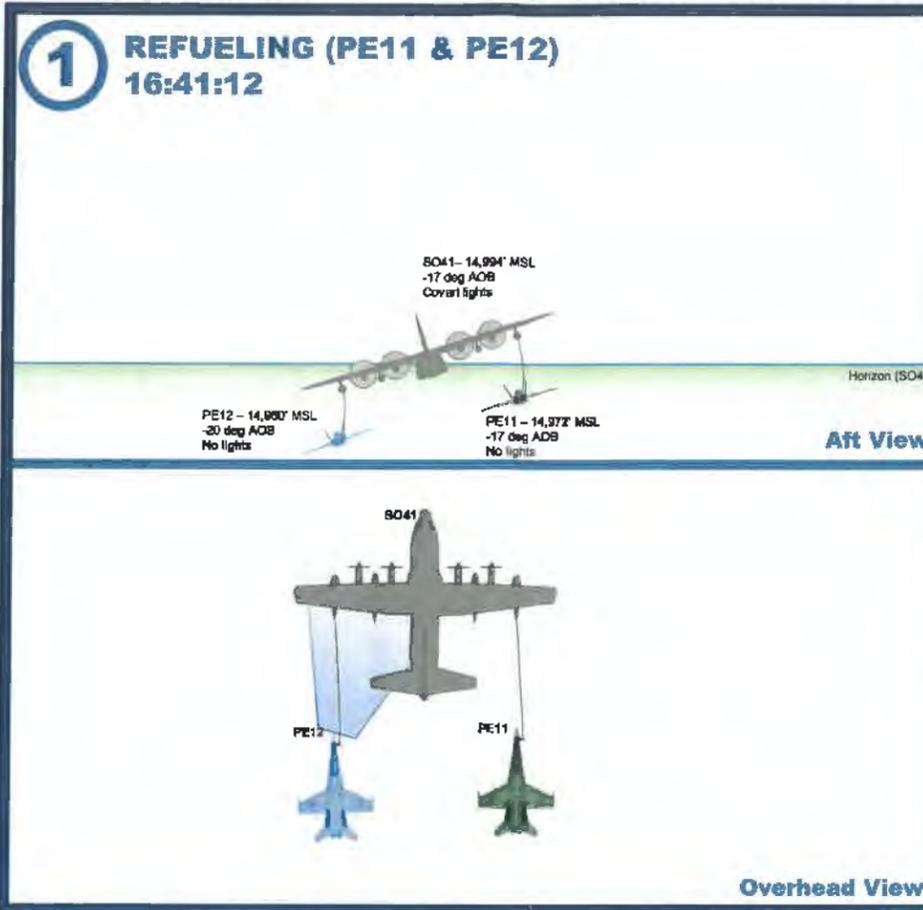


Approx 40 deg Field of View (FOV)
(AN/AVS-11 Night Vision Goggles)

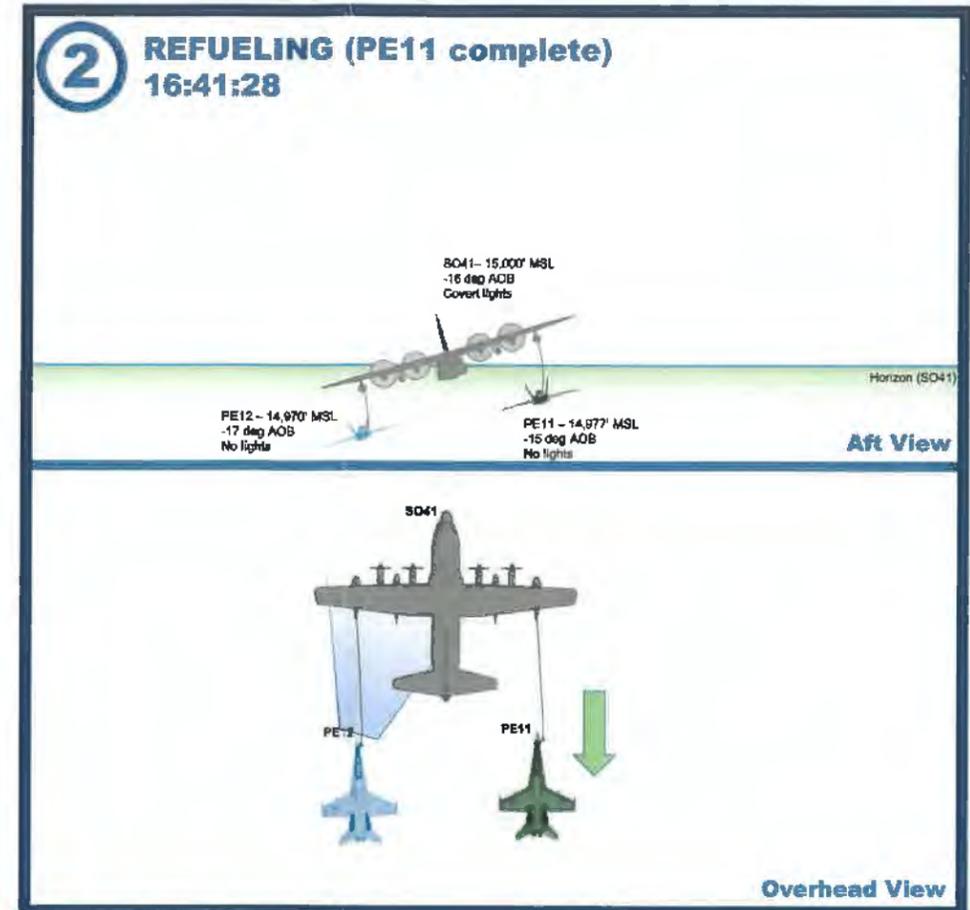
CAUSE MAP

CAUSE

Select causes highlighted from CDA-RB
Cause Map of 2018 midair



Scene 1 narrative: Profane 11 (PE11) and Profane 12 (PE12) are tanking off Sumo41 (SO41); PE 11 on the right hose and PE12 on the left hose. The CDA-RB discovered no problems with tanking procedures to this point. Rendezvous and communication with SO41 were per the SRD.



Scene 2 narrative: PE11 complete with its desired offload ("satisfied") and begins the communication process for movement to right echelon.

Time (GMT)	16:41:01	16:41:02	16:41:03	16:41:04	16:41:05	16:41:06	16:41:07	16:41:08	16:41:09	16:41:10	16:41:11	16:41:12	16:41:13	16:41:14	16:41:15	16:41:16	16:41:17	16:41:18	16:41:19	16:41:20	16:41:21	16:41:22	16:41:23	16:41:24	16:41:25	16:41:26	16:41:27	16:41:28	16:41:29	16:41:30
PE11(MP)																														PROFANE one one, request disconnect, echelon right
PE12(MP)																														
SO41(MPF)																Yeah, he's prolly staying up in his room					an re'llike, 'theres gosa my warriors'					hope so				
SO41(MPM)													I wonder if Roale heard 'em take off?			ha, ha, ha, ha					ah heh heh heh									
SO41(MLO)																														
SO41(MRO)																														
SO41(MACS)																						heh he							he he he	
SO41(SYS)																														

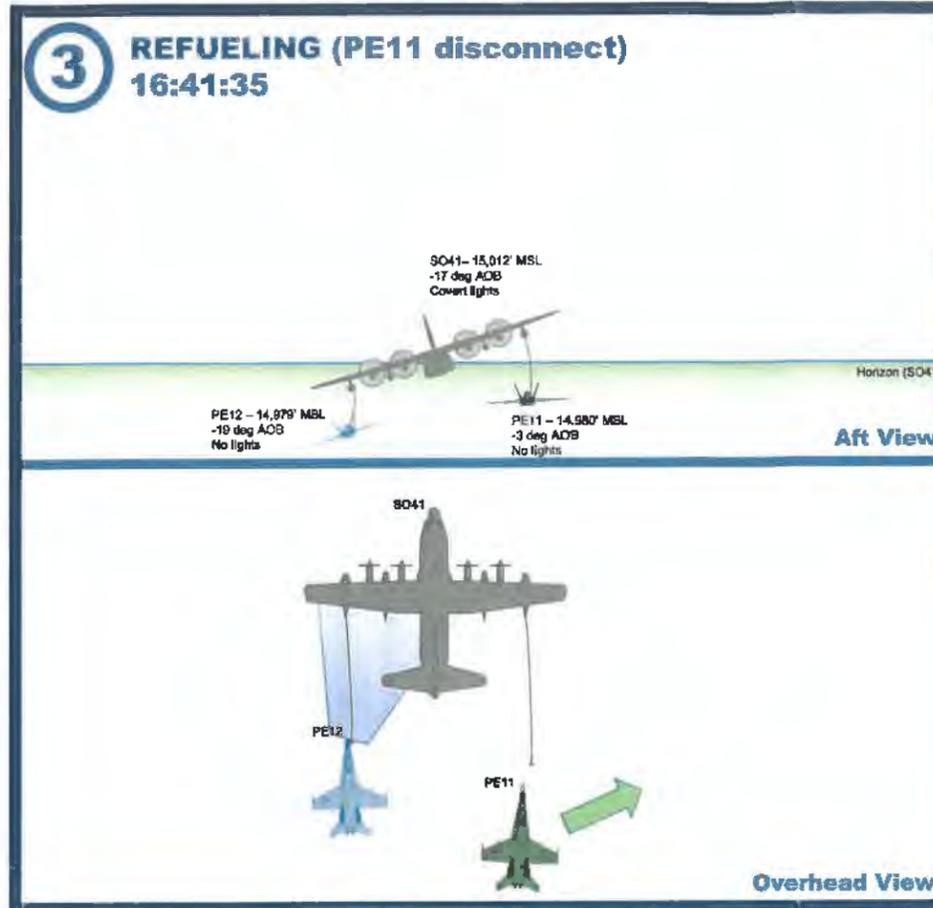
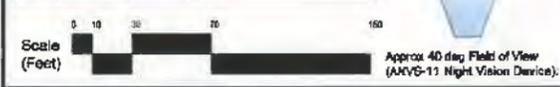
**CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
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16:41:30 - 16:42:00
Storyboard Analysis
of 2018 VMGR-152 / VMFA(AW)-242 Midair
Conducted by MARFORCOM Consolidated
Disposition Authority—Review Board (CDA-RB)
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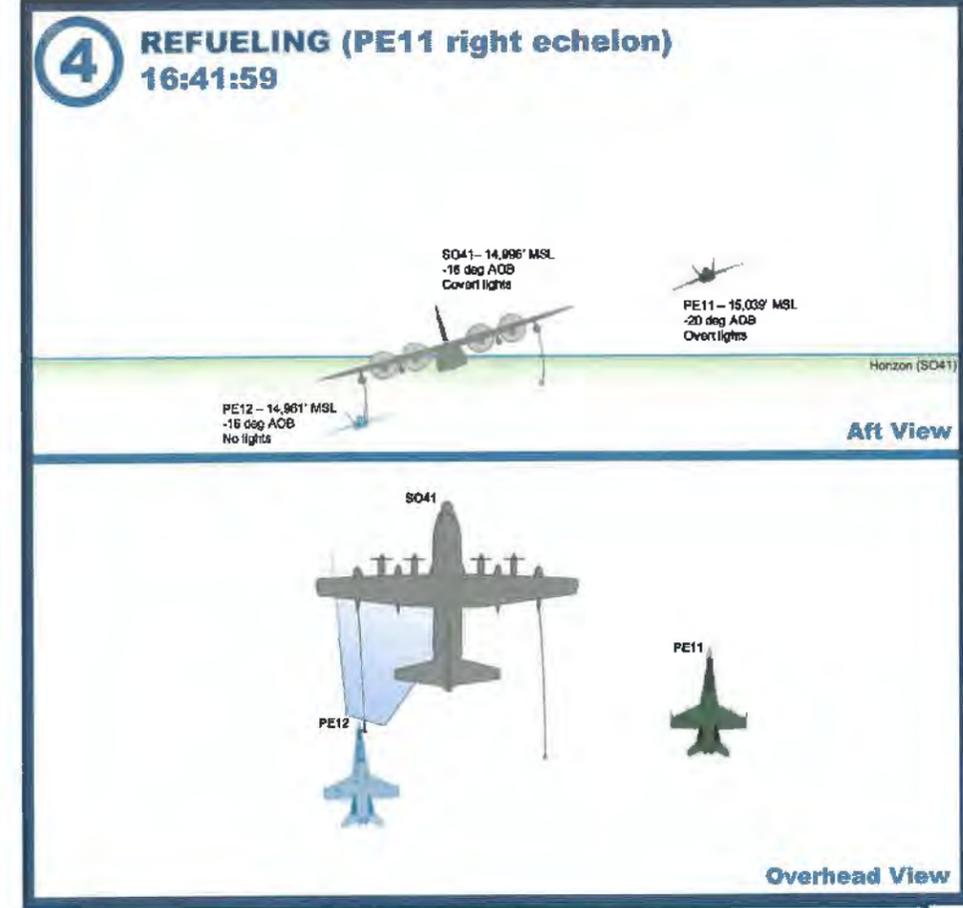
Legend

1. Each slide depicts a single scene from two angles – overhead, and from the aft of the aircraft
2. Aircraft are to scale
3. Intra-aircraft distances (relative altitudes and spacing) are to scale
4. Fore / aft distances are approximate
5. Horizon, aircraft movements and heading are depicted relative to SO41; aircraft movements and heading are depicted relative to SO41

ICB (SUMO 41)	PROFANE11 - Mishap Pilot
Tanker Common	PROFANE12 - Mishap Pilot
System Generated (SUMO41)	SUMO41 - Mishap crew



Scene 3 narrative: PE11 disconnects from the right hose of SO41 and begins movement to right echelon per the SRD and SO41 approval.



Scene 4 narrative: PE11 is established in right echelon, and changes lighting configuration from covert to overt. SO41 remains covert and PE12 remains midnight.

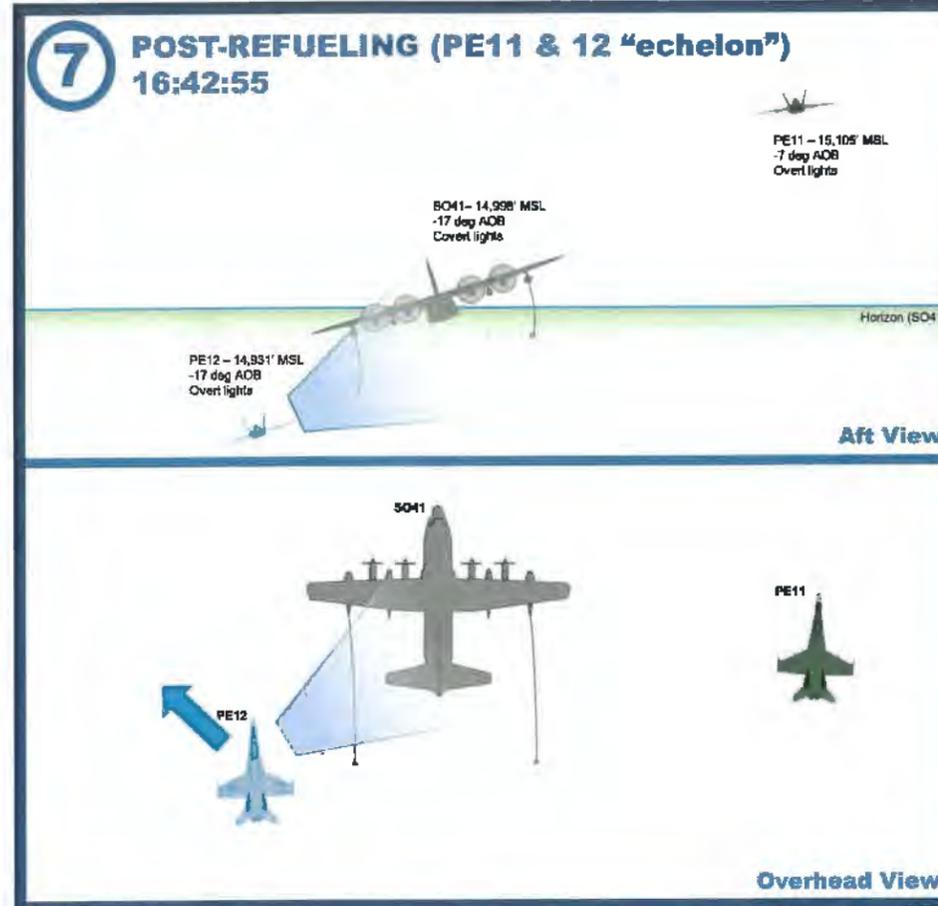
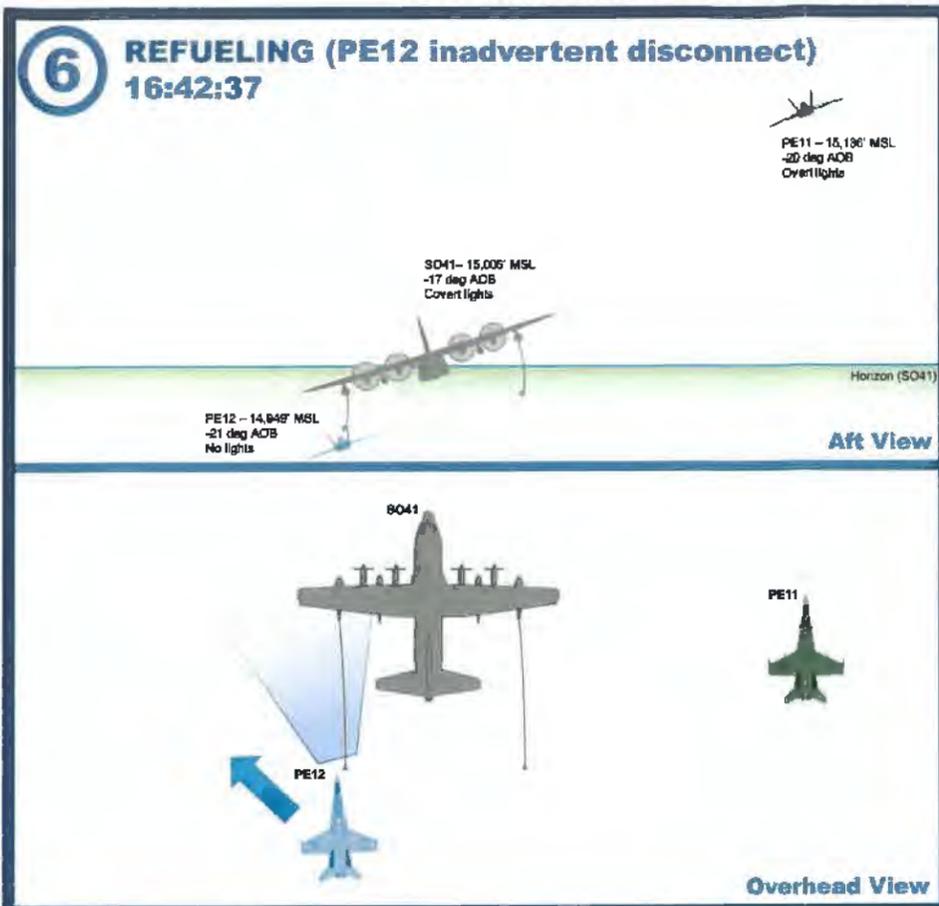
Time (GMT)	16:41:31	16:41:32	16:41:33	16:41:34	16:41:35	16:41:36	16:41:37	16:41:38	16:41:39	16:41:40	16:41:41	16:41:42	16:41:43	16:41:44	16:41:45	16:41:46	16:41:47	16:41:48	16:41:49	16:41:50	16:41:51	16:41:52	16:41:53	16:41:54	16:41:55	16:41:56	16:41:57	16:41:58	16:41:59	16:42:00		
PE11(MP)			One, one																		Affirm, aircraft nine, BUNO one six four six six two											
PE12(MP)																																
SO41(MPF)																																
SO41(MPM)		ah, that's approved as requested														And, one one you have a BUNO for me?												Copy				
SO41(MLO)																																
SO41(MRO)					Disconnect right			One one's movin' to the right es...echelon																								
SO41(MACS)																																
SO41(SYS)																																

16:42:30 - 16:43:00
Storyboard Analysis
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Legend

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3. Inter-aircraft distances (relative altitudes and spacing) are to scale
4. Fore / aft distances are approximate
5. Horizon, aircraft movements and heading are depicted relative to SO41; aircraft movements and heading are depicted relative to SO41

IC3 (SUMO 41)	PROFANE11 - Mishap Pilot
Tanker Common	PROFANE12 - Mishap Pilot
System Generated (SUMO41)	SUMO41 - Mishap crew



Scene 6 narrative: PE12 disconnects from the refueling basket (MWSO witness statement indicates the disconnect was unintentional). PE12 appears to be moving to left echelon as SO41 clears PE12 to right echelon. CDA-RB assesses it is PE12 pilot that requests left echelon from SO 41, who grants PE12 left echelon. **The CDA-RB assesses this is a key moment in the mishap.** PE 12, going to left echelon, forces PE12 to now "position keep" off of two sources, PE11 and SO41 on a low light level night. To compound the situation, SO41 is in a covert lighting configuration (and closest to PE12), while PE11 is in an overt lighting configuration. This is forcing the AN/AVS-11's to switch gains as PE12 divides his focus between SO41 and PE11.

Scene 7 narrative: PE12 moves into left echelon; exactly where, the CDA-RB cannot determine. But through data recovered from the wreckage, and various communications, we know PE12 is on the left side of SO41, slightly stepped down, and in a 17-degree left wing down angle of bank turn. Shortly, SO41 will momentarily roll out of a left turn, and PE 11 and PE12 will roll wings level.

Tanker begins roll out

Time (GMT)	16:42:31	16:42:32	16:42:33	16:42:34	16:42:35	16:42:36	16:42:37	16:42:38	16:42:39	16:42:40	16:42:41	16:42:42	16:42:43	16:42:44	16:42:45	16:42:46	16:42:47	16:42:48	16:42:49	16:42:50	16:42:51	16:42:52	16:42:53	16:42:54	16:42:55	16:42:56	16:42:57	16:42:58	16:42:59	16:43:00		
PE11(MP)																														Whole lotta nothin'		
PE12(MP)																																
SO41(MPF)																															Same	
SO41(MPM)																															Yeah...same, same you guys comin' back at all?	
SO41(MLD)							Disconnected left																									
SO41(MRD)																																
SO41(MAC9)																																
SO41(SYS)																																

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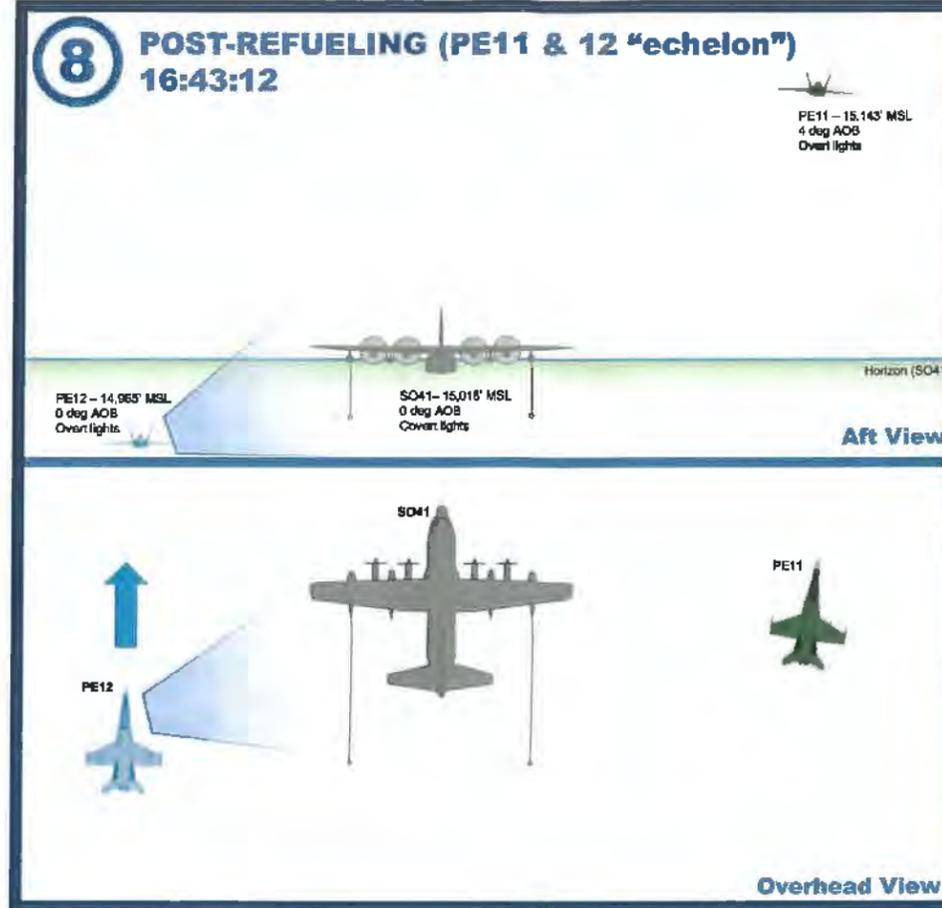
16:43:00 - 16:43:30
Storyboard Analysis

of 2018 VMGR-152 / VMFA(AW)-242 Midair
Conducted by MARFORCOM Consolidated
Disposition Authority—Review Board (CDA-RB)
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Legend

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ICB (SUMO 41)	PROFANE11 - Mishap Pilot
Tanker Common	PROFANE12 - Mishap Pilot
System Generalist (SUMO41)	SUMO41 - Mishap crew



CAUSE MAP

AIR-AIR REFUELING COMPLETED ~ 90 SEC PRIOR

Scene 8 narrative: Tanker has rolled out wings level, and PE12 is moving to or "established" in left echelon. Tanker common conversation is about fuel availability, passing BUNO aircraft numbers, and a quick mention of "blowing the burners" on

Tanker is wings level

Time (GMT)	16:43:01	16:43:02	16:43:03	16:43:04	16:43:05	16:43:06	16:43:07	16:43:08	16:43:09	16:43:10	16:43:11	16:43:12	16:43:13	16:43:14	16:43:15	16:43:16	16:43:17	16:43:18	16:43:19	16:43:20	16:43:21	16:43:22	16:43:23	16:43:24	16:43:25	16:43:26	16:43:27	16:43:28	16:43:29	16:43:30					
PE11(MP)	Uh, we're thinkin' about it, whaddya think, you guys got enough gas for us?									Alright		[Unintelligible] (maybe) we'll go blow the burners a little																							
PE12(MP)																																			
SO41(MPF)								Yeh, ha, ha																											
SO41(MPM)								(Dude), uh, we got a ton o' gas, yeh, absolutely																											
SO41(MLO)																																			
SO41(MRO)																																			
SO41(MACS)																																			
SO41(SYS)																																			

CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
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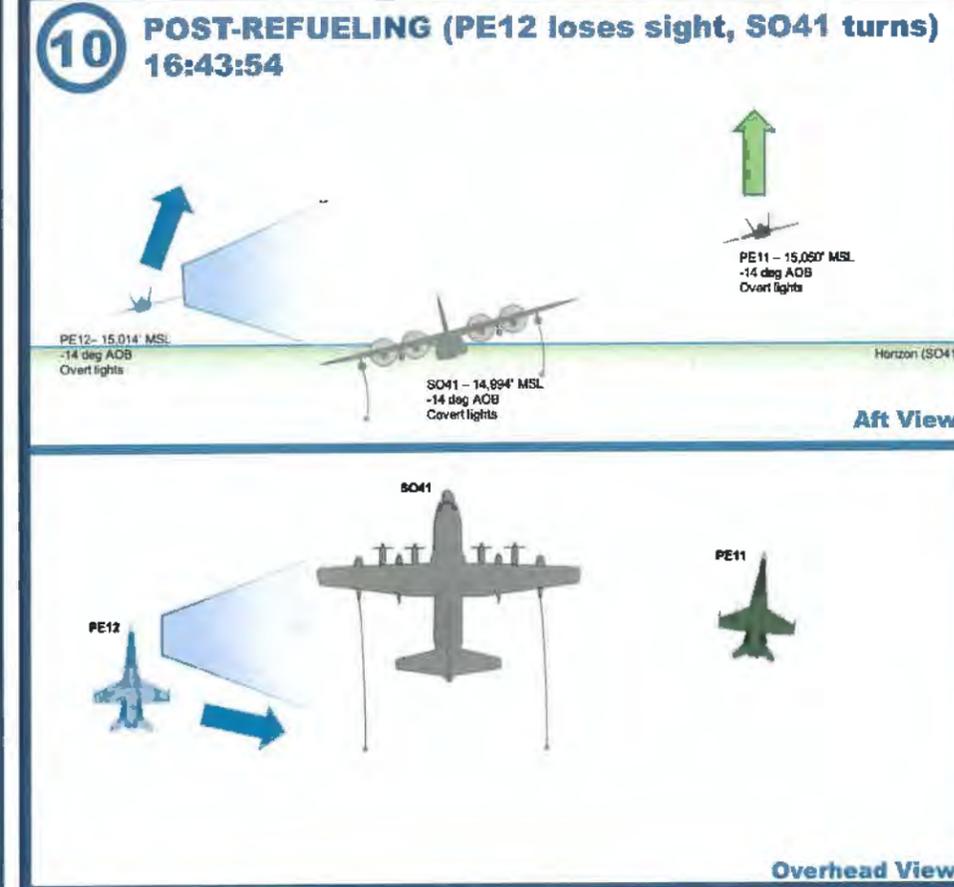
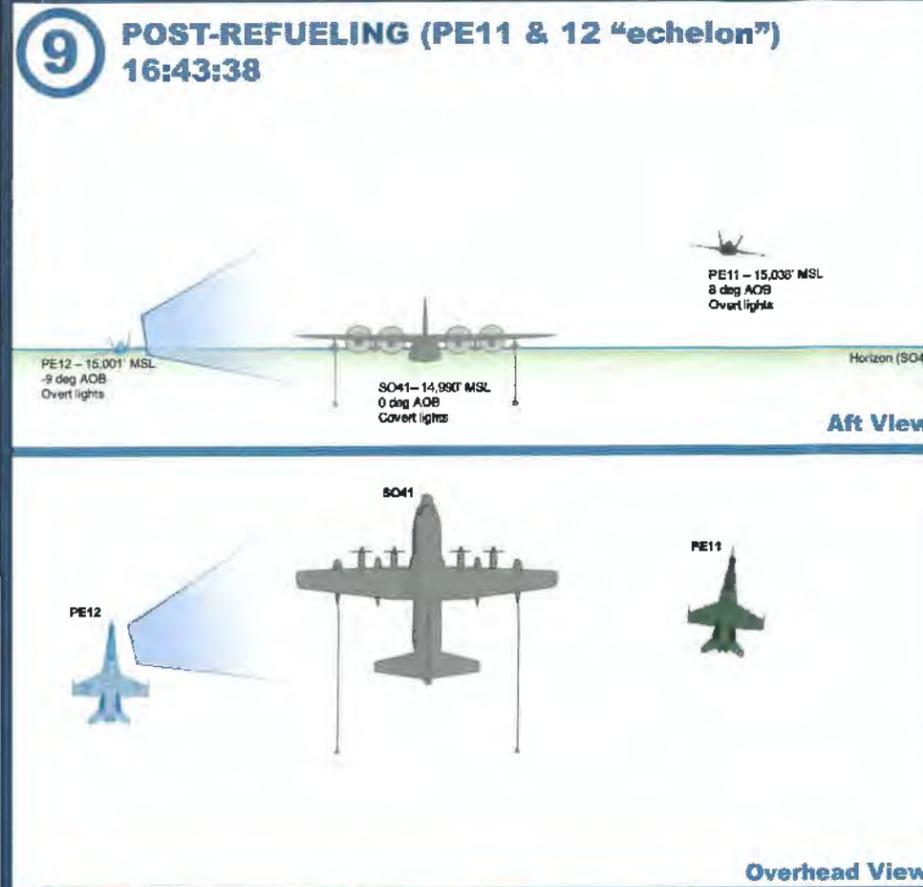
16:43:30 - 16:44:00
Storyboard Analysis

of 2018 VMGR-152 / VMFA(AW)-242 Midair
Conducted by MARFORCOM Consolidated
Disposition Authority—Review Board (CDA-RB)
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Legend

1. Each slide depicts a single scene from two angles – overhead, and from the aft of the aircraft
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5. Horizon, aircraft movements and heading are depicted relative to SO41; aircraft movements and heading are depicted relative to SO41

ICS (SUMO 41)	PROFANE11 - Mishap Pilot
Tanker Common	PROFANE12 - Mishap Pilot
System Generated (SUMO41)	SUMO41 - Mishap crew



Scene 9 narrative: Just prior to this time stamp, PE11 has requested SO41 begin a left hand turn. PE12 is on the same plane as SO41; PE11 is about 48feet above the PE12/SO41.

Scene 10 narrative: This is another key moment in this mishap. SO41 has entered a left turn (covert lighting). PE12 is in a similar AOB left turn, but rising above SO41 by about 20 feet, providing PE12 a direct line of sight to an overt slightly climbing PE11. The CDA-RB also assesses PE11 has a slight drift away from SO41 as SO41 executes a left turn. This makes it even more difficult for PE12 to position keep with goggles that are trying to handle an overt PE11 and a covert SO41. Finally, the CDA-RB has determined that the weather is an undercast cloud layer from 10,000' to 12,000' MSL, 3,000' below the refueling operations — as the tanker is in covert lighting, it is visually "masked" in the lower cloud layer from the perspective of PE12.

CAUSE MAP
PE12 PILOT LOST SIGHT OF C-130

Tanker begins roll left

Tanker established in 16-deg left turn

Time (GMT)	16:43:31	16:43:32	16:43:33	16:43:34	16:43:35	16:43:36	16:43:37	16:43:38	16:43:39	16:43:40	16:43:41	16:43:42	16:43:43	16:43:44	16:43:45	16:43:46	16:43:47	16:43:48	16:43:49	16:43:50	16:43:51	16:43:52	16:43:53	16:43:54	16:43:55	16:43:56	16:43:57	16:43:58	16:43:59	16:44:00	
PE11(MP)		And SUMO, if you go ahead and start a left turn, put us to the middle of the area, we'll give you a little show on the way out																													
PE12(MP)																															
SO41(MPF)		What the hell do these guys...?				Fuck yeah!			Are they gonna fucking burn by both of us on each side?	Dude, I was about to ask, like, can (they) do something cool like we used to?	No one does that shit anymore		Fuckin' like it, guys... excited													What'd he say, just a... just a left turn to the...					
SO41(MPM)	Uhh...41 copies						Uh, four one, uh, left turn				I know	Never																Yeah, back towards, uh...			
SO41(MLO)																															
SO41(MRO)																															
SO41(MACS)																															
SO41(SYS)																															TRAFFIC, TRAFFIC

**CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
1ST MAW AVIATION MISHAPS OF 28 APRIL 2016 AND 6 DECEMBER 2018**

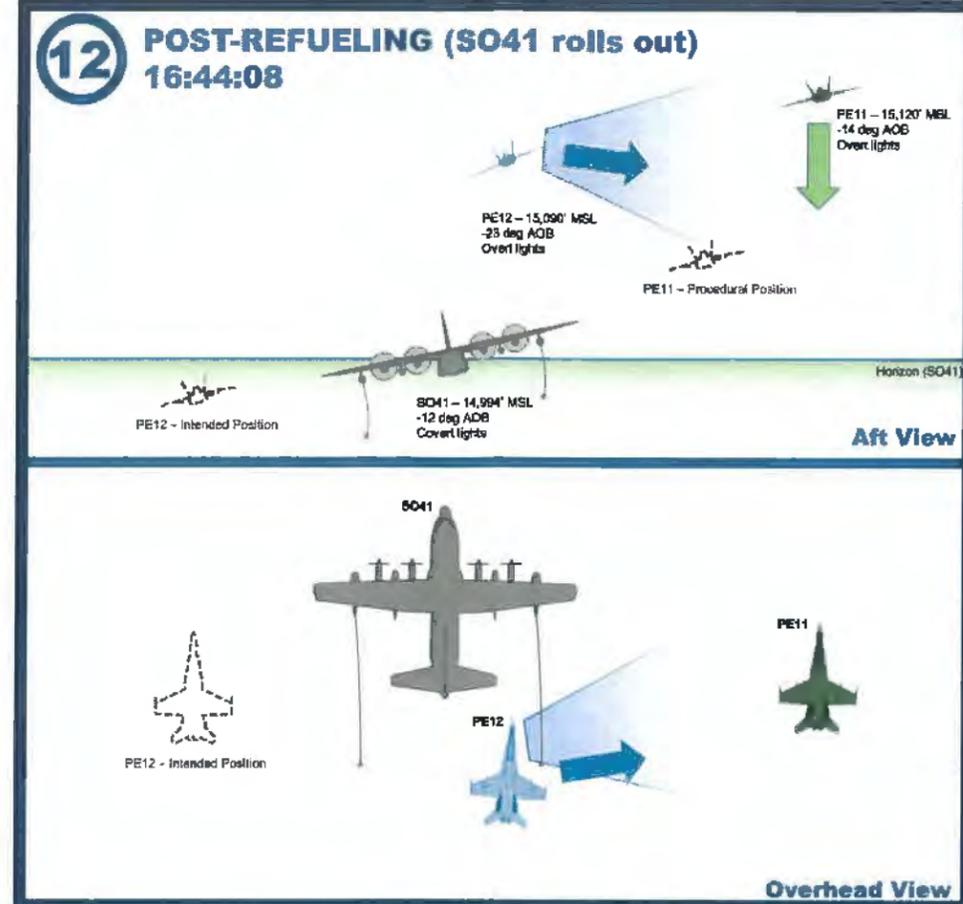
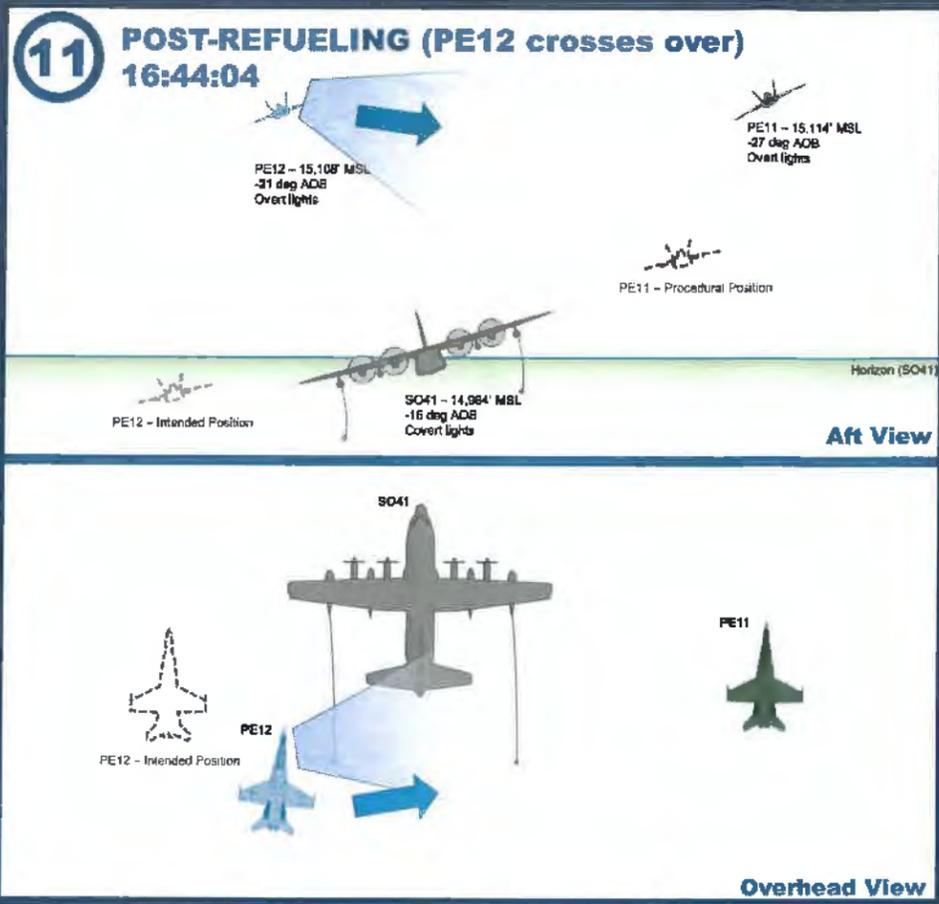
16:44:00 - 16:44:30
Storyboard Analysis
 of 2018 VMGR-152 / VMFA(AW)-242 Midair
 Conducted by MARFORCOM Consolidated
 Disposition Authority—Review Board (CDA-RB)
 Sheet 7 of 8
 12FEB2020

Legend

1. Each slide depicts a single scene from two angles—overhead, and from the aft of the aircraft
2. Aircraft are to scale
3. Inter-aircraft distances (relative altitudes and spacing) are to scale
4. Fore / aft distances are approximate
5. Horizon, aircraft movements and heading are depicted relative to SO41; aircraft movements and heading are depicted relative to SO41

ICS (SUMO 41)	PROFANE11 - Mishap Pilot
Tanker Common	PROFANE12 - Mishap Pilot
System Generated (SUMO41)	SUMO41 - Mishap crew

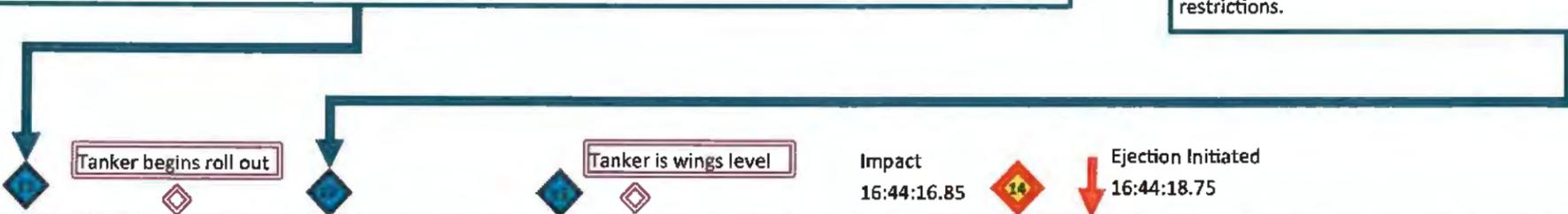
Scale (Feet) 0 10 20 30 40 50 60 70 80 90 100
 Approx 40 deg Field of View (ANVS-11 Night Vision Device)



CAUSE MAP
 PE12 DRIFTED (R) OVER SO41 FROM INSIDE LEFT TURN

Scene 11 narrative: PE12 is 124 feet above SO41, who is rolling out of a left turn. PE11 is 130 feet above SO41. The CDA-RB assesses PE12 is locked on PE11, and fails to notice their drift above (maybe slightly behind) SO41. At this angle, the low field of view of the NVCDs combined with the reduced cockpit visibility to angles lower than 60 degrees from level induced by the F/A-18D leading-edge extensions (LEX) make visibility of the tanker impossible (for either front or rear cockpit), even in favorable lighting conditions. No "blind" or "breakaway" call is heard on tanker common or referenced in witness statements.

Scene 12 narrative: PE12 has now crossed to the right side of SO41, with the tanker's crew's knowledge (as evidenced by the left and right observers' multiple calls, each acknowledged by the pilot flying). PE12's relative angle from SO41 makes station-keeping impossible off any aircraft but PE11, due to previously-discussed field-of-view restrictions.



Time (GMT)	16:44:01	16:44:02	16:44:03	16:44:04	16:44:05	16:44:06	16:44:07	16:44:08	16:44:09	16:44:10	16:44:11	16:44:12	16:44:13	16:44:14	16:44:15	16:44:16	16:44:17	16:44:18	16:44:19	16:44:20	16:44:21	16:44:22	16:44:23	16:44:24	16:44:25	16:44:26	16:44:27	16:44:28	16:44:29	16:44:30		
PE11(MP)																																
PE12(MP)																																
SO41(MPF)																																
SO41(MPM)																																
SO41(MLO)																																
SO41(MRO)																																
SO41(MACS)																																
SO41(SYS)																																

Cause Map Narrative

Cause Maps are a root cause/root hazard analysis tool intended to make the problem clearer through a simple, systems-based approach that is visually communicated to the audience. A benefit for investigators and reviewers is that it organizes the evidence and relationships in a way that shows the investigator's work. This in turn allows readers and decision-makers to understand how conclusions were reached and to evaluate the validity and quality of any conclusions in question.

The CDA-RB used a Cause Map to visually depict the losses sustained from the 2018 VMFA(AW)-242/VMGR-152 mishap once the CDA-RB had completed its research and formed recommendations to prevent a similar event from occurring in the future. The Cause Map provides a visual explanation of why the 2018 mishap occurred and reveals the system of causes and interactions that led to the mishap.

There are four Causal Factors in the 2018 Mishap:

- (1) The decision to place Profane 12 on the left side of Sumo 41, forcing Profane 12 to position keep/fly formation off two platforms.**
- (2) Profane 11's overt lighting configuration while being positioned acute and stepped up on Sumo 41's right side created the conditions for Profane 12 to climb while focusing on an overt lighted Profane 11.**
- (3) Profane 12 lost sight of Sumo 41 because he became singularly focused on Profane 11 because Profane 12's Night Vision Goggles (NVGs) "degained" (washed out) while flying off of an overt lighted Profane 11, and making it harder to see a covert Sumo 41.**
- (4) (b) (6) [REDACTED] lacked the required skills to handle the above described situation/environment, and had a documented history of not confessing to losing sight of his flight lead.**

These four Causal Factors combined with 12 Organizational Contributing Factors and 10 Institutional Contributing Factors to set the conditions for the 2018 mishap. It is important to note once again, none of the Organizational or Institutional Contributing Factors could have been present that tragic evening, and Profane 12 could still have collided with Sumo 41.

**CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
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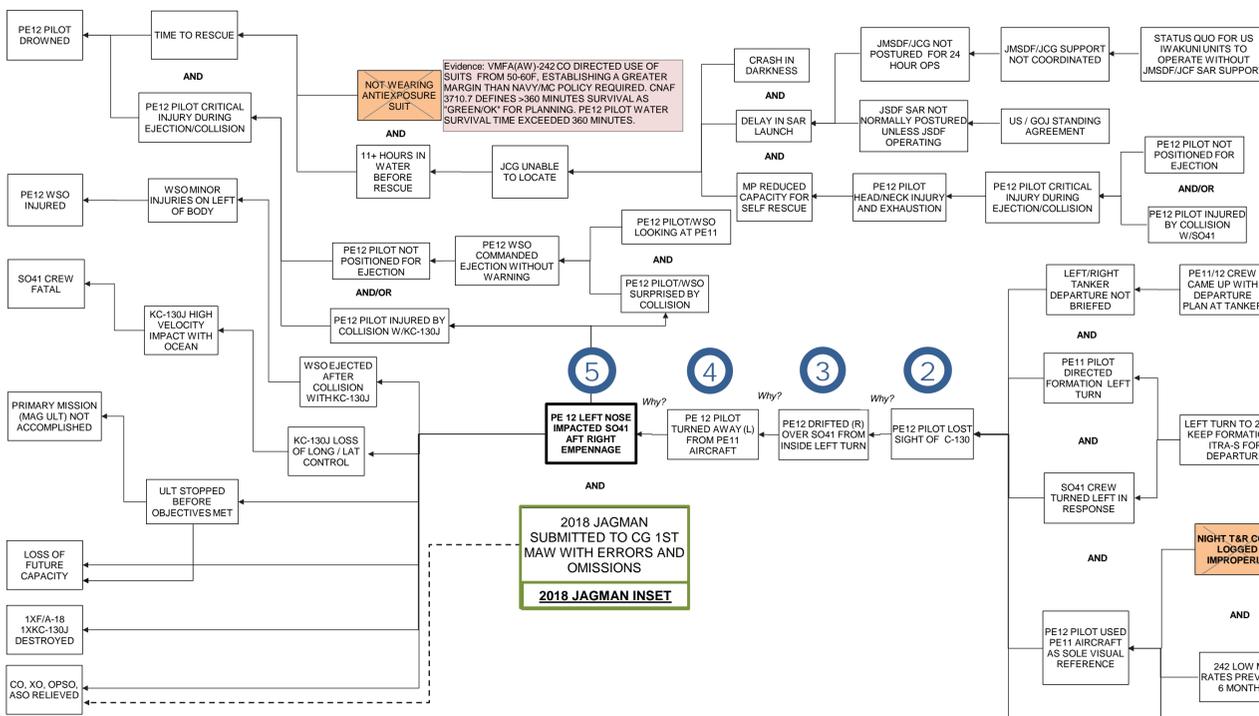
To read the Cause Map, start at the bold border box under the number 5 that says "PE 12 Left Nose Impacted SO41 Aft Right Empennage". Moving to the right of each white box insert the phrase, "Why" in place of the arrows between the boxes. Where more than one independent cause was required to produce an effect, the "And" notation is used to illustrate the confluence of multiple causes combined to generate an event as complex as the 2018 mishap. The red shade boxes indicate a cause was considered but ruled out. The green shade boxes contain recommendations organized by CDA-RB "bin." Numbers in the green shaded area correspond to CDA-RB report recommendation numbers. Involved aircraft relative position in relation to specific causes is represented through the blue circled numbers in each slide scene.

Building the Cause Map uncovered several early and one late stage critical analytical error made by the CDA-RB near the completion of the CDA-RB meeting time but before the report was finalized. This catch enabled the CDA-RB to reassess their conclusions and correct the analysis prior to submission of the report. The CDA-RB benefitted from construction of the Cause Map and the depiction of the Mishap in a visual format. The simple, systems based approach made the problem clearer and consolidated key parts of a lengthy report into an easy-to-follow 11" by 17" single page size.

CONSOLIDATED DISPOSITION AUTHORITY REPORT ON 1ST MAW AVIATION MISHAPS OF 28 APRIL 2016 AND 6 DECEMBER 2018

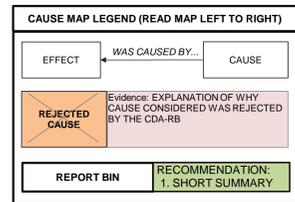
CDA-RB ANALYSIS 2018 VMGR-152 / VMFA(AW)-242 MIDAIR

12 FEB

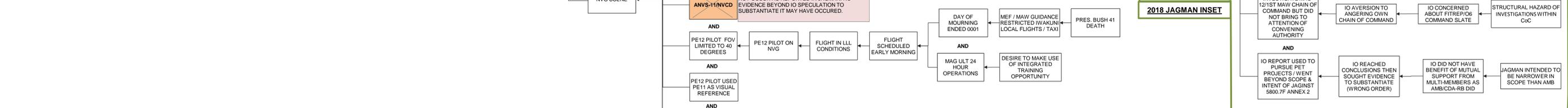
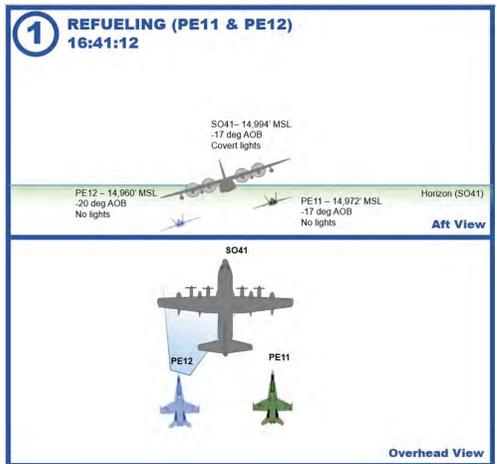
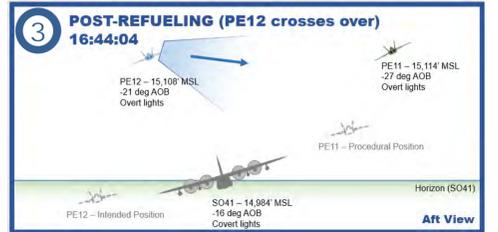
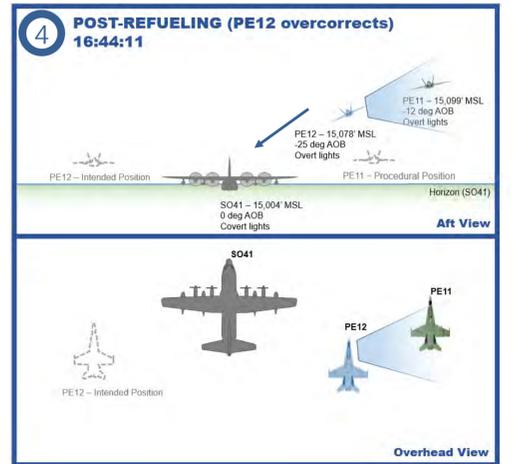
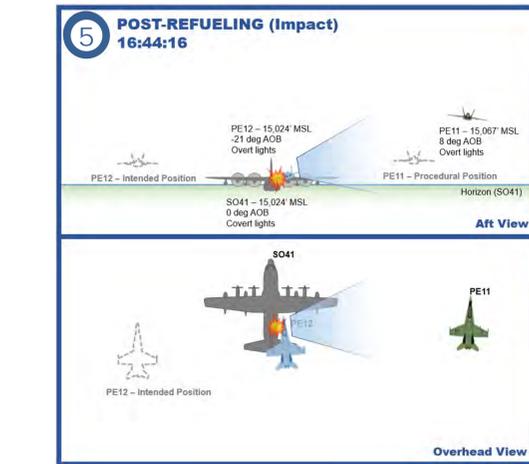


- MEDICATION**
Evidence: PERFORMANCE MAINTENANCE PROGRAM (PMP) LANGUAGE MISUNDERSTOOD BY IO AND 1ST MAW CHAIN OF COMMAND. PMP LOCAL SOP (0-7 APPROVAL) NOT CODIFIED WITH A SIGNED SOP OR POLICY. THOUGH MEDICATION NOT LINKED TO AIRCREW PERFORMANCE, UNAUTHORIZED USE OF MEDICATION BY DPOF PERSONNEL WARRANTS SEPARATE INVESTIGATION.
 - MSHARP CHAINING**
Evidence: TANKING COMPLETE FOR ~30 SEC BEFORE IMPACT. NO T&R EVENT WOULD HAVE PREPARED PE12 PILOT FOR ATTEMPTED DEPARTURE PROCEDURE. THOUGH NOT CAUSAL, THE FACT THAT HAZARD WAS IDENTIFIED IN 2016 MIDAIR AND NOT FIXED WARRANTS SEPARATE SCRUTINY AND ACTION REGARDING MISTRAC SYSTEM ADMINISTRATION.
 - EO/CLIMATE**
Evidence: NO CREDIBLE LINK BETWEEN CALLSIGNS, ETC AND OUTCOME OF THE EVENT. LIKE 2016 MIDAIR AND ADULTERY CASE, THE IO'S BEST COURSE OF ACTION WAS TO REFER ISSUES FOR A SEPARATE INVESTIGATION RATHER THAN FOLD IN TO THE AIRCRAFT MISHAP INVESTIGATION AS CONTRIBUTING OR CAUSAL. CSA/MCAS & DECS SURVEYS DID NOT SHOW ANYTHING ABNORMAL.
 - PHOTOS**
Evidence: NO CREDIBLE LINK BETWEEN COCKPIT PHOTOS AND OUTCOME OF THE EVENT. SOME PHOTOS OLD/FROM DIFFERENT SQUADRONS, THE IO'S BEST COURSE OF ACTION WAS TO REFER ISSUES FOR A SEPARATE INVESTIGATION RATHER THAN FOLD IN TO THE AIRCRAFT MISHAP INVESTIGATION AS CONTRIBUTING OR CAUSAL.
- NOT CONTRIBUTING, BUT MAY WARRANT SEPARATE INVESTIGATION**

- ORM WORKSHEET**
Evidence: RISK MANAGEMENT WAS DISCUSSED IN FLIGHT BRIEF AND IN PLANNING. AT THE TIME OF THE MISHAP, NO DIRECTIVE REQUIRED USE OF AN ORM WORKSHEET AS DOCUMENTATION OF THE RISK ASSESSMENT. ORM WORKSHEET WOULD NOT HAVE COVERED THE DEPARTURE FROM THE TANKER.
 - FATIGUE/CIRCADIAN RHYTHM**
Evidence: PE12 PILOT VOICE RECOGNIZED ON CVR PROVIDING BUNO. SOUND IS ALERT AND PROMPT, NOT LAGGING FROM FATIGUE OR CIRCADIAN RHYTHM ADJUSTMENTS. SAME FOR PE11 AND SO41 PILOTS. NOTICE PROVIDED TO ADJUST FROM DAYS TO NIGHTS WAS SUFFICIENT. USING 9HRS PER DAY SHIFT ANECDOTAL EVIDENCE THAT NOT ALL CREW STARTED TRANSITION WHEN ASSIGNED TO NIGHTS.
 - NO O-4 SUPERVISOR**
Evidence: PE11 PILOT HELD SENIOR QUAL ON NIGHTS (FAI) WHICH IS A SENIOR INSTRUCTOR QUALIFICATION AND IN MANY WAYS PREFERABLE TO A MAJOR/LTCOL WITHOUT COMPARABLE QUAL. PLACED FOR SUPERVISION BASED ON RANK ALONE. DECISION TO DEPART TANKER WOULD NOT HAVE BEEN STOPPED BY AN O4 IN THE READY ROOM.
 - AIRCRAFT MALFUNCTION**
Evidence: EXAMINATION OF FLIGHT DATA SHOWS AIRCRAFT OPERATING NORMALLY UP UNTIL IMPACT OF PE12 WITH SO41. NO DISCREPANCY THAT COULD CONTRIBUTE TO THE COLLISION FOUND DURING EXAMINATION OF ALL AVAILABLE EVIDENCE.
- CONSIDERED, NOT CONTRIBUTING**



CDA-RB RECOMMENDATION SUMMARY	
MANNING	<p>RECOMMENDATION:</p> <ol style="list-style-type: none"> HQMC REVIEW AND ASSESS THE MINIMUM COMPOSITE SCORE FOR AV-8B PIPELINE SELECTION. DETERMINE IF THIS CONTROL MEASURE AND ASSOCIATED RISK SHOULD CONTINUE TO BE ASSUMED/ACCEPTED. DETERMINE IF THE CONTROL MEASURE IS ADEQUATE GIVEN THE TRANSITION TOP-35B/C, AND DETERMINE THE PROCESS/POLICY BY WHICH THE MARINE CORPS WILL MONITOR THE ENVIRONMENT FOR CHANGES THAT AFFECT THE NATURE AND/OR THE IMPACT OF THIS RISK. HQMC REASSESS MINIMUM NSS FOR STRIKE PIPELINE ASSESSMENT AND GRADUATION. HQMC REASSESS MINIMUM NSS FOR TACAIR FRS COMPLETION. DETERMINE IF MINIMUM PERFORMANCE BASELINE SHOULD BE ESTABLISHED FOR FIRST-TOUR PILOTS ASSIGNED TO FORWARD-BASED SQUADRONS. HQMC DETERMINE IF T&R REQUIRED DESIGNATIONS AND QUALIFICATIONS SHOULD BE FIGURED INTO AIRCREW ASSIGNMENT POLICIES FOR FORWARD-BASED SQUADRONS.
TRAINING & OPERATIONS	<p>RECOMMENDATION:</p> <ol style="list-style-type: none"> T&R MANUAL SCRUB FOR SUBJECTIVE ASSESSMENT OF REQUIRED PERFORMANCE STANDARDS AND COMPLETION REQUIREMENTS. NSI REQUIREMENT FOR F/A-18 AAR-2202 T&R CODE. F/A-18 T&R MANUALS CLARIFY WAIVER/DEFERRAL AUTHORITY AND APPROPRIATE USE. MATCH ATTAINMENT PROFICIENCY FOR F/A-18 2201/2202 T&R CODES TO SRD. ADD SEPARATE KC-135 DAY/NIGHT 2000 LEVEL CODES TO F/A-18 T&R MANUAL LAW SRD. AIR TO AIR REFUELING ADD NOTE TO US SRD FOR CORRECT POSITION INWARD US TANKERS WITH OBSERVERS. ADD TABLE TO ATP 3.3.4.2 LISTING OBSERVER EQUIPPED REFUELERS. ADD REFORMED AND STABILIZED DEPARTURE NOTE TO ATP 3.3.4.2. USMC ALL TMS CONUS / OCONUS LIGHTING CONFIGURATION CONFERENCE. ON PAGE 7.7 OF US SRD ADD A LIGHTING CAPABILITY TABLE. ADD GENERAL LIGHTING NOTE TO CH 3B OF US SRD. HQMC ALIGN T&R MANUAL WITH ATP-56/US SRD, THEN WITH TACSOP AND SQD SOPS. US SRD ADDRESS/PROHIBIT NON-ESSENTIAL COMMUNICATION DURING REFUELING. SQUADRON SOPS BE REVIEWED TO ENSURE ALIGNMENT WITH ALL APPLICABLE GOVERNING DIRECTIVES. SAR DO/Joint & COMBINED ELECTRONIC, REAL-TIME DISTRIBUTION OF SAR STATUS AND ABILITY TO COORDINATE SAR SURGE TO 15 MINUTE STRIP FOR LARGE FORCE EXERCISES. DO/Joint FORCE CONVEY SAR OPT TO REVIEW ESTABLISHING A CONUS/OCONUS SAR RESPONSE REQUIREMENT. NAV AIR CONTINUE DEVELOPMENT OF LOCATING DEVICES FOR INCAPACITATED AIRCREW. SAR BIAT OPT TO DETERMINE HOW BEST TO MEET NEW SAR REQUIREMENTS. NVG UPDATE MAWTS-1 NVD MANUAL TO INCLUDE SYMBOLLOGY 'SHALL' BE BLANKED WHILE REFUELING.
MEDICAL	<p>RECOMMENDATION:</p> <ol style="list-style-type: none"> UPDATE CNAFINST 6410.1 / CNAF M-3710.7 TO CLARIFY POLICY AND APPROVAL AUTHORITY FOR USE OF PERFORMANCE ENHANCING AND PERFORMANCE ENHANCING MEDICATIONS. UPDATE CNAFINST 6410.1 TO CLARIFY GUIDANCE ON ACCOUNTABILITY METHODS FOR PMP/PEP MEDICATIONS. NAMI OIC UPDATE FLIGHT SURGEON TRAINING TO ENSURE MEDICATION USE INTENDED DURATION IS DISCUSSED WITH PATIENTS AND RECORDED IN THE ELECTRONIC HEALTH RECORD. HQMC COMMISSION A STUDY ON AVIATION SLEEP MANAGEMENT.
SAFETY	<p>RECOMMENDATION:</p> <ol style="list-style-type: none"> SIMPLIFY MISHAP COST REPORTING & DETERMINATION PROCESS TO ENSURE THAT LESSONS LEARNED ARE DISTRIBUTED TO PREVENT AMBIGUITY AND DELAYED REPORTING. HQMC/NSC ESTABLISH PROCESS BY WHICH SIR INFORMATION IS TRACKED AND PUSHED TO THE PMP. HQMC AND NSC ENSURE THE FLEET CAN EASILY ACCESS ALL SIRs. ACCESS INCLUDES UNCOMPLICATED SECURITY MEASURES AND A WELL-ORGANIZED DATABASE SO A SQUADRON PILOT CAN QUICKLY FIND AND INTERPRET PERTINENT SIRs. HQMC AND NSC DETERMINE AN EFFECTIVE METHOD TO FACILITATE THE FLEET'S ABILITY TO ASSIMILATE LESSONS LEARNED FROM PAST MISHAPS. AN EMPHASIS SHOULD BE PLACED ON CASE STUDIES AND SCENARIO-BASED TRAINING. DEVELOP CAPABILITY IN FUTURE MISTRAC ITERATIONS FOR CCs TO MONITOR, MANAGE, AND CLOSE MISRECHAZREGs. HQMC LEVY A REQUIREMENT IN MSHARP CONTRACT THAT ALL MISHAP MAKE FOUR CHANGES TO THE JAGMAN THAT IMPROVE THE IO SELECTION AND INVESTIGATIVE PROCESS.



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ANNEX A: Administrative and Disciplinary Actions

2018 Mishap

1. Major General Thomas D. Weidley, USMC

(b) (6), (b) (7)(C)

b. Mishap Billet/Unit: Commanding General, 1ST MAW.

c. (b) (5), (b) (6), (b) (7)(C)

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that Major General Weidley performed his duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C)

CDA Decision: (b) (5) no administrative or disciplinary action directed.

2. Colonel Mark T. Palmer, USMC

(b) (6), (b) (7)(C)

b. Mishap Billet/Unit: Commanding Officer, MAG-12.

c. (b) (5), (b) (6), (b) (7)(C)

e. Past Administrative/Disciplinary Action:

(b) (6), (b) (7)(C)

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CDA-RB Findings: No evidence of misconduct. There were some leadership and supervisory deficiencies as noted in the body of the CDA Report, however, there is no basis to conclude that Colonel Palmer performed his duties in a substandard manner. (b)

[REDACTED] (b),
[REDACTED] (b),
[REDACTED] (7)

(b) (5), (b) (6), (b) (7)(C)
[REDACTED]
[REDACTED] (b) (5), (b) (7)(C)
[REDACTED]

CDA Decision: (b) (5) [REDACTED] no (b) (6), (b) (7) administrative (b) (6), (b) (7)(C) [REDACTED] and no disciplinary action directed.

3. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: IO for 2018 mishap CI. Served as the A/CS, G-5, 1ST MAW.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]
[REDACTED]

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings:

(b) (6), (b) (7)(C) [REDACTED] was concerned about how the focus and findings of the 2018 mishap CI would be perceived by his leadership, and more importantly, how it would affect him personally. He chose to place his personal aspirations over his professional duties and failed to fully investigate all the facts, circumstances, individuals, and organizations that may have contributed to the 2018 mishap. As a result, the 2018 mishap CI was not impartial in its focus, thorough in its scope, nor accurate in its findings.

(b) (5), (b) (6), (b) (7)(C)
[REDACTED]

CONSOLIDATED DISPOSITION AUTHORITY REPORT ON
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(b) (5), (b) (6), (b) (7)(C)

The CDA-RB recognizes the complexities and challenges associated with thoroughly investigating the 2018 mishap, particularly at the institutional and organizational level. (b) (5), (b) (7)(C) was basically qualified and available to serve as the IO, however, he was not the ideal selection considering his lack of O-6 command experience, poor investigative demeanor, and current assignment within 1ST MAW.

(b) (5), (b) (6), (b) (7)(C)

CDA Decision: (b) (6), (b) (7)(C) (b) (6), (b) (7)(C)

(b) (6), (b) (7)

No administrative or disciplinary action directed.

4. Lieutenant Colonel James R. Compton, USMC

- a. Current Assignment: Retired.
- b. Mishap Billet/Unit: Commanding Officer, VMFA(AW)-242.
- c. (b) (5), (b) (6), (b) (7)(C)

e. Past Administrative/Disciplinary Action:

On 22 April 2019, Lieutenant Colonel Compton was relieved as Commanding Officer, VMFA(AW)-242 by the Commanding General, 1ST MAW due to a loss of trust and confidence in his ability to lead the Squadron in compliance with all applicable orders and directives.

On 24 April 2019, Lieutenant Colonel Compton submitted a retirement request to Headquarters, USMC, requesting a 1 August 2019 retirement date. A retirement date of 1 December 2019 was ultimately approved.

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(b) (6), (b) (7)(C) [REDACTED]

On 20-21 November 2019, the CDA-RB met in Norfolk, Virginia. The Board discussed the facts and circumstances surrounding the December 2018 mishap, the numerous institutional and organization challenges facing the Squadron (many of which were beyond Lieutenant Colonel Compton's control), and Lieutenant Colonel Compton's performance, leadership, actions taken, and decisions made as Commanding Officer, VMFA(AW)-242.

The CDA-RB determined that Lieutenant Colonel Compton's relief for cause (b) (6), (b) (7)(C) [REDACTED] were appropriate based on the Commanding General's loss of trust of confidence in his ability to lead the Squadron. The CDA-RB unanimously determined that Lieutenant Colonel Compton did not commit any misconduct, and that his level of performance was not substandard so as to warrant disciplinary action or further administrative action beyond the relief (b) (6), (b) (7)(C) [REDACTED].

(b) [REDACTED]
(5) [REDACTED]
[REDACTED]

CDA Decision: (b) (5) [REDACTED]. No additional actions directed.

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5. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Executive Officer (XO), VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action: On 22 April 2019, (b) (6), (b) (7)(C) [REDACTED] was relieved of his duties by the Commanding General, 1ST MAW (b) (6), (b) (7)(C) [REDACTED]

CDA-RB Findings: No evidence of misconduct, however, there is a basis to conclude that (b) (6), (b) (7)(C) [REDACTED] failed to properly lead, supervise, manage the staff, and ensure safe flight practices within VMFA(AW)-242. His level of performance was not substandard so as to warrant disciplinary action or further administrative action beyond the relief for cause (b) (6), (b) (7)(C) [REDACTED]

(b) (5), (b) (6), (b) (7)(C) [REDACTED]

CDA Decision: (b) (5) [REDACTED] no administrative or disciplinary action directed.

6. (b) (6), (b) (7)(C) [REDACTED] USMC

a. (b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Director, Safety and Standardization (DOSS), VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) [REDACTED] performed his (b) (6), (b) (7)(C) [REDACTED] duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]

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CDA Decision: (b) (5) [REDACTED]; no administrative or disciplinary action directed.

7. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Operations Officer (OpsO), VMFA(AW)-242.

c. (b) (6), (b) (5), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Actions: On 22 April 2019, (b) (6), (b) (7)(C) was relieved of his duties by the Commanding General, 1ST MAW (b) (6), (b) (7)(C) [REDACTED]

CDA-RB Findings: No evidence of misconduct, however, there were some performance and judgment issues. (b) (6), (b) (7)(C) bears responsibility for the poor pairing of the aircrews during the ULT and for the selection of (b) (6), (b) (7)(C) as a flight lead. There was a basis for the Commanding General, 1st MAW to relieve (b) (6), (b) (7)(C) due to a loss of trust and confidence.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]

CDA Decision: No administrative beyond the relief for cause (b) [REDACTED], (b) (6), (b) (7)(C) [REDACTED] (b) (6), (b) (7)(C) [REDACTED]

8. (b) (6), (b) (7)(C) [REDACTED] USMC

a. (b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Aviation Safety Officer (ASO), VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action: On 22 April 2019, (b) (6), (b) (7)(C) was relieved of his duties by the Commanding

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General, 1ST MAW (b) (5), (b) (7)(C)

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) performed his ASO duties in a substandard manner by failing to lead, supervise, or ensure safe flight practices within VMFA(AW)-242. (b) (6), (b) (7)(C) took all necessary actions as ASO to ensure a good safety program, to include proactively identifying and mitigating risks. There was no factual basis to support his relief for cause (b) (5), (b) (7)(C)

(b) (5), (b) (6), (b) (7)(C)

CDA Decision: (b) (5) (b) (5), (b) (7)(C) (b) (6), (b) (7)(C) (7)(C)

no additional administrative or disciplinary action directed.

9. (b) (6), (b) (7)(C) USMC

- a. Current Assignment: Left active duty (EAS) on 17 October 2019. Currently in the Individual Ready Reserve (IRR).
- b. Mishap Billet/Unit: Pilot/Flight Lead, Profane 11; VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C)

e. Past Administrative/Disciplinary Action:

(b) (5), (b) (7)(C)

(b) (6), (b) (7)(C)

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(b) (6), (b) (7)(C) [REDACTED]

[REDACTED] (b) (6), (b) (7)(C) [REDACTED]

[REDACTED] (b) (6), (b) (7)(C) [REDACTED]
[REDACTED] (b) (6), (b) (7)(C) [REDACTED]

CDA-RB Findings: There is a factual basis to conclude that (b) (6), (b) (7)(C) committed misconduct (unauthorized use of Ambien and false official statement to the IO regarding his Ambien use). More importantly, he performed his flight lead duties in a substandard manner by failing to properly lead and supervise (b) (6) and for engaging in unsafe flight practices.

(b) (5), (b) (6), (b) (7)(C) [REDACTED] 7)

CDA Decision: (b) (5) [REDACTED] no additional administrative or disciplinary action directed.

10. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]
b. Mishap Billet/Unit: Weapon Systems Officer (WSO), Profane 11; VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action: (b) (6), (b) (7)(C) [REDACTED]

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(b) (6), (b) (7) [REDACTED]
(C)

CDA-RB Findings: No evidence of misconduct, however, (b) (6), (b) (7) (b) (6), (b) (7) was part of the flight crew and bears some responsibility for the mishap. He remained silent during (b) (6), (b) (7)(C) deficient pre-flight brief as well as during the improper departure from Sumo 41. (b) (6), (b) (7)(C) performance of duties was not substandard so as to warrant disciplinary action or administrative action beyond (b) (5), (b) (6), (b) (7)(C).

(b) (5), (b) (6), (b) (7)(C) [REDACTED]

CDA Decision: (b) (5) [REDACTED]; no additional administrative or disciplinary action directed.

11. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: WSO, Profane 12; VMFA-242 (AW).

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action:

(b) (6), (b) (7)(C) [REDACTED]

(b) (6), (b) (7)(C) [REDACTED]

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(b) (5), (b) (7)(C) [REDACTED] (b) (7)(A), (b) (7)(C) [REDACTED]

[REDACTED] (b) (6), (b) (7)(C) [REDACTED] (b) (6), (b) (7)(C) [REDACTED] (b) (6), (b) (7)(C) [REDACTED]

CDA-RB Findings: There is a factual basis to conclude that (b) (6), (b) (7)(C) committed misconduct (unauthorized use of Ambien, false official statement to the 2018 mishap IO regarding his Ambien use, and violating CNAF 3710.7 by using an over-the-counter antihistamine without consulting with the flight surgeon). Additionally, he performed his WSO duties in a substandard manner (he shared responsibility with the mishap pilot to maintain sufficient clearance from Sumo 41, and he failed to execute this duty).

(b) (5), [REDACTED]
(b) (6), [REDACTED]
(b) (7)(C) [REDACTED] (b) (7) [REDACTED]

[REDACTED]

[REDACTED]

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(b) (5), (b) (6), (b) (7)(C) [REDACTED]

[REDACTED]

[REDACTED]

CDA Decision: (b) (6), (b) (7)(C) misconduct and substandard performance of duty (b) (5), (b) (6), (b) (7)(C)

[REDACTED] (b) (6), (b) (7)(C) (b) (6), (b) (7)(C)

12. (b) (6), (b) (7)(C) USMC

a. (b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Pilot Training Officer (PTO), VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) performed his PTO duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]

CDA Decision: (b) (5) no administrative or disciplinary action directed.

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2016 Mishap

1. (b) (6), (b) (7)(C) [REDACTED], USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Commanding Officer, MAG-12.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) [REDACTED] performed his duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]

CDA Decision: (b) (5) [REDACTED] no administrative or disciplinary action directed.

2. (b) (6), (b) (7)(C) [REDACTED] USMC

(b) (6), (b) (7)(C) [REDACTED]

b. Mishap Billet/Unit: Commanding Officer, VMFA(AW)-242.

c. (b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) [REDACTED] performed his duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]

CDA Decision: (b) (5) [REDACTED]; no administrative or disciplinary action directed.

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3. (b) (6), (b) (7)(C) [REDACTED] USMC
- a. (b) (6), (b) (7)(C) [REDACTED] [REDACTED]
- b. Mishap Billet/Unit: Commanding Officer, VMFA(AW)-242 post 2016 mishap.
- c. (b) (5), (b) (6), (b) (7)(C) [REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
- e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) [REDACTED] performed his duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]

CDA Decision: (b) (5) [REDACTED] no administrative or disciplinary action directed.

4. (b) (6), (b) (7)(C) [REDACTED] USMC
- a. (b) (6), (b) (7)(C) [REDACTED] [REDACTED] [REDACTED]
- b. Mishap Billet/Unit: Mishap Pilot, VMFA(AW)-242.
- c. (b) (5), (b) (6), (b) (7)(C) [REDACTED] [REDACTED]
[REDACTED] [REDACTED]
- e. Past Administrative/Disciplinary Action: None.

CDA-RB Findings: No evidence of misconduct, and no basis to conclude (b) (6), (b) (7)(C) [REDACTED] performed his duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C) [REDACTED]
[REDACTED]

CDA Decision: (b) (5) [REDACTED] no administrative or disciplinary action directed.

5. (b) (6), (b) (7)(C) [REDACTED] USMC
- (b) (6), (b) (7)(C) [REDACTED]
- b. Mishap Billet/Unit: Mishap WSO, VMFA(AW)-242.
- c. (b) (5), (b) (6), (b) (7)(C) [REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
- e. Past Administrative/Disciplinary Action: None.

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CDA-RB Findings: No evidence of misconduct, and no basis to conclude that (b) (6), (b) (7)(C) performed his WSO duties in a substandard manner.

(b) (5), (b) (6), (b) (7)(C)

CDA Decision: (b) (5) no administrative or disciplinary action directed.

Annex B: CDA-RB Members Overview

(1) (b) (6)
(b) (6) He has made two unit deployments to Iwakuni Japan in the 1990s, served as the Commanding Officer of VMFA-212 (forward based in Iwakuni, Japan), Commanding Officer Marine Aircraft Group 31, Head Aviation Weapons Requirements, and is a former TOPGUN Instructor.

(2) (b) (6)
(b) (6) Has multiple deployments to Iwakuni, served as the Squadron Commander VMFA(AW)-533 (conducted a unit deployment to Iwakuni), Commander Marine Operational Test and Evaluation Squadron One (VMX-1). He is a TOPGUN graduate, Weapons and Tactics Instructor (WTI), and is a former Marine Aviation Weapons and Tactics One (MAWTS-1) Instructor.

(3) (b) (6)
(b) (6) He has over 600 combat hours on six Carrier deployments (one to WESTPAC) and over 800 arrested landings. He has served tours at TOPGUN as an Instructor Pilot, HQMC Aviation Hallway, The Basic School (TBS) and Joint Staff J-8. He has commanded VMFA-251 (Beaufort, SC) and Marine Aircraft Group 11 (Miramar, CA).

(4) (b) (6)
(b) (6) Has served as a military judge for the Western and Eastern Judicial Circuits, Navy-Marine Corps Trial Judiciary, Regional Defense Counsel for the Pacific Region Defense Services Organization, and Staff Judge Advocate for the 4th Marine Expeditionary Brigade, U.S. Marine Corps Forces Special Operations Command, and Marine Corps Installations Pacific/Marine Corps Base Camp S.D. Butler.

(5) (b) (6)
(b) (6)
(b) (6) He has served a tour at Marine Aircraft Group 26 where he was selected as the Second Marine Aircraft Wing's Flight Surgeon of the Year in 1995. He has also served tours at: the Naval Hospital Naples, Italy, where he deployed on a contingency basis as part of a Port Vulnerability Assessment Team following the bombing of the USS Cole in Yemen; Naval Hospital Keflavik; Senior Medical Officer on the USS George Washington (CVN-73) in Yokosuka, Japan; and as the Director of the Combined Army / Navy Residency in Aerospace Medicine.

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(6) (b) (6)

(b) (6)

(b) (6)

(b) (6)

served in the maintenance departments of an HMM, HMM, a Marine Aviation Logistics Squadron (MALS), and Afghan Special Mission Wing while deployed to Iraq and Afghanistan. She has also served as a Quality Assurance Officer on two occasions while assigned to MALS. During her tenure in the squadrons, she earned the Aircrew designation and flew as an Aerial Observer/Aerial Gunner both CONUS and OCONUS.

(7) (b) (6)

(b) (6)

(b) (6)

He has served as an F/A-18 pilot (VMFA-212, Iwakuni, Japan) and a KC-130J pilot in VMGR-252. He is a TOPGUN graduate, received his Master's Degree in Aeronautical Engineering from the Air Force Institute of Technology at Wright-Patterson Air Force Base in Dayton, Ohio, and taught in the Aerospace Engineering Department at the United States Naval Academy.

(8) (b) (6)

(b) (6)

(b) (6)

has served as a COMMSTRAT Officer at the 22d MEU, 2d MAW, 2d MARDIV, II MEF, and MARSOC. (b) (6) has completed two MEU deployments including participation in KFOR and OEF, and two OIR deployments. He is also a joint-qualified officer with his assignment to the Joint Public Affairs Support Element, participating in Operations Damayan (Philippines) and United Assistance (Liberia/Ebola).

(9) (b) (6)

is an MV-22B pilot, with over 2000 flight hours, (b) (6)

(b) (6)

as the Aircraft Mishap Investigation Instructor where he teaches Navy, Marine Corps, Coast Guard, Federal and Foreign partner nations how to prepare for, respond to, and analyze aircraft mishaps from safety, administrative, and legal perspectives. (b) (6) deployed with two MEUs and one SPMAGTF. He also maintains qualifications as Weapons and Tactics Instructor, NATOPS Instructor, Air-Air Refueling Instructor, Instrument Evaluator, Flight Leadership Standardization Evaluator, and Air Mission Commander. (b) (6) attained a Graduate Degree (MS) in Human Factors with Specialization in Systems Engineering, and continues his education in Root Cause Analysis Techniques and Advanced Investigation Topics.

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(10) (b) (6)

(b) (6)
(b) (6)

He is a former United States Air Force MC-130P and T-6 Instructor Pilot. He has served tours as: Assistant Director of Operations and Special Operations Instructor Pilot 353rd Operations Support Squadron and as the Standardization Officer and Special Operations Pilot 17th Special Operations Squadron, Kadena Airbase, Okinawa, Japan: as a Special Operations Pilot 67th Special Operations Squadron, as the Executive Aide to the Commander and Special Operations Copilot 352nd Special Operations Group, and as a Special Operations Copilot 67th Special Operations Squadron, all at RAF Mildenhall, United Kingdom.

(11) (b) (6)

(b) (6)

most recent deployment was in support of a UDP to Iwakuni, Japan; Gwangju, Republic of Korea; Honolulu, Hawaii; and Anderson AFB, Guam from March 2018 to October 2018. (b) (6) has also deployed in support of Operation Inherent Resolve from March 2016 to October 2016. He has 1000 hours in the F/A-18 of which 300 are combat hours, and 200 are night time hours. His qualifications include Weapons and Tactics Instructor, Marine Division Tactics Instructor, Fighter Attack Instructor, Night Systems Instructor, Forward Air Controller (Airborne) Instructor, and Mission Commander.

(12) (b) (6)

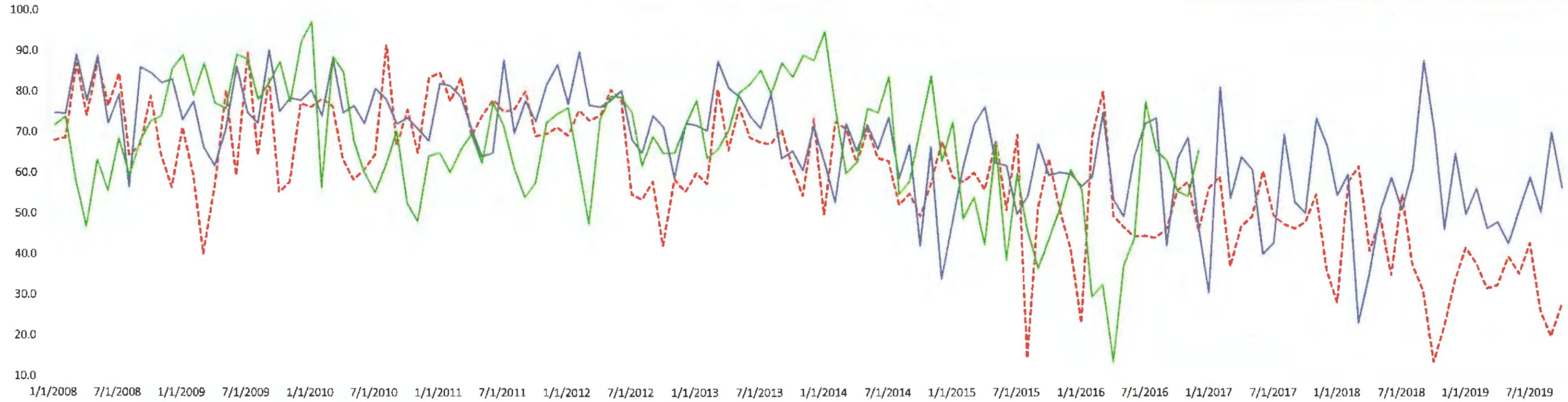
assigned as the KC-130J Crewmaster NATOPS Assistant Program Manager and NATOPS Evaluator for the (b) (6)

(b) (6)

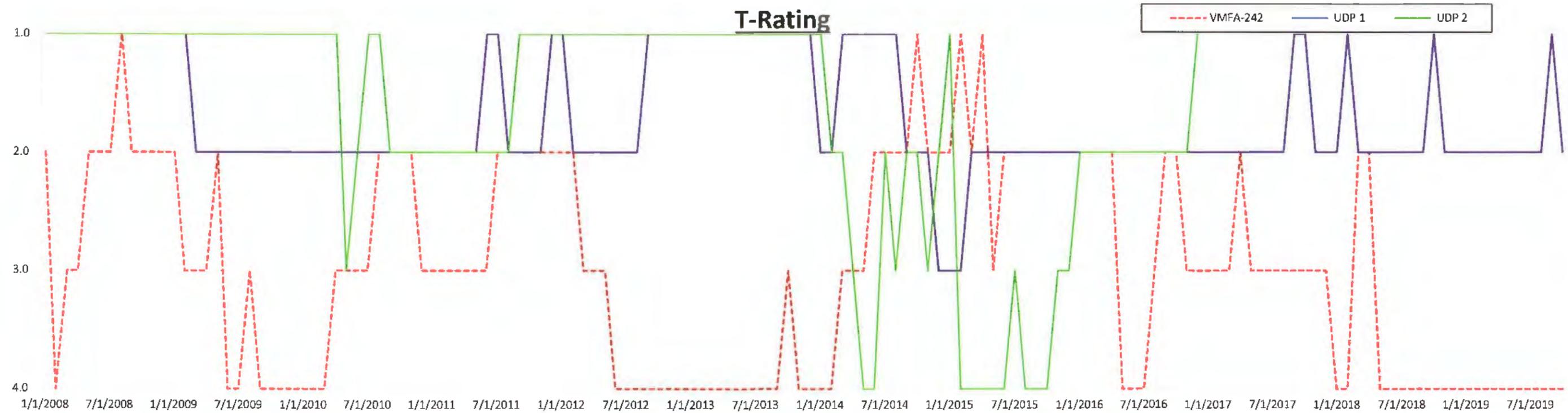
(b) (6)

has previously been assigned as a Crewmaster Schoolhouse Instructor, Weapons and Tactics Instructor, Crew Resource Management Instructor, and Maintenance Control Safe for Flight as well as a Division Chief. He has deployed in support of the 13th MEU, 22nd MEU, OEF, and SPMAGTF-CR-AF while assigned to VMGR-152, VMGR-352, and VMGR-252.

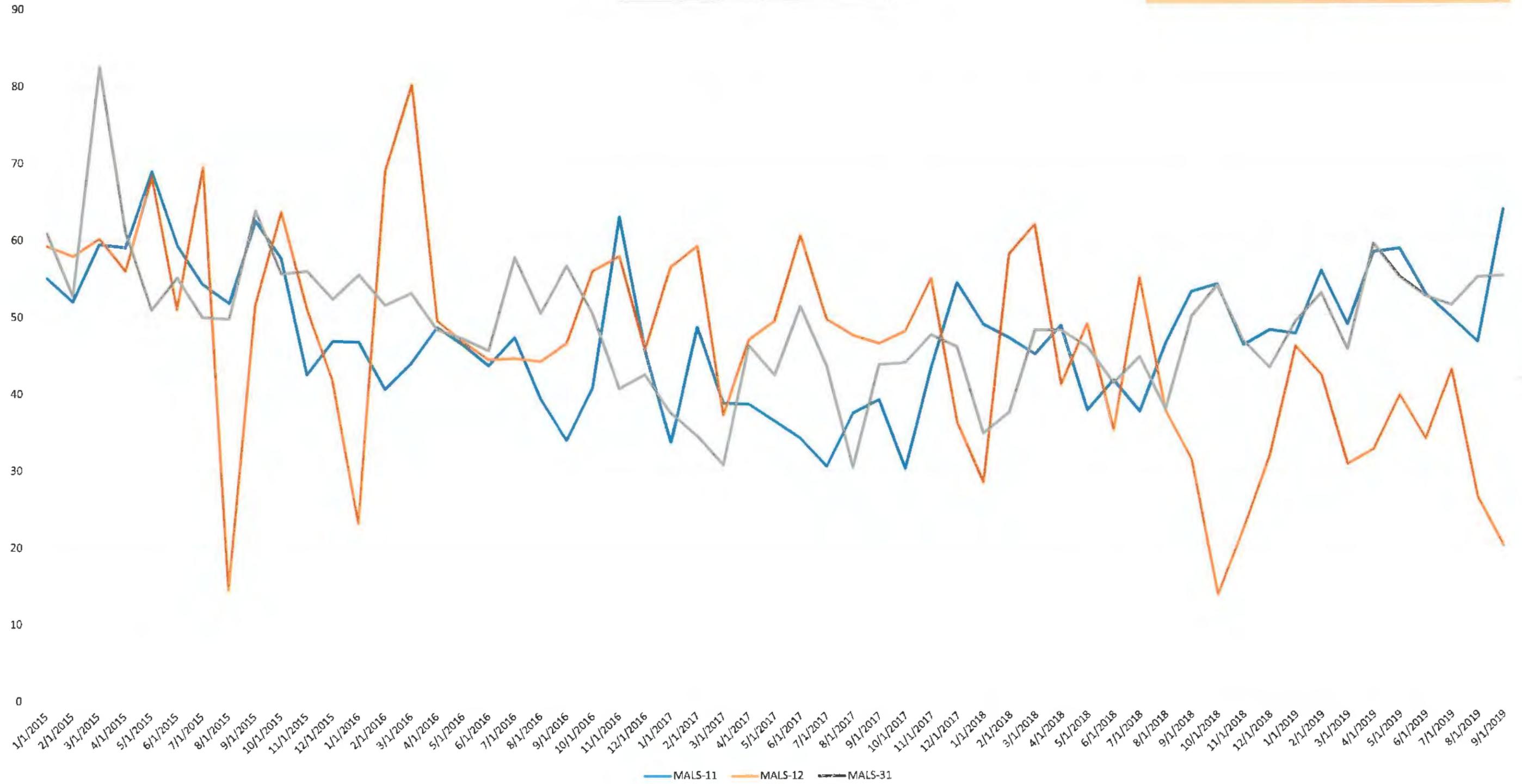
VMFA(AW)-242 & UDP MC %



T-Rating



MALS MC % (2015-2019)



Annex D: Institutional Knowledge/Information Management (KM/IM)

The CDA-RB found issues related to Knowledge and Information Management during the course of its review, initially highlighted in the 2018 mishap CI and confirmed during their own analysis while developing this report. It is the CDA-RBs belief that though not causal or contributory to either mishap, effective KM/IM practices would have laid the foundation for an effective information environment and set the conditions to efficiently and effectively inform commanders and staff in the planning and execution of their exercises and operations. As the Marine Corps operates in an increasingly complex information environment in the age of Big Data, the CDA-RB offers these KM/IM concerns and recommendations for consideration, not just for WESTPAC equities but for the Service writ large.

Significant issues related to Knowledge Management (KM) and Information Management (IM) were identified at 1st MAW and MAG-12 during the investigation.

KM is defined as "the integration of people and processes, enabled by technology, to facilitate the exchange of operationally relevant information and expertise to increase organizational performance."

IM, as described in the Marine Corps Tactical Publication (MCTP) MCTP 3-30B, is an enabler of command and control. It provides information for situational awareness or decision making. IM consists of people and processes enabled by technology.

Simply put, the end state of KM is enhanced operational performance while IM is utilized for decision making, based on a common situational understanding throughout the organization.

Institutional Knowledge/Information Management Findings

MAG-12 SOP (GruO 3700.1). VMGR-152 OPSO stated during her interview for the 2018 CI that she found it difficult to find a current version of Group Order 3000.1 (SOP for Flight Operations) on SharePoint. She noted that the SOP did not include anything beyond what could be found in the VMGR-152 SOP or the MCAS Iwakuni Station Order.

The CDA-RB conducted a similar search, confirming the OPSO's statement finding a Group Order 3000.1M, dated April 6, 2009 after a difficult search on the MAG SharePoint site.

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Additionally, a document labeled 3000.1N, dated 23 Oct 2015 found on the VMFA-533 share drive stated that MAG-12 no longer maintains an SOP and that it would follow the Wing SOP. This document was not found on the MAG-12 SharePoint.

1st MAW SOP (WgO 3700.1). Several officers interviewed for the 2018 CI mentioned that Wing Order 3000.1 (SOP for Air Operations) was separated by chapters in Microsoft Word and not in a PDF format on the MAW SharePoint site so the document appeared to be a draft. One interviewee stated the SOP was considered a living document and purposely editable to avoid re-routing the SOP after updates. All the officers interviewed indicated this was unusual and that they were accustomed to Commander approved, signed SOPs in a PDF format for reference on the respective SharePoint sites. The CDA-RB conducted a search and found the WgO 3700.1, in a PDF format, signed by MajGen Weidley dated 26 June 2019. Of note, the interviews were conducted circa Jan-Mar of 2019 and the 2018 JAGMAN was signed 24 June 2019, therefore the CI would not have included this information as a finding of fact.

Battle Rhythm events: Vigilant Ace/ ULT. LtCol Compton and (b) (6) (b) (6) indicated in their interviews during the 2018 CI and a subsequent interview with the former CO of VMFA 225, that there were only two mission planning briefs and no confirmation brief in preparation for the ULT. What was dubbed as a confirmation brief was described simply as a "discussion."

Multiple Sources of Information. There are multiple sources of information, techniques, tactics, and procedures that are published by various entities with no oversight by any one agency. The Training and Readiness Manual, TACSOP, ATP-56, NATOPS manuals, CNAF 3710.7, USMC 3710.8, Naval Aviation Maintenance Publication (NAMP) 4790.2C, Night Vision Device (NVD) Manual, Weapons Tactics Techniques, and Procedures (WTTP) MCO 3500.109, and MAWTS-1 Course Catalog are all referenced for input to aerial refueling. These documents contain important information but are published without any one supervisory authority.

Big Data. During the CDA-RB's analysis, the team harvested structured data from multiple databases on VMFA(AW)-242's poor readiness, low mission capable rates, and abysmal flight hours, when compared to sister UDP squadrons, etc. that pointed to a very "unready" squadron. There should have been a risk mitigation process at the MAG or Wing, based on the information

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available, undertaken before VMFA(AW)-242 flew 24-hour operations in support of VIGILANT ACE.

Institutional Knowledge/Information Management Opinions

Lack of updated or available SOPs. Due to the nature of the Wing and subordinate unit KM and IM practices, locating and utilizing updated 3700 SOPs were challenging at best and may have been a source of confusion on how to conduct tanking operations and may have been a contributing factor that ultimately led to a lack of a standardized process.

Lack of an identifiable Battle Rhythm. Based on the description of the confirmation brief, an exercise-driven battle rhythm with identified inputs and outputs for the planning briefs and final confirmation brief could have addressed some of the confusion regarding the purpose of the training, flight schedule, flows, use of Ambien, 24-hour operations and other crucial planning and execution events.

Resistance. There are various local procedures and archives of data at individual units throughout the Marine Corps. There will be significant resistance to any change in the manner these procedures and data are managed. Transformation requires direction from senior leadership to enforce changes and empower Information Management Officers (IMO) to lead the establishment and supervision of knowledge management processes.

SharePoint access. Ease of access is critical to make SharePoint a viable data storage tool to assist in knowledge management. The CDA-RB attempted to gain access to 1st, 2nd, and 3rd MAW SharePoint sites with mixed success. Every SharePoint site seems to have a different way to access the information (using various certificates) that makes it challenging to use consistently.

Technology. In this digital age where volumes of information are stored in "the cloud," the management of data and knowledge must be intentional. This includes condensing and combining documents and archiving, as required, to reduce clutter.

Multiple Sources of Information. There may be gaps incurred in standardized techniques, tactics, and procedures (TTPs) because there is not one vetting authority. In contrast, the USAF has one supervisory authority which vets all governing documents.

Institutional Knowledge/Information Management Recommendations

KM/IM 1. Recommend the appropriate HQMC agency develop a Knowledge Management Marine Corps Order (KMMC-XX) or Information Management Marine Corps Order (IMMC-XX) with an associated Inspector General (IG) Checklist that requires O5 and above Commanders establish and manage a formal Information Management Program. A draft checklist, pending a published order, has been established by II MEF IMO for reference.

KM/IM 2. Recommend the appropriate HQMC agency create a nested SharePoint Governance Policy to establish standardization and consistency across the force for accessing key information, rendering compliance as a process.

KM/IM 3. Recommend the appropriate HQMC agency reference the following documents to refine IMO processes across the enterprise as it relates to technical and tactical roles in process analysis, shared and functional area situational awareness and collaboration (workspace, chat, web conferencing, SharePoint, Collaboration At Sea, All Partners Access Network (APAN) etc.)

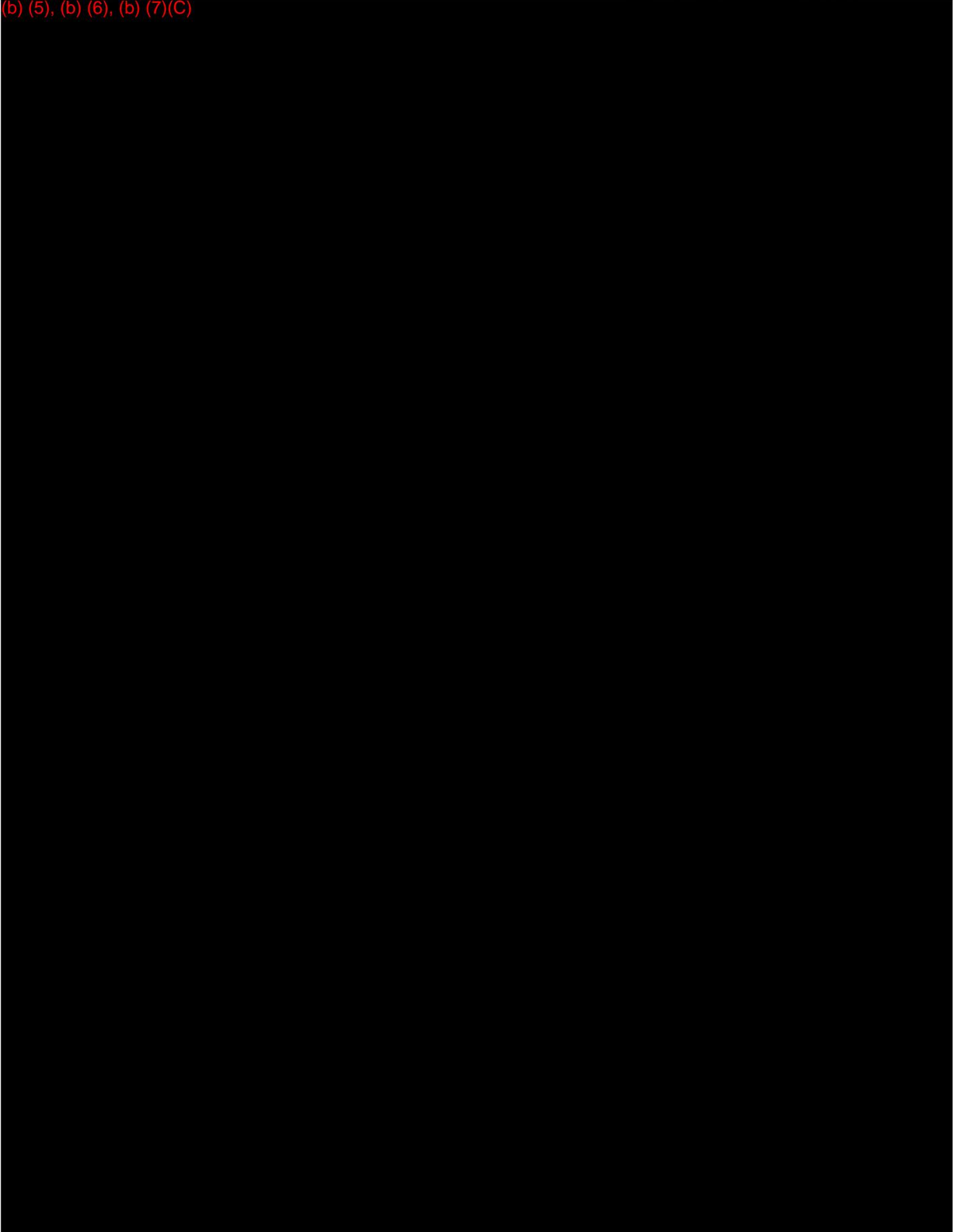
- 1) DoD Directive 5010.42, DoD Wide Continuous Process Improvement
- 2) US MARFORCOM Order S224.1B, Continuous Process Improvement Program;
- 3) II MEF MEFO 3146.1B SharePoint Governance and Management
- 4) II MEF MEFO 5271.1 Information Management
- 5) II MEF IMO draft IGMC Checklist for IM/C2 (II MEF has provided to I and III MEF IMOs and IGs.
- 6) II MEF "Staff Action Handbook", an annually updated IM/KM handbook for MEFs and MSC staffs.

KM/IM 4. Recommend MAWTS-1, in coordination with Aviation Standards Branch (ASB) TECOM, provide supervision over updating and disseminating all tactical reference documents that are published by the various entities governing TTPs; maintain an orders and directives page on SharePoint (or associated collaboration tool) and establish a process for reviewing and updating all tactical/employment documents.

KM/IM 5. Recommend each MAW maintain an IMO, Capt or above, down to the Group level to manage KM and IM processes as a special staff function. Ensure they receive the required training to earn the FMOS of 8055.

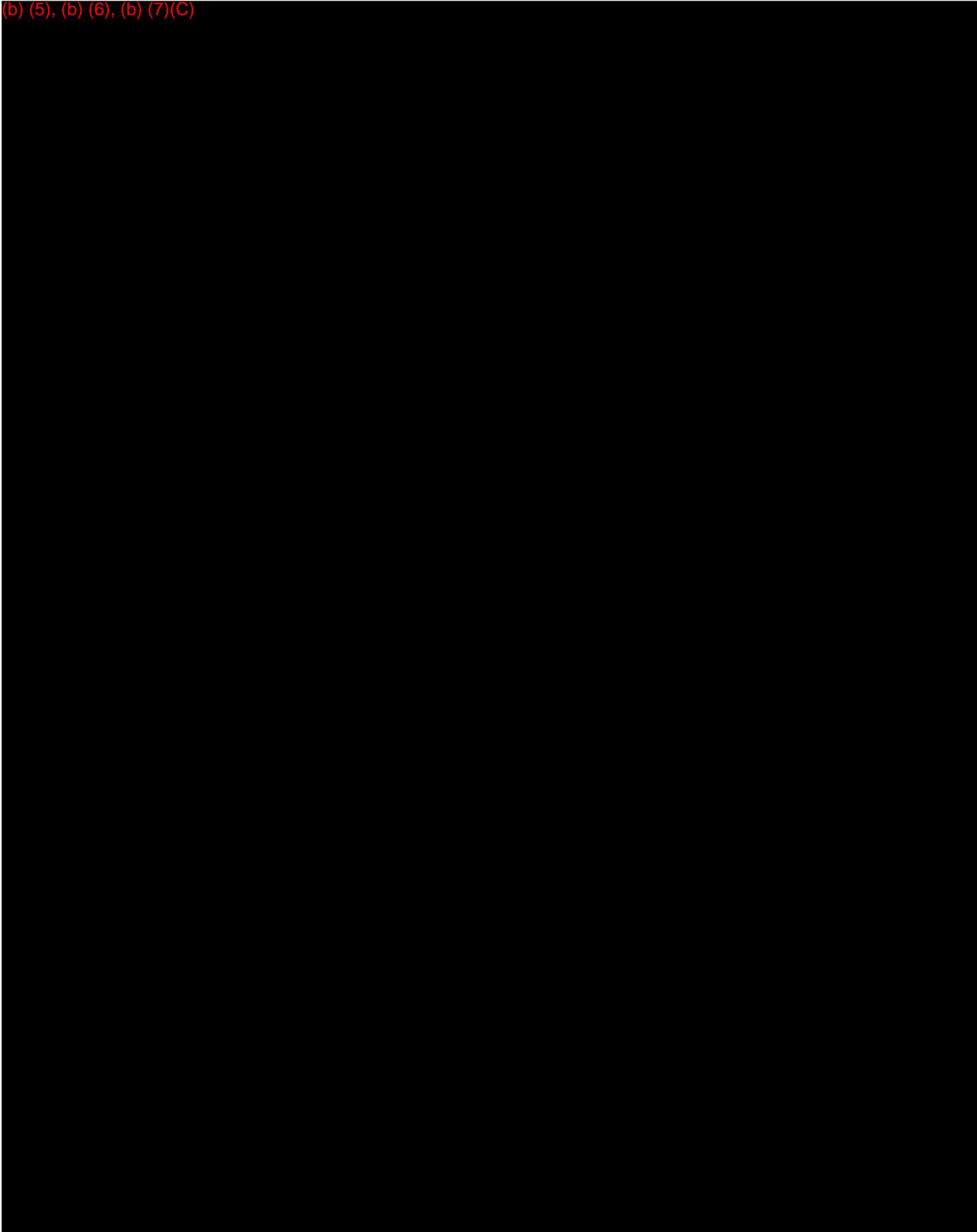
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(b) (5), (b) (6), (b) (7)(C)



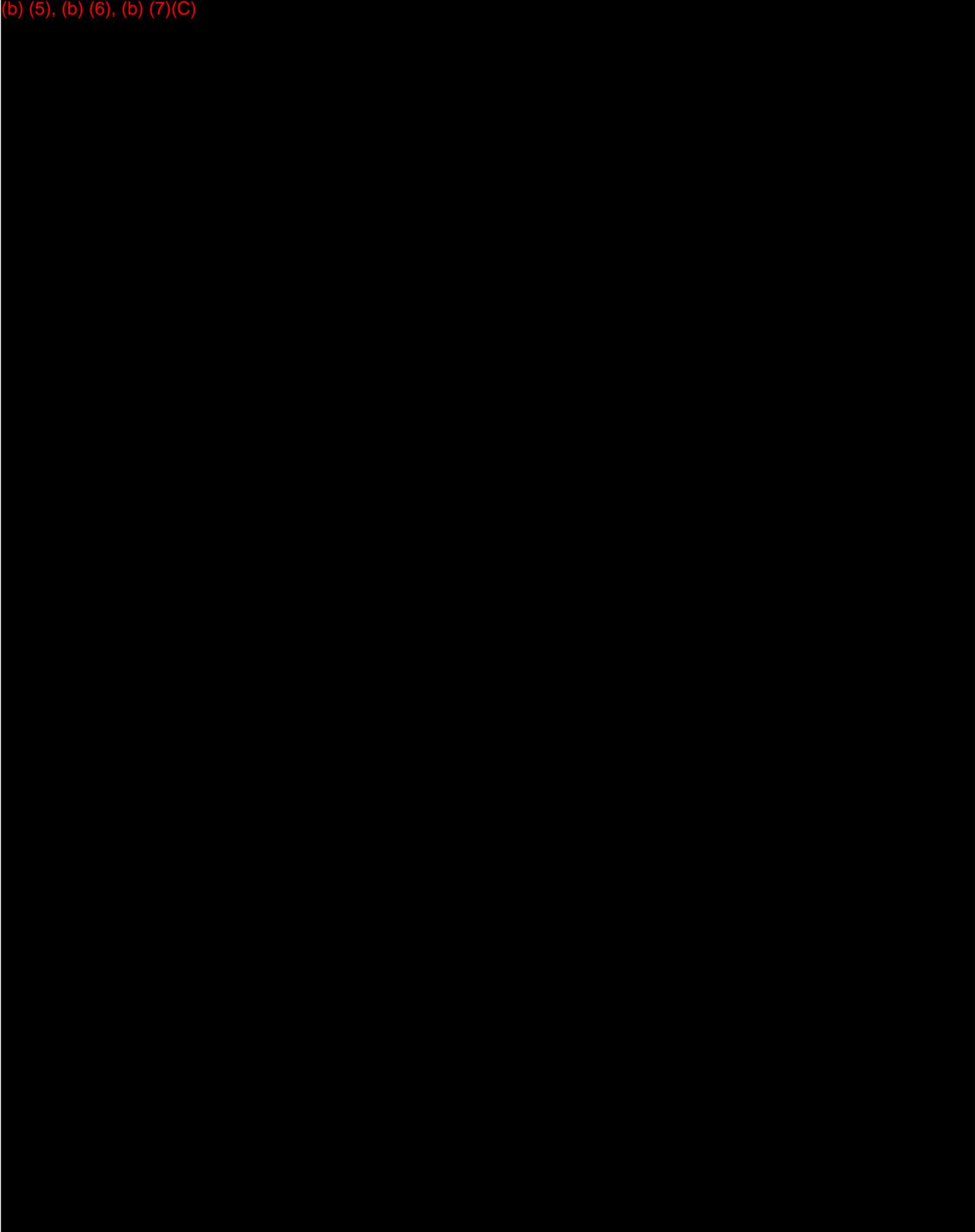
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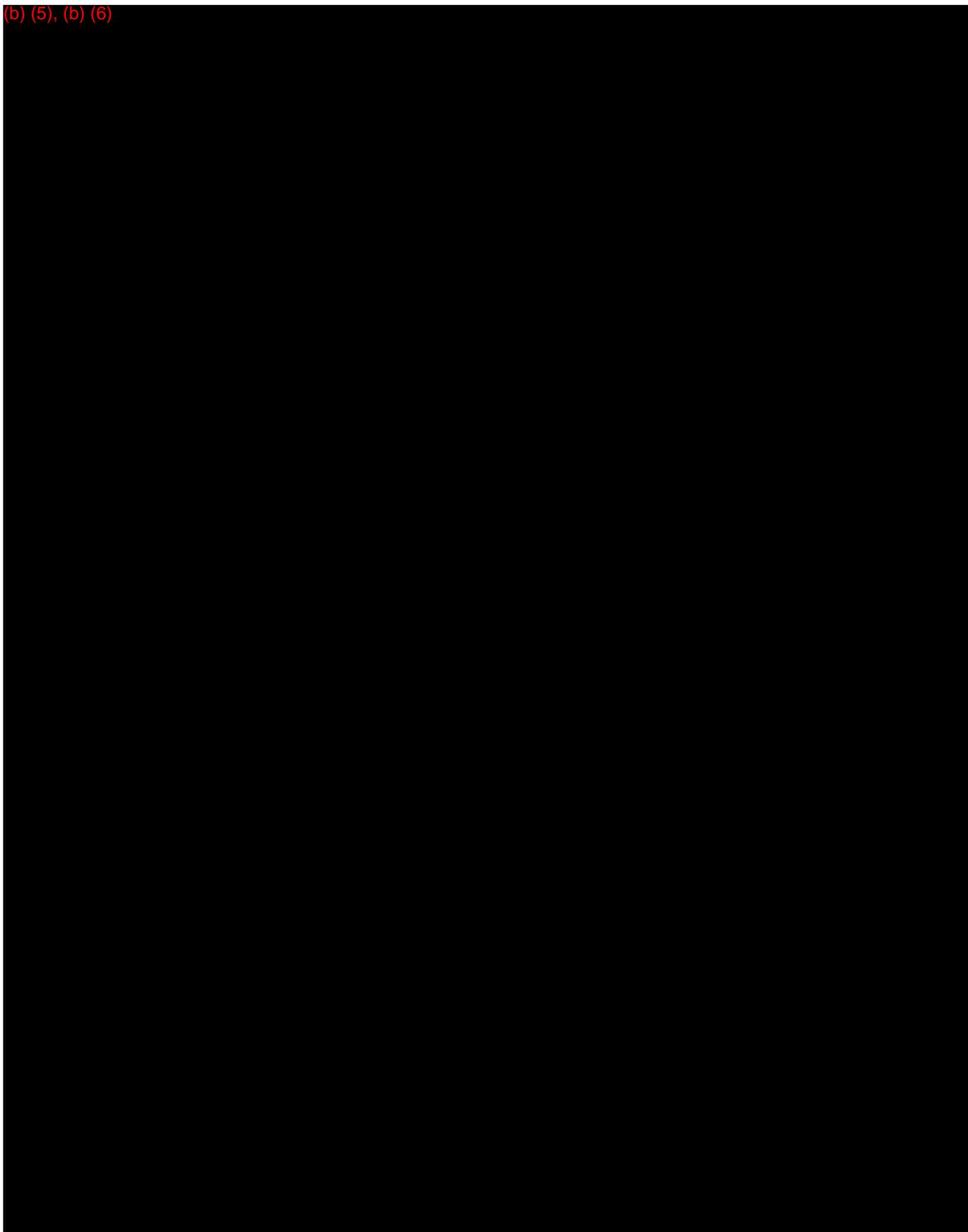
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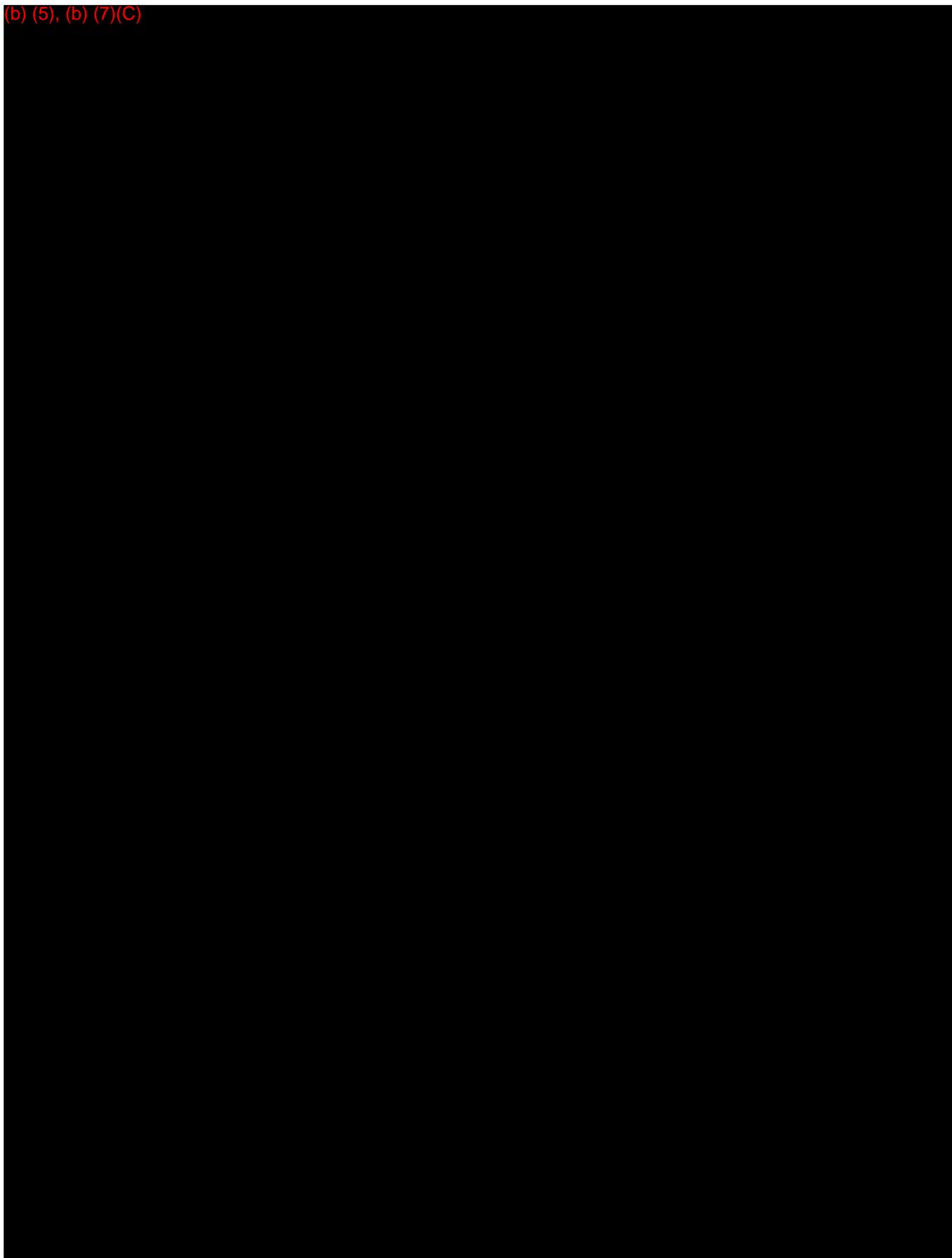
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(b) (5), (b) (6)

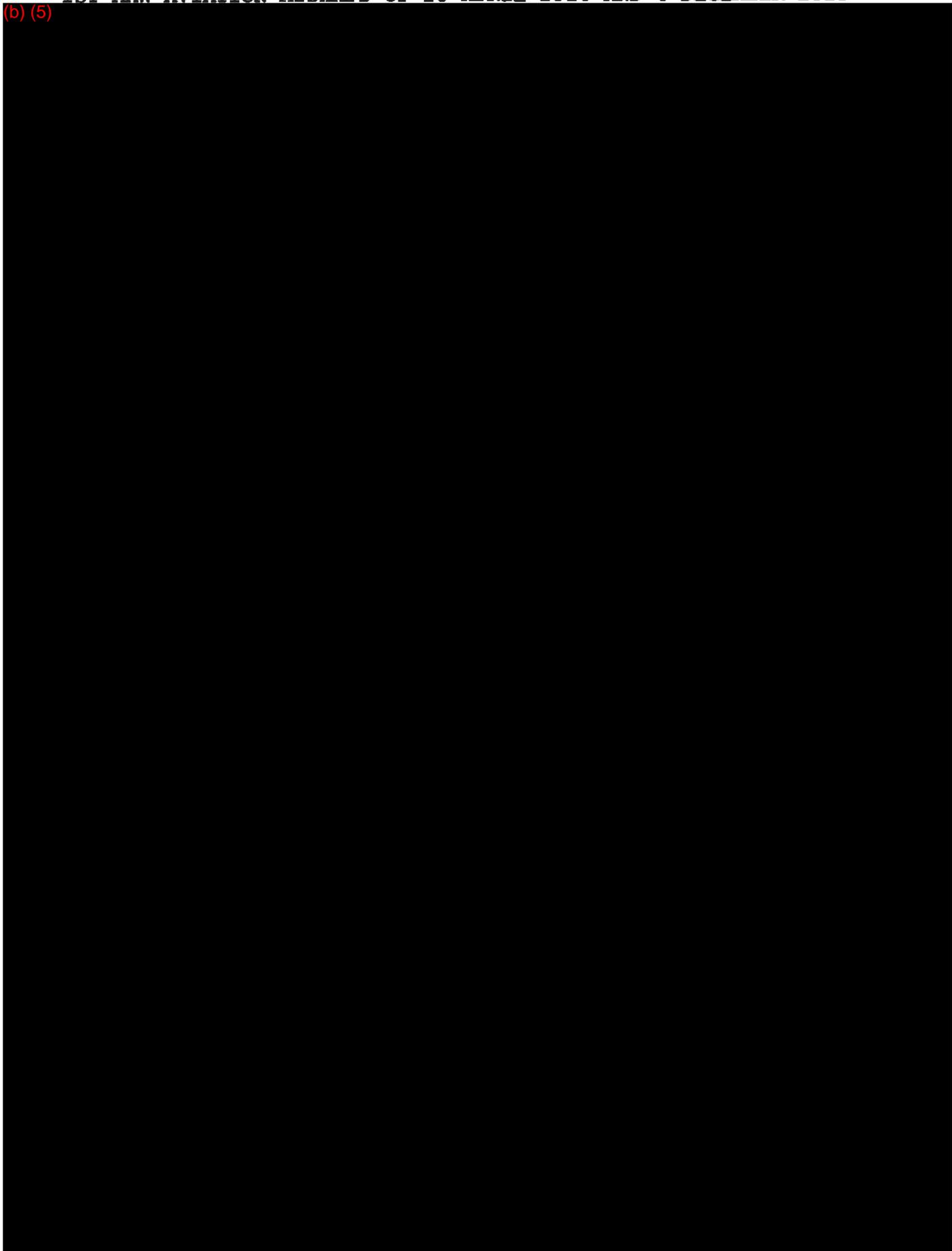


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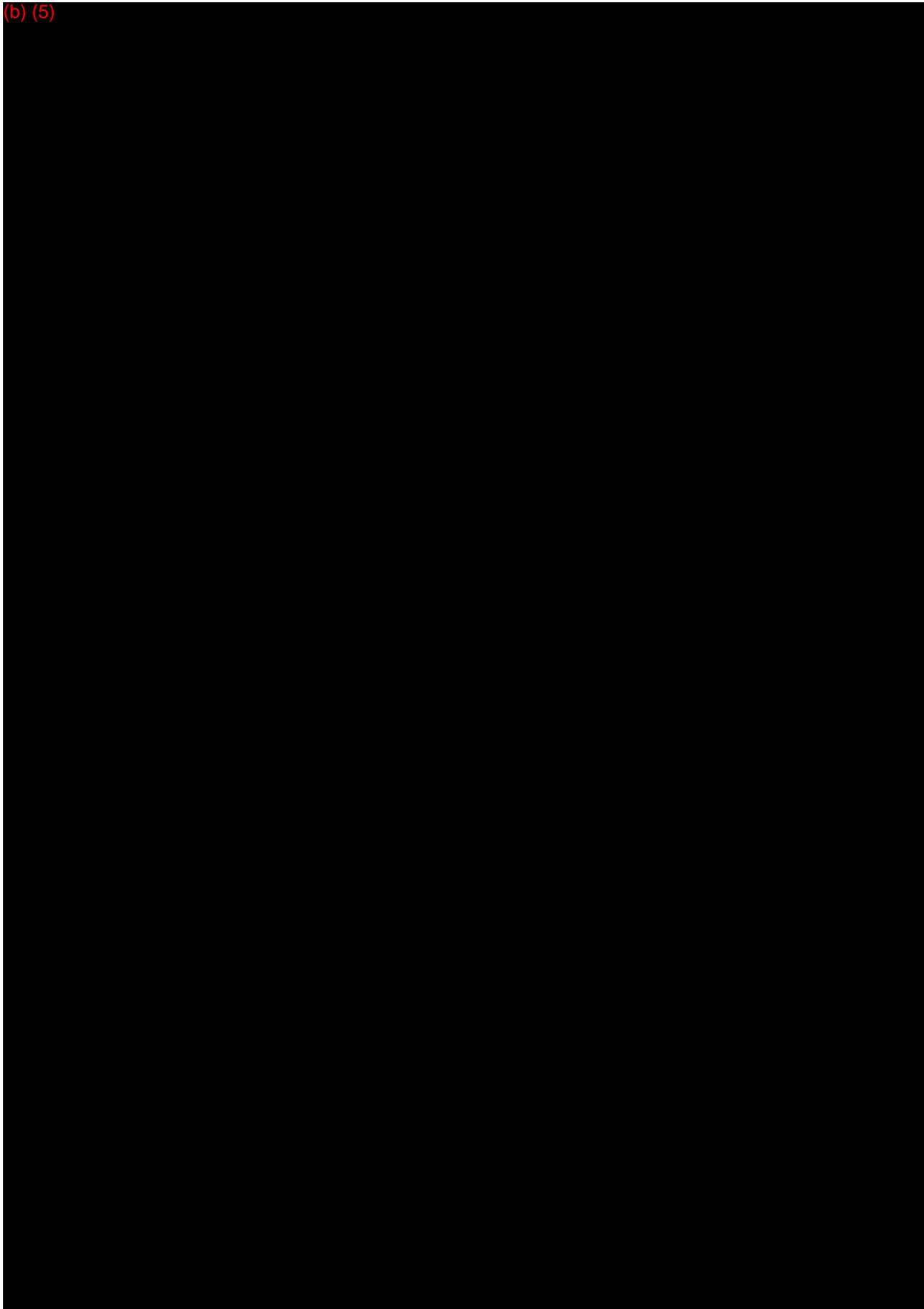


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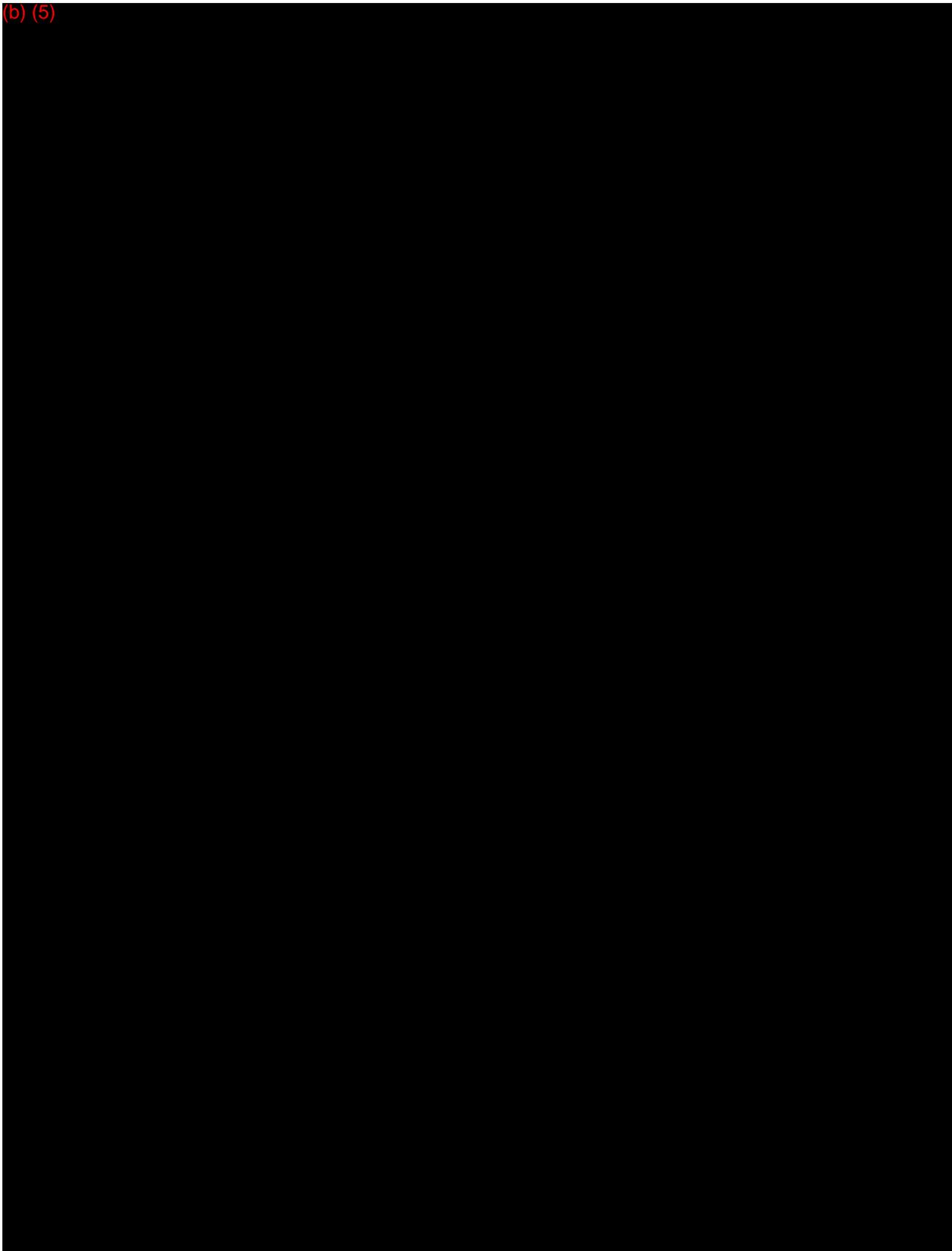
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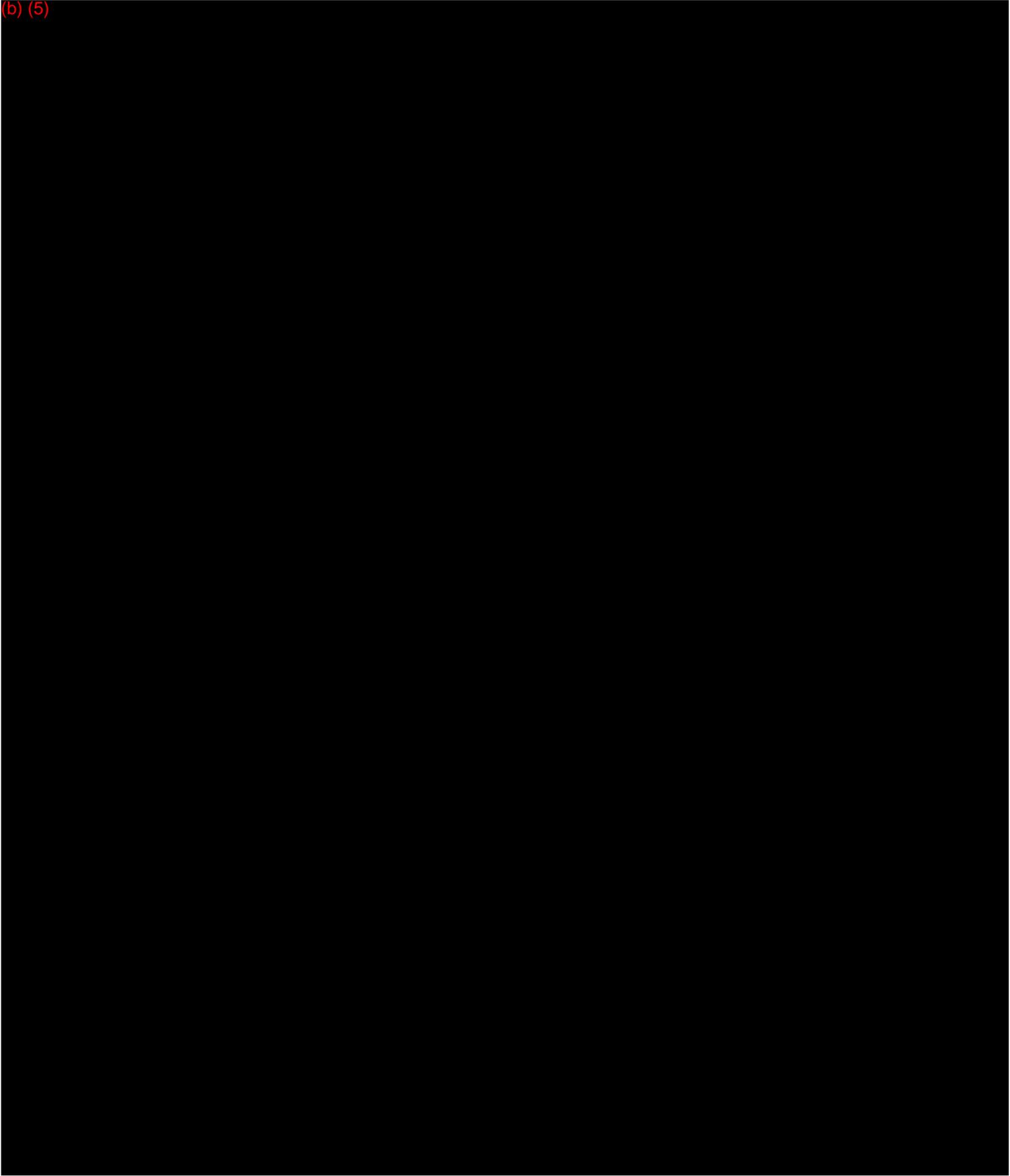
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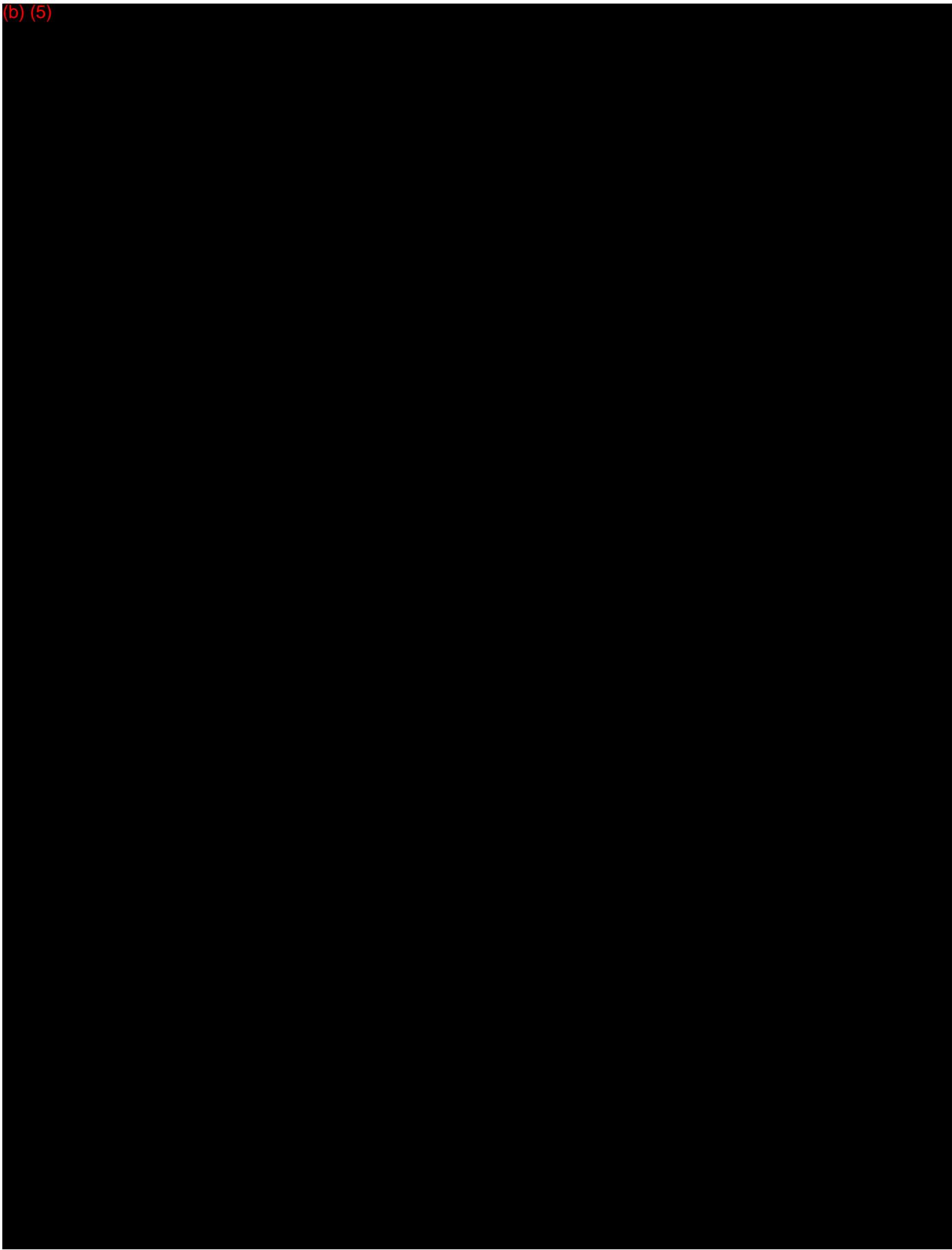
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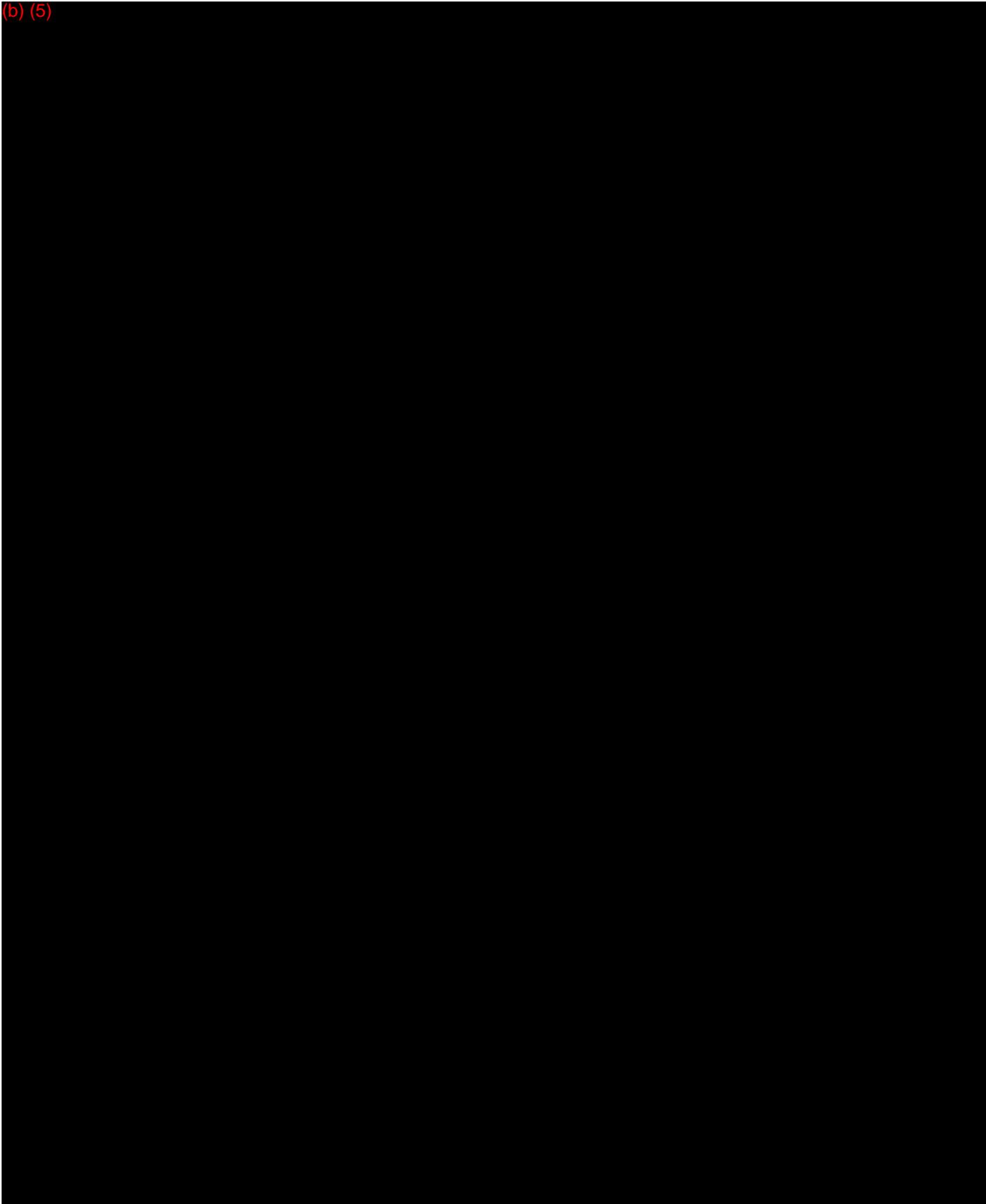
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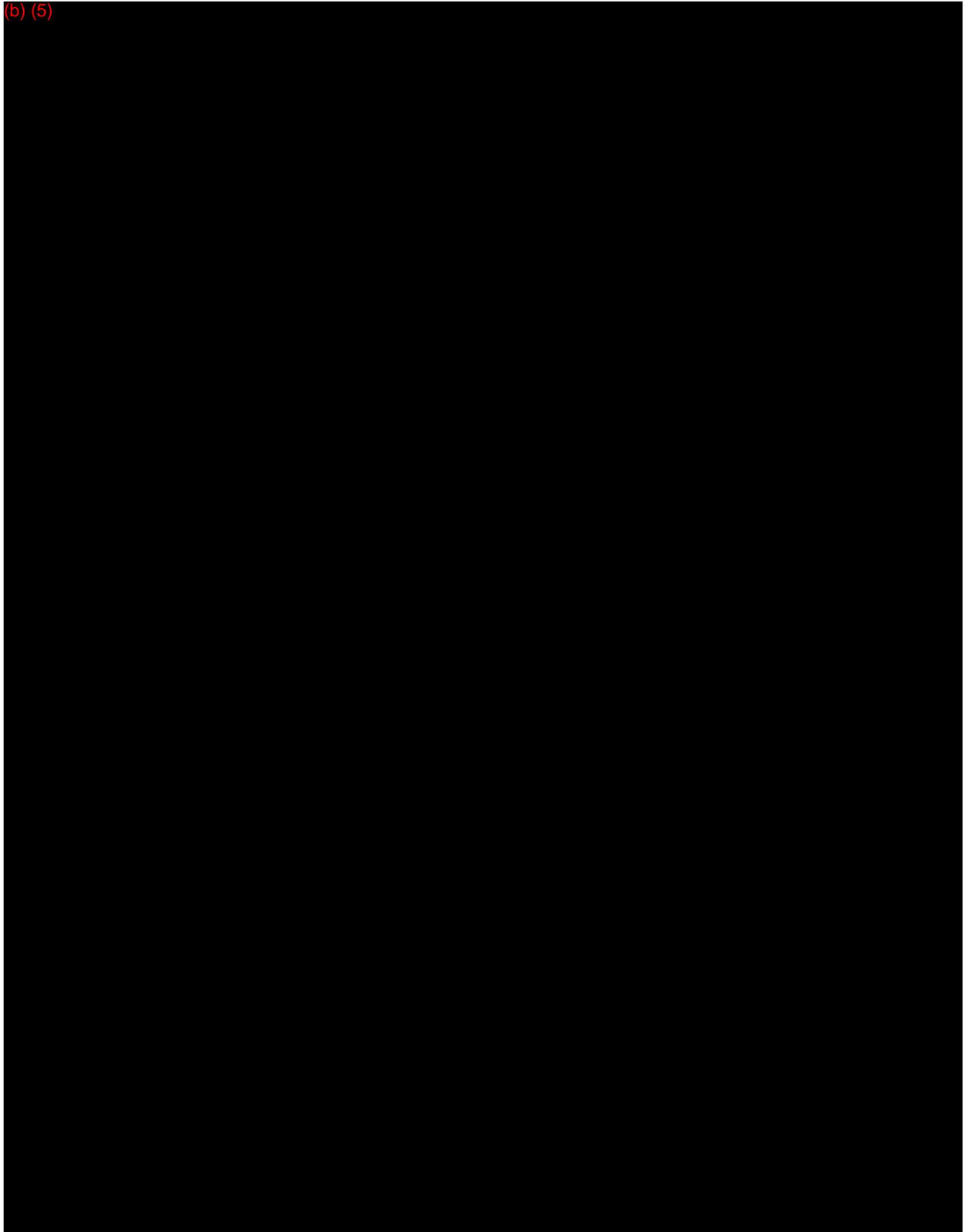
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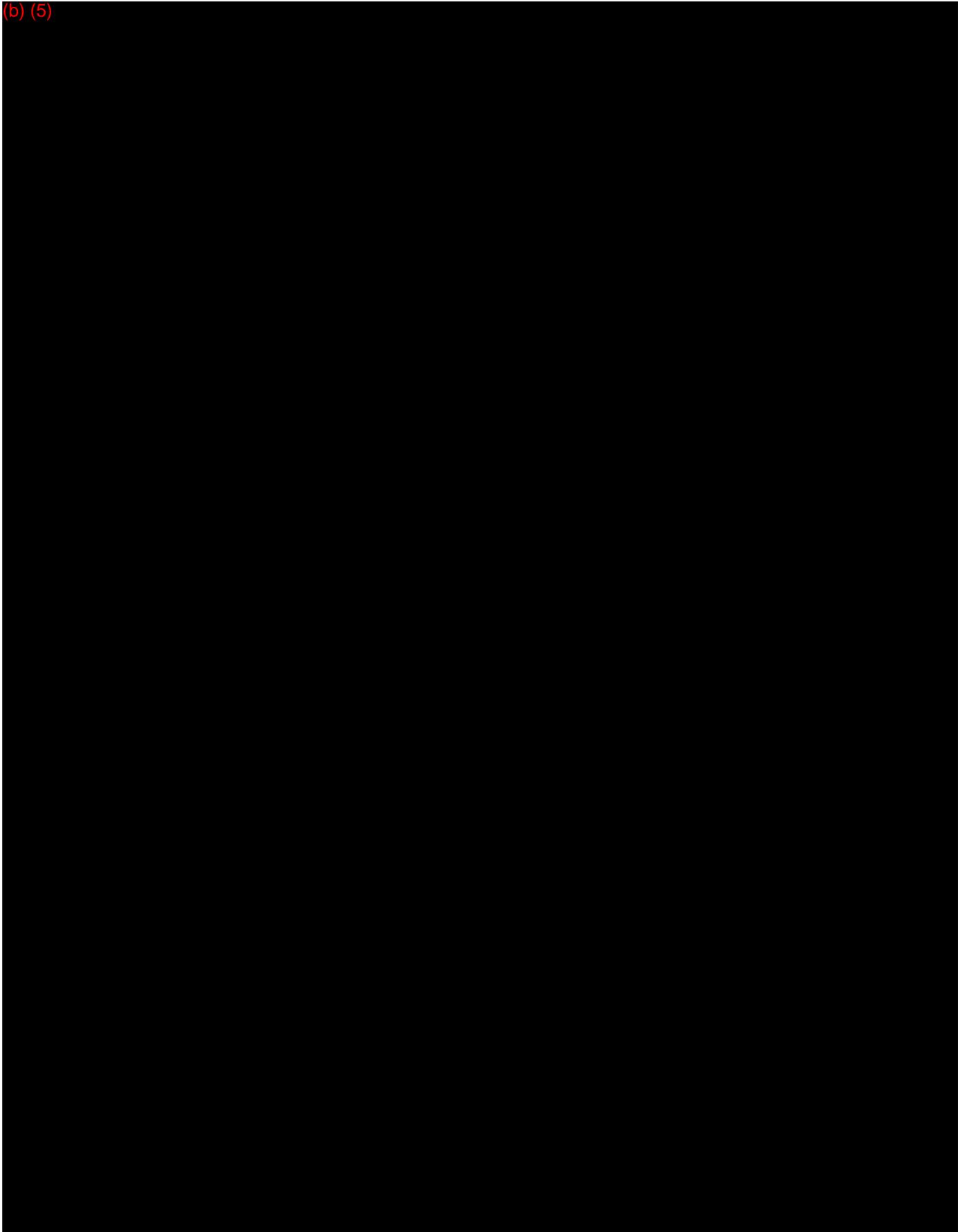
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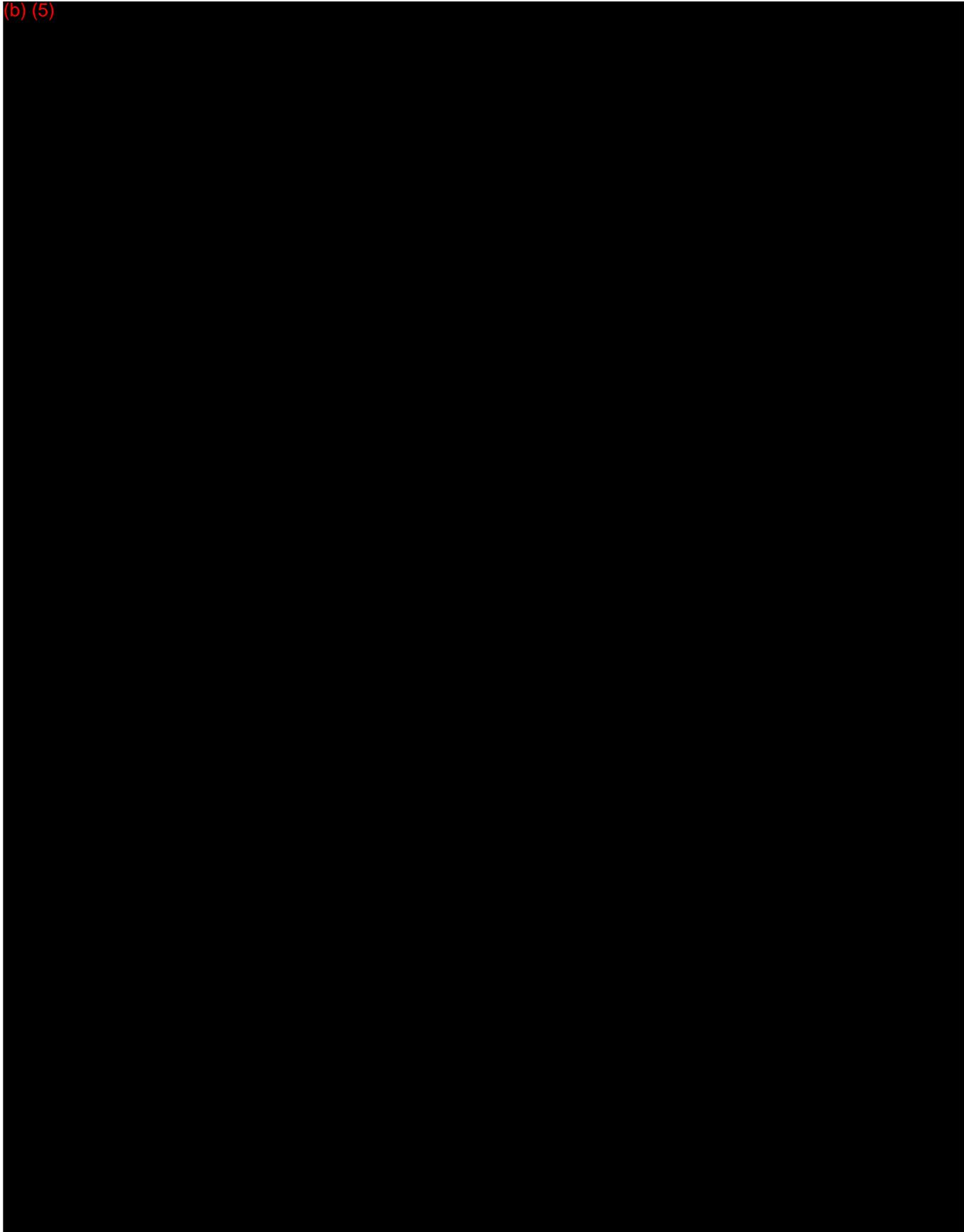
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(b) (5)

