

AIR STAFF AND COMMAND COLLEGE

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**TRANSFORMING THE MUNITIONS AND MISSILE
MAINTENANCE OFFICER CAREER FIELD**

By

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DISCLAIMER

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ABSTRACT

The current construct of Air Force Specialty Code 21M, Munitions and Missile Maintenance Officer was a direct result of both the unauthorized transportation of nuclear warheads and the mistaken shipments of classified ICBM components. This construct, represented by three distinct paths within the 21M career field include conventional munitions, nuclear weapons and ICBMs. Even though this approach was developed to strengthen specialization within the 21M career field, it has failed to address the basic fundamental problems discovered and identified from the aforementioned incidents.

For the past twenty years, the 21M career field has been in a state of flux, or more importantly an identity crisis. Because of this, incongruences have perpetuated not only amongst the munitions officers who encompass the career field, but the squadron, group and wing commanders with oversight, and most importantly, the men and women accomplishing the mission throughout the USAF's munitions storage area (MSA)s, weapon storage area (WSA)s and missile fields.

Regardless of the internal and external turmoil, munitions officers remain viable and highly important to not only the nuclear enterprise, but to the USAF and Department of Defense. However, unless there are fundamental changes to the 21M career field, munitions officers are in danger of becoming marginalized by both AFSCs 21A, Aircraft Maintenance and 13N, Nuclear Operations communities. Furthermore, unless the 21M community takes control of its destiny, it will continue to be weakened to the point of irrelevancy.

BIOGRAPHY

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If we take man as he is, realistically, we make him worse due to drifts or detriments in him or his environment. However, if we take him as he should be, optimistically, we help him become what he can be.

-Viktor E. Frankl

INTRODUCTION

Since the unauthorized transportation of nuclear warheads from Minot Air Force Base (MAFB) to Barksdale Air Force Base (BAFB) and the mistaken shipments of classified Minuteman III (MMIII) intercontinental ballistic missile (ICBM) components to Taiwan, the United States Air Force (USAF) has remained focused on the reinvigoration of the nuclear enterprise.¹ Specific USAF actions have included the creation of Air Force Global Strike Command (AFGSC), the addition of a new USAF directorate to the Air Staff (A10/Strategic Deterrence and Nuclear Integration), the reorganization of the Air Force Nuclear Weapons Center (AFNWC), increased rates of inspections (to include Nuclear Surety Inspections (NSI)s and numerous additional reports, boards and inquiries.² However, even with the assimilation of these immense organizational changes, the USAF nuclear enterprise continues to be plagued by incidents that mar its reliability and credibility. As a result of a large portion of these incidents involving maintenance related activities, Air Force Specialty Code (AFSC) 21M, Munitions and Missile Maintenance Officer (or *munitions officer*) is one career field requiring additional focus and attention.³ Transforming the Munitions Officer career field will be critical to the nuclear enterprise as the USAF continues along the *Air Force Nuclear Enterprise Flight Plan* (2013), forward to meet the overarching force development objectives outlined in the *Air Force Future Operating Concept* (2015), and onward towards the anticipated environment and challenges forecasted for 2035.

BACKGROUND

First and foremost, how and why did this “reinvigoration” occur? On 30 August 2007, two pylons loaded with six each inert Air Ground Missile-129As (or more commonly called, Advanced Cruise Missiles (ACMs)) were scheduled for transportation from MAFB to BAFB by a B-52H Stratofortress tactical ferry mission.⁴ However, this did not occur as planned when one pylon of nuclear ACMs (installed with W-80-1 nuclear warheads vice inert Training Ferry Payloads) was inadvertently removed from the Weapon Storage Area (WSA), loaded and transported to BAFB.⁵ As a result of numerous opportunities by Maintenance Supervision, Munitions Control, Munitions Schedulers, a Munitions Maintenance Handling Team, Munitions Loaders, the aircraft Crew Chief, B-52 Instructor Radar Navigator and aircraft Navigator to identify the handling of nuclear weapons, this incident nevertheless occurred unrestricted.⁶

During a press conference following the incident, Secretary of the Air Force (SecAF) Michael Wynne explained there was a systematic erosion of nuclear enterprise standards preceding this incident.⁷ This conclusion was further substantiated as both the Air Combat Command (ACC)’s Command Directed Investigation (CDI) *An Unauthorized Transfer of Nuclear Warheads* (ACC CDI) and Secretary of Defense (SecDef)’s Defense Science Board (DSB) Permanent Task Force on Nuclear Weapon Surety’s *Report on the Unauthorized Movement of Nuclear Weapons* emphasized how there were overall feelings of apathy for the nuclear enterprise and lack of professional discipline from the units involved.⁸ Additionally, both reports further emphasized how this incident occurred as a result of a breakdown in training, supervision and leadership, and were symptomatic of broader leadership and cultural problems within the USAF.⁹ Lastly, former SecAF Larry Welch (author of the DSB report), testified during a Senate Armed Forces Committee briefing on 12 February 2008 that “military units

responsible for handling the bombs were not properly inspected...and all the ways that we have to store and handle these weapons in order to perform the mission, it just requires, we believe, more resources and more attention than they're getting.”¹⁰

Even with increased focus and critical self-assessment as a result of the unauthorized transfer, it would take less than a year before the USAF was once again embroiled in another incident involving the nuclear enterprise. This new incident involved two inadvertent shipments of classified MMIII ICBM forward-section assemblies (two each per shipment) from Hill AFB to Taiwan.¹¹ The resulting investigation discovered the assemblies were shipped from Francis Edwards (FE) Warren AFB to Hill AFB for storage in a Defense Logistics Agency (DLA) warehouse in 2005.¹² However, after turn-in from the WSA, FE Warren AFB Traffic Management Office personnel failed to properly mark the containers prior to shipment.¹³ Upon receipt, Hill AFB's DLA personnel failed to open the containers to identify the contents, which resulted in the containers being sent to an unclassified warehouse for storage.¹⁴ Once in the warehouse, DLA personnel used the hazard classification number to erroneously identify and label the contents of the containers (still unopened) as helicopter batteries.¹⁵ Finally, in 2006, as part of the Foreign Military Sales (FMS) program, the containers now labeled as helicopter batteries were shipped to Taiwan where they sat unnoticed until January 2007.¹⁶ Even though the US knew the wrong items were shipped (Taiwan notified FMS office), they remained in Taiwan custody for an additional seventeen months before being identified as classified materiel by US personnel and secured by the US American Institute in Taiwan for return to the US.¹⁷

Speaking in regards to both of the findings, SecDef Robert M. Gates stated there was an “overall decline in Air Force nuclear weapons stewardship, a problem...not effectively addressed for over a decade. Both the Minot-Barksdale nuclear weapons transfer incident and the Taiwan

misshipment...have a common origin: the general erosion of nuclear standards and a lack of effective oversight by the Air Force leadership.”¹⁸ Lastly, the classified inadvertent shipment coupled with the unauthorized transfer, ultimately contributed to the resignation of SecAF Wynne and Chief of Staff of the Air Force (CSAF) General T. Michael Mosely for the erosion of leadership that allowed for a decline in the USAF’s nuclear mission and for a culture that allowed personnel handling nuclear weapons to not follow existing rules.¹⁹ With a steep hill to climb, acting SecAF Michael B. Donley and newly appointed CSAF General Norman A. Schwartz outlined their strategic plan for reinvigoration, which included the nuclear enterprise being placed as the number one priority for the USAF.²⁰

AFSC 21M, MUNITIONS AND MISSILE MAINTENANCE OFFICER

One thing the ACC CDI failed to conclude was that the majority of the personnel responsible for the unauthorized transfer were directly managed by munitions officers.²¹ As a result of this oversight, the munitions officer career field was not adequately examined during any of the investigations, or attributed as a potential root cause.²² However, what was identified, indicated a faulty scheduling process whereas supervisors, predominantly non-commissioned officers and senior non-commissioned officers (SNCO)s had not done their jobs by providing correct mission-related information to officers with management oversight.²³ A conclusion that ultimately mars the leadership credibility and purpose of why a munitions officer is there in the first place. Additionally, like the ACC CDI and BRR, the *Investigation into the Shipment of Sensitive Missile Components* (Donald Report) also failed to specifically reference AFSC 21M, Munitions and Missile Maintenance Officer in its findings. Examples which implicate munitions officers include:

- Half of the 22 commanders and vice commanders involved with missile related operations, did not have a background in the field.²⁴
- Overall lack of leadership presence when nuclear weapons maintenance was being conducted in WSAs.²⁵
- Ineffective supply chain management.²⁶
- Deficiencies associated with munitions accountability transfer.²⁷

One of the potential reasons why the munitions officer was not implicitly referenced was an overall lack of understanding of the career field. Prior to the end of the Cold War, munitions officers were a separate maintenance career field, which included Explosive Ordnance Disposal (EOD).²⁸ In 1993 as part of an overall reduction in forces, the conventional munitions and nuclear weapons maintenance portions were merged with aircraft maintenance officers and the EOD portion was merged with Civil Engineering (CE).²⁹ However, this was short lived. Because of declining expertise in conventional munitions and nuclear weapons, the munitions officer was reformed in 1999 when these portions were extracted from aircraft maintenance and combined with ICBM maintenance officers, thus creating the Munitions Officer career field.³⁰ Nevertheless, this too was short lived when post 9/11, the munitions officer found itself shifting away from nuclear weapons and ICBM maintenance in favor of conventional munitions operations.³¹ Although the shift towards conventional munitions may be concluded as a potential cause facilitating the unauthorized transportation of nuclear warheads and the mistaken shipments of classified components, as well as an adequate explanation as to why there was an erosion of nuclear weapon maintenance expertise after the Cold War, it does not accurately depict the lack of understanding or causal analysis in relationship to the munitions officer career field.³²

Even with the lack of analysis in regards to shifting focus and priorities, the munitions officer did evolve and benefit in relationship to munitions accountability. Specifically:

- Creation of current munitions officer construct of shreds whereas a particular entry level AFSC is awarded upon completion of applicable follow-on specialty course (AFSC 21MXA, Conventional Munitions Officer; AFSC 21MXI, ICBM Maintenance Officer; and AFSC 21MXN, Nuclear Maintenance Officer).³³
- Air Education Training Center (AETC) created the Nuclear Accounting Course (NAC) to provide munitions officers and enlisted AFSC 2W2, Nuclear Weapons Maintenance Technicians with the advanced knowledge and skills needed to perform Munitions Accountable Systems Officer (MASO) and Nuclear Ordnance Controlled Management (NOCM) duties.³⁴
- Management of Nuclear Weapon Related Materiel (NWRM).
- Nuclear weapon custody transfer procedures were revamped.

However, regardless of these improvements, the munitions officer career field still experienced an identity crisis inadvertently created whereas knowledge and skills became broader and generalized pre 9/11 that was not necessarily examined during any of the resulting investigations. Nor examined post 9/11 whereas munitions officer focus shifted towards conventional munitions combat operations. And then finally, post unauthorized transportation of nuclear warheads from MAFB to BAFB and the mistaken shipments of classified components to Taiwan, where skills became overly specialized and stove piped with the creation of separate munitions officer shreds for conventional munitions, nuclear weapons and ICBM maintenance.

There is no doubt that the munitions officer community suffered from the effects of shifting focus and priorities beginning with the end of the Cold War, throughout the

reinvigoration of the nuclear enterprise, onward to present day, 2016.³⁵ And there is no doubt the munitions officer will continue to remain critical to the USAF nuclear enterprise as a result of responsibilities encompassing management and administration of nuclear weapons and programs, to include being the only logistics related career dedicated to the nuclear mission.³⁶ However, if the munitions officer continues to gravitate towards the “flavor of the day” (i.e. post 9/11: conventional munitions; post 2007: nuclear enterprise) and view the shreds as separate career fields versus an architecture that maintains a career field structure collectively supporting all mission requirements, there is continued risk of mission areas becoming marginalized again. For the munitions officers to remain credible, balance and equality must be found between all three shreds of the career field, to include the importance of munitions accountability.

MUNITIONS ACCOUNTABILITY

Historically, munitions accountability responsibilities fell under logistics and the supply career field.³⁷ The accountable officer for munitions, or MASO, was originally a supply officer as opposed to current state where the responsibility falls under maintenance, or more specifically, munitions. In fact, at one time the acronym MASO stood for Munitions Accountable Supply Officer. It was not until Combat Ammunition System (CAS) became the accountable property system of record (APSR) for both conventional munitions and NOCM materiel, and the publication of Air Force Regulation 136-12, *Combat Ammunition Operations Policy* in 1990, where the MASO acronym was changed to Munitions Accountable Systems Officer.³⁸

Formal training for MASOs included attendance of AETC’s Munitions Supply or Munitions Inventory Management course, specifically targeting both conventional munitions and nuclear weapons accounting and reporting.³⁹ As part of an overall reduction of forces in 1993,

AFSC 21A, Aircraft Maintenance Officers assumed MASO duties for nuclear weapons and enlisted AFSC 2W0, Munitions Systems SNCOs assumed primary MASO duties for conventional munitions.⁴⁰ When the munitions officer remerged in 1998, nuclear weapon accountability was returned from aircraft maintenance and subsequent training was included as part of the Nuclear Maintenance Officer Course (NMOC).⁴¹ For conventional munitions, things largely stayed the same, whereas AFSC 2W0, Munitions Systems SNCOs continued to assume MASO duties.⁴² This was essentially the state of affairs precluding the unauthorized transfer between MAFB and BAFB.

Enlisted career fields related to munitions accountability also had their beginnings in supply. Specifically, AFSC 645X0A, Munitions Supply was its own career field dedicated to both conventional munitions and nuclear weapons accountability.⁴³ However, in the late eighties, a need for aligning munitions accountability under maintenance was identified which saw AFSC 645X0A becoming AFSC 465X0, Munitions Operations.⁴⁴ And then with the streamlining of career fields in 1993, AFSC 465X0 was eliminated, with the conventional munitions portion (including MASO responsibilities) being assumed by AFSC 2W0, Munitions Systems, and the nuclear weapons portion being assumed by AFSC 2W2, Nuclear Weapons.⁴⁵ Because of limited accountability integration for both AFSC 2W0 and 2W2 career fields' basic ascension courses, separate courses for conventional munitions and nuclear weapons accountability were eventually created. AFSC 2W0s receive formal training (AETC) through a specialized Conventional Munitions Accountability course (created circa 1998). And as previously stated, nuclear weapons accountability for AFSC 2W2s is now being taught through AETC's NAC.

After the unauthorized transfer, the ACC CDI identified senior leadership failure to assume ownership of nuclear weapons and an overreliance on lieutenants for the management of nuclear stockpiles.⁴⁶ Further alarming by this conclusion was that both the ACC CDI and BRR identified shortcoming in training for MASOs nuclear stockpile management, particularly when it came to the utilization of Defense Integration and Management of Nuclear Data Systems (DIAMONDS), the Department of Defense (DoD)'s Defense Threat Reduction Agency (DTRA) APSR for nuclear weapons and NOCM materiel.⁴⁷ Even though munitions officers did evolve and benefit with AETC's creation of NAC in 2009, it still does not address a potential disparity between MASO rank and experience, or the lack of knowledge and experience with munitions accountability from maintenance group (MXG) and squadron leadership as identified by the Donald Report.⁴⁸

Lastly, conventional munitions and nuclear weapons accountability are critical to the munitions officer career field. However, their value continues not to be leveraged to the fullest extent possible outside offices responsible for the day to day management. For example, even though there is only anecdotal evidence to support, there is a large portion of AFSC 21A and 21MxI leadership at the group or squadron level who have never attended either course. Lastly, and even more telling, is the amount of enlisted 2W0 and 2W2 SNCOs and quality assurance evaluators who also have not attended either of their respective courses. In fact according to the *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, nuclear accountability was a footnote for the ninth and final ranking needed to grow a successful 2W2 Chief.⁴⁹ If munitions accountability (conventional munitions, nuclear weapons and NWRM) continues to remain critical to the munitions officer career field, renewed focus at the group and squadron level is essential to mitigate like findings from the Donald Report whereas it

was identified leadership did not have the background or experience necessary to recognize poor performance before resulting in a major organizational failure.⁵⁰

CRITICAL ASSESSMENT

There is no doubt of the importance of the munitions officer to the nuclear enterprise. However, even with the creation of AFGSC, addition of A10/Strategic Deterrence and Nuclear Integration to the Air Staff, reorganization of AFNWC, increased rates of inspections, numerous additional reports, boards and inquiries, opportunities to critically assess AFSC 21M, Munitions and Missile Maintenance Officer career field were not addressed or maximized.

The publication of *Reinvigorating the Air Force Nuclear Enterprise* in October 2008, outlined the USAF's strategic plan to re-establish a culture of compliance and accountability.⁵¹ This report determined root causes of nuclear enterprise decline as weaknesses in nuclear inspections, staff assistance visits and unit quality assurance programs.⁵² This was further emphasized in SecDef's *Phase II: Review of the DoD Nuclear Mission* report whereas it was explained how a rigorous inspection process is critical in maintaining a credible US nuclear deterrent while citing significant shortfalls with DoD NSI processes.⁵³ Both of these reports ultimately drove robust nuclear inspections and staff assistance visits across the USAF from DoD DTRA inspectors, Air Force Inspection Agency inspectors, owning Major Command (MAJCOM) NSI inspectors, and local evaluations. Lastly, and most importantly, *Reinvigorating the Air Force Nuclear Enterprise* codified USAF focus in restoring rigid adherence to standards and the subsequent promotion of a "Zero Defect" culture.⁵⁴

Successful execution of rigid adherence to standards and promotion of a "Zero Defect" culture were themes that encompassed follow-on reviews of the nuclear enterprise. In a 2011 *Independent Assessment of the Air Force Nuclear Enterprise*, DSB Permanent Task Force of

Nuclear Weapons Surety concluded that USAF leadership can have high confidence that, with few exceptions, their operating and direct support forces understand the nuclear mission, and are a professional, disciplined, and committed force.⁵⁵ This high confidence was directly attributed to the extraordinary level of oversight, increased inspections, and the USAF's return to a healthy culture of compliance and accountability.⁵⁶ Additionally, a DSB follow-on report published in 2013, stated measures taken by the USAF have restored high standards of discipline and their nuclear forces are thoroughly professional, attentive, and committed to the special demands this mission requires.⁵⁷

As a result of two separate proficiency exam cheating scandals (one involving USAF ICBM operators and the other involving US Navy nuclear propulsion personnel performing nuclear missions), SecDef Charles Hagel ordered an additional review looking at the nuclear enterprise from a DoD perspective on 10 February 2014.⁵⁸ Two of the key issues this report uncovered were a demand for micro-perfection and an inspection culture that was inadvertently overriding mission concerns.⁵⁹ Specifically, this report uncovered nuclear enterprise leaders demanded a "zero defect" mentality in every operational and administrative action often at the expense of sustained mission performance in an attempt to reduce risk from external criticism.⁶⁰ This the report concluded, has led to widespread substitution and/or extraneous processes and procedures (at all levels) that have added additional strain on personal responsibility to both commander's authority and accountability.⁶¹ With the insistence of this zero-defect mentality, a culture evolved in which commanders were compelled to eliminate the possibility of any errors, to include non-essential processes and procedures, thus often creating additional cumbersome and inefficient processes.⁶² For example, nuclear maintenance technicians were causing work-stoppage by rejecting components for defects beyond authoritative criteria.⁶³

The report also uncovered how inspections were being utilized to supplement commander authority and accountability.⁶⁴ Specifically, NSI inspectors began interpreting author intent of directives (e.g. Air Force Instruction, Technical Order, etc.), and began overriding commander's authority and responsibility by inadvertently creating policy.⁶⁵ Additionally, this was also further exasperated as commanders often faced criticism for events and decisions that preceded their assignment to the unit or base.⁶⁶ These factors coupled with risk-aversion for anything but perfect results during inspections (i.e. zero defects), and the well-established history of punishment in the nuclear enterprise (unauthorized transportation of nuclear warheads from MAFB to BAFB and mistaken shipments of classified components to Taiwan), became the commander's primary focus as opposed to unit readiness and mission accomplishment.⁶⁷

Recommendations from this review included the SecDef moving the nuclear enterprise from a culture of micromanagement to a culture of qualified people empowered towards accomplishing the nuclear enterprise mission by making it clear that individual behavior is a matter of personal responsibility.⁶⁸ Most importantly, failure to meet performance and behavior norms is a military discipline issue to be addressed by commanders.⁶⁹ Even though this was a complete change in direction from previous reports, reviews and assessments, not all nuclear enterprise leaders shared SecDef views outlined in the 2 Jun 2014 *Independent Review of the Department of Defense Nuclear Enterprise* report.⁷⁰ Colonel Robert Vercher, former commander of the 91st Missile Wing at MAFB, said during an Associated Press interview that "You might call it micromanagement, but I would call it oversight — proper oversight".⁷¹ Col Vercher further went on to say, "When I hear the word 'micromanagement' I go, 'It depends.' How much do you want your tax return micromanaged by your accountant? Exquisitely or just kind of haphazardly?"⁷²

Haphazard or not, shifting the nuclear enterprise from a culture of micromanagement to a culture of qualified people empowered to accomplish the mission is a phenomenal opportunity for munitions officers to assume ownership of the career field and consider both, bold and broad changes in functional ideology.

RECOMMENDATIONS

Recommendation 1 – During the next 21M Utilization and Training Workshop (U&TW), reevaluate all specialized 21M/Munitions Officer courses (i.e. Conventional Maintenance Officer Course, NMOC, ICBM Missile Maintenance Officer Course, etc.) to exploit maintenance fundamentals. Emphasis should target a reinforcement of maintenance fundamentals for integration into subsequent specialized course versus teaching the same lessons from Munitions and Missile Maintenance Officer Fundamentals Course. **Rationale:** Even though there has been value focusing on the differences between the three shreds, it has inadvertently furthered the gap on maintenance fundamentals that are the foundation or commonality associated with all officer and enlisted maintenance career fields. For example, AFI 21-101, *Aircraft and Equipment Maintenance* is the basic AFI for all weapon system and support equipment maintenance management.⁷³ For a munitions officer, AFI 21-200, *Munitions and Missile Maintenance Management* is the next level of AFI providing strategic structure for munitions units and the policy framework for nuclear, conventional, and missile organizations.⁷⁴ If you are a munitions officer in an ICBM unit, you are further augmented by AFI 21-201, *Conventional Munitions Management*, AFI 21-202, Volume 1, *Missile Maintenance Management*, AFI 21-203, *Nuclear Accountability Procedures* and AFI 21-204, *Nuclear Weapons Maintenance*. Because of this, a munitions officer in an ICBM unit is in danger of maintenance fundamentals becoming diluted; for example, supply discipline (AFI 21-101), parts

residue (AFI 21-101), special certification roster (AFI 21-101 and AFI 21-200), tool control (both AFI 21-101 and AFI 21-200) and conventional munitions custody account management (AFI 21-201).⁷⁵ Conversely, munitions officers in non-nuclear units run into the same type of problem with diluted nuclear enterprise focus; for example, accountability and maintenance of Department of Energy support equipment (H1125A bolsters and H1242 castors at Joint Base Lewis-McChord) or Dull Sword reporting of nuclear certified equipment (MHU-141, Munitions Handling Trailers at Balad AB). At the fundamental core, a munitions officer must always identify as a munitions officer vice award of an entry level AFSC 21M shred.

Recommendation 2 – Consider mandating the minimum rank for nuclear account MASOs to be a Captain (or higher), with Tier 1 Departmental Level waiver approval (MAJCOM Commander and concurring HAF publication approving official) required for anything lower. Additionally, consider requiring the lowest echelon position of a nuclear account MASO as an extension from the maintenance supervision level to ensure full spectrum integration. **Rationale** - Current Munitions Officer Career Progression Chart identifies the position of MASO as an entry level position. This is a huge mistake in regards to nuclear accounts. Even though one year nuclear maintenance experience is required before appointment (AFI 21-203), this does not adequately prepare lieutenants MASOs for their responsibilities, nor does it posture a MASO for success.⁷⁶ For example, the USAF continues to identify the Nuclear Enterprise as the number one priority, and yet throughout the last ten years, the four biggest nuclear weapons accounts have continually been managed by lieutenants.

Please note that this is not a slight on the lieutenants running these accounts. In fact, the lieutenant MASO responsible for the largest physical movement of nuclear weapons to occur after the unauthorized transfer between MAFB and BAFB performed flawlessly and was

specifically highlighted in the *Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management Phase II: Review of the DoD Nuclear Mission* (December 2008).⁷⁷

However, even though a huge accomplishment and success for munitions officers, this is not the norm or a reflection of continued success. This is further exacerbated as time and time again, we place the lieutenant MASO in the NOCM/Nuclear Accountable Reporting Section as the de facto Officer in Charge (OIC). To succeed and excel as a nuclear MASO, the officer must have a firm understanding of the scheduling process, breadth and experience in how maintenance is conducted and reported, and most importantly, how everything is integrated with the squadron, group and wing.

Recommendation 3 – Mandate conventional munitions accounts as a responsibility of the Munitions Officer career field, with Tier 1 Departmental Level waiver approval (MAJCOM Commander and concurring HAF publication approving official) required for any deviation (enlisted or differing officer AFSC). **Rationale:** One of the consequences with the munitions officer being eliminated in 1993, was the removal of officer MASOs from conventional munitions accounts. Mandating munitions officer/MASO responsibility would provide increased opportunities for lieutenants to start gaining breadth and experience as MASOs for the multiple smaller conventional munitions accounts. However, for the bigger conventional munitions accounts supporting fighter and bomber wings, consider mandating the minimum rank of captain (or higher), with Tier 1 Departmental Level waiver approval (MAJCOM Commander and concurring publication approving official) required for anything lower. As with recommendation 2, also consider requiring the lowest echelon position for captain MASOs to be as extension from the maintenance supervision level to ensure full spectrum integration.

Recommendation 4 – During the next 21M U&TW, review and rebalance all lieutenant OIC, section and flight commander manning positions USAF wide. **Rationale:** There is a huge disconnect with lieutenant manning positions for a MXG in a Missile Wing in relation to a MXG in other wings (fighter, bomber, etc.). For example, there are multiple OIC or section commander positions filled within an ICBM Missile Maintenance Squadron (MMXS). However, a similar sized Munitions Squadron (MUNS) (with or without a nuclear mission) or large munitions flight, may have no OIC positions filled to grow lieutenants. In addition to must fill ICBM maintenance opportunities for munitions officers, MUNS opportunities (must fill considerations) that could greatly benefit both lieutenant growth and experience include production flight, munitions materiel flight, or special weapons flight.

Recommendation 5 – Maximize opportunities for munitions officers to apply conventional munitions production in a combat environment. **Rationale:** Even though 21MxA Conventional Munitions Officers are recommended to attend Air Force Combat Ammunition Center's Combat Ammunition Planning and Procedures Course as a lieutenant (within 12 to 24 months of assignment) and again as a captain, opportunities to exercise and apply course lessons downrange are not as robust as one would think.⁷⁸ Specifically, even though there is only anecdotal evidence to support, munitions officers downrange are viewed as unnecessary in favor of AFSC 21A, Aircraft Maintenance and 2W0, Munitions Systems SNCOs to oversee conventional munitions production and operations. If a 21M does deploy downrange, they are usually filling an Aircraft Maintenance billet as opposed to a Munitions Officer billet.

It is important to note that the nuclear enterprise is critical to the munitions officer career field. However, for the munitions officer to remain credible, it must ensure expertise and

balance in all three shred disciplines, which includes all aspects of conventional munitions maintenance.

Recommendation 6 – Maximize opportunities for munitions officers and other AFSCs to attend non-AFSC awarding munitions officer courses; specifically, NAC and Conventional Munitions Accountability courses. **Rationale** Conventional munitions and nuclear weapons accountability are critical to the munitions officer career field. However, their value is not necessarily leveraged to the fullest extent possible outside offices responsible for the day to day management. For example, even though there is only anecdotal evidence to support, there is a large portion of AFSC 21A, Aircraft Maintenance and 21MxI, ICBM Maintenance at the group and squadron commanders who have never attended either course. This is discerning in consideration of a recommendation from the ACC CDI which emphasized the need of a nuclear course for commanders which would include nuclear accountability and custody instruction.⁷⁹ Lastly, and even more telling, is the amount of enlisted 2W0 and 2W2 SNCOs and quality assurance evaluators who have not attended either of their respective courses.

Examples of officer and enlisted AFSC (and brief justification) that could potentially leverage both courses attendance and overall situational awareness (strategic, operational and tactical) are:

- AFSC 21A, Aircraft Maintenance - Aircraft Maintenance Squadrons (AMXS) are responsible for real world munitions expenditures (conventional munitions accountability). Additionally, nuclear bomber and dual capable aircraft AMXSs are responsible for custody transfer of nuclear weapons (nuclear weapon accountability). Subsequently, the majority of aforementioned squadrons will have at least one conventional munitions custody account (conventional

munitions accountability). Lastly and most importantly, depending on wing mission and organizational structure, munitions flights of various sizes are attached to Logistic Readiness, Consolidated Aircraft Maintenance, Equipment Maintenance, or Maintenance Squadrons.

- AFSC13N, ICBM Operations; AFSC 21MxI, ICBM Maintenance; and AFSC 2M0, ICBM Maintenance - Missile maintenance group and squadron leadership are responsible for the custody transfer of nuclear weapons (nuclear weapon accountability). Lastly, MMXSs will have at least one conventional munitions custody account (conventional munitions accountability).⁸⁰
- AFSCs 2W0, Munitions Systems and 2W2, Nuclear Weapons - Even though there only anecdotal evidence to support, there is a large portion of SNCOs and QA evaluators in both career fields who have never attended either course.⁸¹

Opportunities for munitions officers and other AFSCs to attend non-AFSC awarding munitions officer courses will enhance critical self-assessment by MXG leadership and the different types of maintenance squadron commanders who have oversight of these activities. Renewed focus on these courses will also mitigate like findings from the Donald Report whereas it was identified leadership did not have the background or experience necessary to recognize poor performance before major organizational failure occurs.⁸²

Recommendation 7 – Create officer and enlisted Special Experience Identifiers (SEIs) for nuclear weapons and conventional munitions accountability experience. **Rationale:** As a result of the *Independent Assessment of the Air Force Nuclear Enterprise* (April 2011) identifying assignment policies not taking full advantage of personnel with SEIs assigned, renewed focus in regards to conventional munitions and nuclear weapons accountability presents

an opportunity to leverage and support SEIs as a management tool.⁸³ Additionally, SEI management of accountability experience will ultimately facilitate Air Force Personnel Center filling required experience (AFI 21-201 and AFI 21-203) necessary for MASO positions USAF wide.

Recommendation 8 – During the next 21M U&TW, consider reevaluating Career Field Education and Training Plan (CFETP)’s Air Force In-Residence Course List to potentially leverage other opportunities for munitions officers. **Rationale:** Munitions officers have always been encouraged to pursue courses that apply to their duties and deepen their technical knowledge. However, the current CFETP’s Air Force In-Residence Course List does not codify or maximize opportunities. For example, AFSC 21M CFETP does not include the following courses:

- AETC’s Advance Nuclear Concepts Courses (Nuke 100, 200, and 300)
- J3AZR2W051 047A, Missile Maintenance (AIM-9M)
- J3AMP2W0X1 A47A, Missile Maintenance, (AGM-88 Series)
- J3AMP2W0X1 E47A, Missile Maintenance, (AGM-65 Series)
- United States Air Force in Europe, Vault Maintenance Course
- 20th Air Force Advances ICBM Operations Course
- Any 21AX1 Aircraft Familiarization Courses

As explained in Recommendation 6, courses such as these have the potential for munitions officers to gain knowledge and experience necessary to recognize poor performance before a major organizational failure occurs.⁸⁴

Recommendation 9 – Consider a formalized competitive selection process for officers wishing for exchange opportunities with AFSC 21A, Aircraft Maintenance, thus creating a

program similar to management of 21M/13N exchange opportunities (Missile Operations and Missile Maintenance Exchange program). **Rationale:** No one can discount the maintenance similarities between munitions and aircraft maintenance, nor the importance of knowledge and assimilation of flight line operations to conventional munitions and nuclear weapon operations (custody transfer, pilot proficiency requirements, training missile management, load training munitions, Cartridge Actuated Devices/Pneumatic Actuated Devices, etc.). However, if the munitions officer wishes to remain credible for the USAF, and most importantly, to the men and women they lead and serve, straying too far away from MSAs, WSAs or missile fields will continue to compromise their relevance.

Recommendation 10 – Consider limiting 13N (and potentially recommendation 9, AFSC 21A) exchange tours to two years versus three years. **Rationale:** This will ensure the munitions officer has assignments in at least two shreds (three years each) and a two year exchange tour before becoming a “senior” captain and serving as a munitions/maintenance operations officer. Doing so will support, ensure and enhance AFSC 21M career progression.

Recommendation 11 – Recommend an independent assessment exploring the possibility of EOD returning back to the munitions officer career field and functional alignment under MUNNS/Munitions Flight organizational structure. **Rationale:** Historically, EOD was part of the Munitions Officer career field.⁸⁵ When the Munitions Officer career field was eliminated in 1993, the EOD portion was incorporated into CE as a result of their relationship with emergency response. Yes, emergency response is an important aspect of EOD. However, the men and women encompassing the EOD enlisted career field are functionally more aligned with conventional munitions and nuclear weapons operations, as opposed to CE. A specific example

highlighting this commonality is the EOD Nuclear Training Path which includes emphasis on nuclear weapons design, physics, safety, and component subsystems.⁸⁶

Recommendation 12 – Recommend divorcing all Munitions Flights from existing Logistic Readiness, Consolidated Aircraft Maintenance, Equipment Maintenance, and Maintenance Squadrons. If the munitions flight is not large enough to create a MUNS, recommend creating a “Munitions” Detachment reporting directly to their respective Group Commander. **Rationale:** There is a disconnect between AFI 21-101, AFI 21-200 and AFI 21-201 in regards to organizational flow for the munitions flight within these type of squadrons. Specifically, because these type of squadrons are aircraft centric, the individuals filling actual maintenance supervision roles are filled from the aircraft community (AFSC 21A/2A), and not from a weapons/munitions maintenance (AFSC 21M/2W) whereas they would have the necessary education and experience (recommendation 6). Because of the aircraft community’s lack of munitions experience, munitions flight commanders/chiefs are actually filling the role of maintenance supervision. Subsequently, this also applies to section chiefs who are then actually filling the role of flight chiefs. Integrating detachments would also have the benefit of creating opportunities for lieutenants to gain breadth and experience needed to transform them into the munitions officers needed for the future.

CONCLUSION

One has no choice but to acknowledge the pivotal significance of the unauthorized transportation of nuclear warheads from MAFB to BAFB and the mistaken shipments of classified components to Taiwan has had on the Munitions Officer career field. Major General Dick Newton, Assistant Deputy Chief of Staff Operations speaking on the ACC CDI, stated that “nothing like this has ever occurred” and that this “was an isolated incident”.⁸⁷ His statements

are true in regards to inadvertent shipment of nuclear warheads between MAFB and BAFB. However, this has proven not to be an isolated incident for the nuclear enterprise as HAF/A10, AFGSC, and AFNWC continue to address additional maintenance related incidents, to include the 2010 FE Warren's communications outage and the 2014 Bent Spear incident.⁸⁸ Even though there is continued focus, momentum and critical assessment within the USAF as a result of the recommendations outlined in the latest SecDef's report (2014), further analysis and discussion are required. Especially for the munitions officer, as the USAF continues along the *Air Force Nuclear Enterprise Flight Plan* (2013), forward to meet the overarching force development of the *Air Force Future Operating Concept* (2015), and onward towards the anticipated environment and challenges of 2035.



ENDNOTES

¹ I wish to thank Dr. Ronald Dains for his thoughtful comments and suggestions. All errors found herein are my own.

² Eric K. Fanning and Mark A. Welsh, III, *Flight Plan for the Air Force Nuclear Enterprise*, 26 June 2013, p. 1; Larry D. Welch and John C Harvey, Jr., *Independant Review of the Department of Defense Nuclear Enterprise*, 2 June 2014, p. 29.

³ For practicality in preventing confusion and the reduction of overutilization with redundant AFSC alpha numeric codes and subsequent nomenclature, the term *munitions officer* will be used to represent the entirety of the career field which will include AFSC 21M, Munitions and Missile Maintenance Officer; AFSC 21MXA, Conventional Munitions Officer; AFSC 21MXI, ICBM Maintenance Officer; and AFSC 21MXN, Nuclear Maintenance Officer. Only when necessary will the differences between the three shreds be highlighted.

⁴ Larry D. Welch., *Report of the Unauthorized Movement of Nuclear Weapons*, February 2008 (Revised April 2008), p. 2; Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007; Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, pp. 239-240.

⁵ Larry D. Welch, *Report of the Unauthorized Movement of Nuclear Weapons*, February 2008 (Revised April 2008), p. 2; Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007.

⁶ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007.

⁷ Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 240.

⁸ Larry D. Welch, *Report of the Unauthorized Movement of Nuclear Weapons*, February 2008 (Revised April 2008), p. 3; Ken Theurer and James Russel, "Why Military Justice Matters", *The Reporter*, Summer 2010, p. 9.

⁹ James Schlesinger, *Phase I: The Air Force's Nuclear Mission*, September 2008, p. 30.

¹⁰ Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 240.

¹¹ James Schlesinger, *Phase I: The Air Force's Nuclear Mission*, September 2008, p. 13; Josh White, "Nuclear Parts Sent to Taiwan in Error", *Washington Post*, 26 March 2008, Accessed January 17, 2016, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>; Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 241.

¹² Josh White, "Nuclear Parts Sent to Taiwan in Error", *Washington Post*, 26 March 2008, Accessed January 17, 2016, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>.

¹³ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 13; Josh White, "Nuclear Parts Sent to Taiwan in Error", *Washington Post*, 26 March 2008, Accessed January 17, 2016, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>.

¹⁴ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 13.

¹⁵ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 13; Josh White, "Nuclear Parts Sent to Taiwan in Error", *Washington Post*, 26 March 2008, Accessed January 17, 2016, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>.

¹⁶ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 13; Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 241.

¹⁷ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 13; Josh White, "Nuclear Parts Sent To Taiwan in Error", *Washington Post*, 26 March 2008, Accessed January 17, 2016, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008; Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 241.

¹⁸ Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 243.

¹⁹ Barbara Starr and James McIntyre, "Air Force officers relieved of duty over loose nukes." *CNN*. 19 October 2007, accessed January 17, 2016. <http://www.cnn.com/2007/US/10/19/loose.nukes/>; Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 243.

²⁰ Donald C. Alston, *Reinvigorating the Air Force Nuclear Enterprise*, 24 October 2008, p. 1.

²¹ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 82; Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6.

²² Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 82.

²³ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007, pp. 31-46; Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 82.

²⁴ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 87; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, p. 47.

²⁵ *Ibid.*

²⁶ K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, pp. G-1 - G-18.

²⁷ *Ibid.*, pp. H-33 - H-36.

²⁸ Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6.

²⁹ Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6; Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, p. 65.

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- ³⁰ Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6-7; Department of the Air Force, *AFSC 21MX Munitions and Missile Maintenance Officer Career Field Education and Training Plan*, 12 November 2014, p. 13; Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, pp. 65-66; Polly A. Peyer, *Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures*, 8 February 2008, pp. 18-19.
- ³¹ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007, p. 53; Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, pp. 22, 42-43, 55, and 82; Donald C. Alston, *Reinvigorating the Air Force Nuclear Enterprise*, 24 October 2008, pp. 46-47.
- ³² Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, p. 65.
- ³³ Department of the Air Force, *AFSC 21MX Munitions and Missile Maintenance Officer Career Field Education and Training Plan*, 12 November 2014, pp. 10-11; Andrew Salloum, *Addressing the Lack of Nuclear Expertise in Munitions Officers: Merging the 13S and 21M ICBM Career Fields*, 12 June 2010, p. 4.
- ³⁴ George Woodward, "Sheppard officials launch Nuclear Accountability Course", *U.S Air Force*, 6 October 2009, Accessed 7 March 2016, <http://www.af.mil/News/ArticleDisplay/tabid/223/Article/118925/sheppard-officials-launch-nuclear-accountability-course.aspx>.
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- ³⁶ Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, p. 65; Kim Brooks, "Missile and Munitions Maintenance Officers: The Air Force's Real Secret Weapon", *Exceptional Release*, Summer 2015, p. 11.
- ³⁷ Polly A. Peyer, *Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures*, 8 February 2008, p. 38.
- ³⁸ Air Force Regulation 136-12, *Combat Ammunition Operations Policy*, 24 August 1990, p. 250.
- ³⁹ Polly A. Peyer, *Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures*, 8 February 2008, p. 38; Air Force Regulation 20-14, *Management of Government Property in Possession of the Air Force*, 3 August 1984, p. 4; Air Force Regulation 20-14, *Management of Government Property in Possession of the Air Force*, 21 July 1989, Change 2, 26 December 1990, p. 5.
- ⁴⁰ Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6; Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, p. 65; Air Force Instruction 21-204, *Nuclear Weapons Procedures*, 5 August 1994, p. 14.
- ⁴¹ Polly A. Peyer, *Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures*, 8 February 2008, p. 38; Air Force Instruction 21-204, *Nuclear Weapons Procedures*, 5 August 1994, p. 14.
- ⁴² Air Force Instruction 21-202, *Combat Ammunitions Systems Procedures*, 25 July 1994, p. 5.
- ⁴³ Interview Maj Shane Lensgraf, 28 March 2016; Air Force Regulation 20-14, *Management of Government Property in Possession of the Air Force*, 3 August 1984, p. 4.

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- ⁴⁴ Interview Maj Shane Lensgraf, 28 March 2016; Air Force Regulation 20-14, *Management of Government Property in Possession of the Air Force*, 21 July 1989, Change 2, 26 December 1990, p. 5.
- ⁴⁵ Air Force Instruction 21-202, *Combat Ammunitions Systems Procedures*, 25 July 1994, p. 5; Air Force Instruction 21-204, *Nuclear Weapons Procedures*, 5 August 1994, p. 14.
- ⁴⁶ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007. p. 52.
- ⁴⁷ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007. p. 53; Polly A. Peyer, *Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures*, 8 February 2008. p. 38.
- ⁴⁸ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 87; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, p. 47.
- ⁴⁹ Shirley D. Ross, *Final Report: Nuclear Enterprise Human Capital Strategy and Execution Progress 2010-2012*, 15 October 2012, p. 40.
- ⁵⁰ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 87; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, p. 47.
- ⁵¹ Donald C. Alston, *Reinvigorating the Air Force Nuclear Enterprise*, 24 October 2008, p. 19.
- ⁵² *Ibid.*, p. 20.
- ⁵³ James Schlesinger, *Secretary of Defense Task Force on Department of Defense Nuclear Weapons Management, Phase II: The DoD Nuclear Mission*, December 2008, p. vii.
- ⁵⁴ Donald C. Alston, *Reinvigorating the Air Force Nuclear Enterprise*, 24 October 2008, p. 27.
- ⁵⁵ Larry D. Welch, *Independent Assessment of the Air Force Nuclear Enterprise*, April 2011, p. 12.
- ⁵⁶ *Ibid.*, p. 21.
- ⁵⁷ Larry D. Welch, *Air Force Nuclear Enterprise Follow-on Review*, April 2013, pp. preface and 1.
- ⁵⁸ Larry D. Welch and John C. Harvey, Jr., *Independent Review of the Department of Defense Nuclear Enterprise*, 2 June 2014, pp. 13 and B-1 to B-2.
- ⁵⁹ *Ibid.*, pp. 7-10.
- ⁶⁰ *Ibid.*, p. 7.
- ⁶¹ *Ibid.*, p. 8.
- ⁶² *Ibid.*, p. 8.
- ⁶³ Larry D. Welch, *Air Force Nuclear Enterprise Follow-on Review*, April 2013, p. 8.
- ⁶⁴ Larry D. Welch and John C. Harvey, Jr., *Independent Review of the Department of Defense Nuclear Enterprise*, 2 June 2014, p. 8.
- ⁶⁵ *Ibid.*, p. 9.
- ⁶⁶ Larry D. Welch, *Air Force Nuclear Enterprise Follow-on Review*, April 2013, p. 16.
- ⁶⁷ Larry D. Welch and John C. Harvey, Jr., *Independent Review of the Department of Defense Nuclear Enterprise*, 2 June 2014, pp. 8-9.
- ⁶⁸ *Ibid.*, p. 11.
- ⁶⁹ *Ibid.*, p. 11.

⁷⁰ Robert Burns, “AP Interview: AF Should Empower Young Nuke Leaders”, *Associated Press*. 25 June 2014, Accessed on 15 February 2016, <http://news.yahoo.com/ap-interview-af-empower-young-nuke-leaders-231405366--politics.html>.

⁷¹ Ibid.

⁷² Ibid.

⁷³ Air Force Instruction 21-101, *Aircraft and Equipment Maintenance Management*, 21 May 2015, p. 1.

⁷⁴ Air Force Instruction 21-200, *Munitions and Missile Maintenance Management*, 2 January 2014, p. 1.

⁷⁵ In particular to conventional munitions custody account management, reference point was in regards to inexperience of ICBM Maintenance and Nuclear Maintenance Officers with managing this type of task. Even though it is identified as a core task for 21M3A, Conventional Munitions (CFETP), it is not a core requirement applicable to all shreds.

⁷⁶ Air Force Instruction 21-203, *Nuclear Accounting Procedures*, 18 September 2014, p. 25.

⁷⁷ James Schlesinger, *Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management Phase II: Review of the DoD Nuclear Mission*, December 2008, p. 62.

⁷⁸ Department of the Air Force, *AFSC 21MX Munitions and Missile Maintenance Officer Career Field Education and Training Plan*, 12 November 2014, pp. 10-11

⁷⁹ Douglas Raaberg, *Commander Directed Report of Investigation* (Unclassified, Redacted Version), October 2007, p. 52.

⁸⁰ Custody account management was added for emphasize in regards to ICBM Munitions Officers. It is still viewed by the author as a core foundation for all Munitions Officers (Recommendation 1).

⁸¹ It is important to note that NOCM materiel were once accounted for in CAS. A DIAMONDS spare module was specifically created because AFSC 2W2, Nuclear Maintenance Technicians did not want to use CAS. However, this has since changed as a result of the Donald Report whereas stricter controls for NWRM were created, which includes CAS accounting and management.

⁸² Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 87; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, p. 47.

⁸³ Larry D. Welch, *Independent Assessment of the Air Force Nuclear Enterprise*, April 2011, p. 15.

⁸⁴ Michelle Spencer; Aadina Ludin; and Heather Nelson, *The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components*, January 2012, p. 87; K. H. Donald, *Investigation into the Shipment of Sensitive Missile Components to Taiwan*, 22 May 2008, p. 47.

⁸⁵ Sandra Gregory, *Nuclear Munitions and Missile Maintenance Officer Attraction and Retention*, 24 March 2009, p. 6.

⁸⁶ Department of the Air Force, *AFSC 3E8X1 Explosive Ordnance Disposal Career Field Education and Training Plan*, 1 March 2016, p. 29.

⁸⁷ Barbara Starr, “Air Force Officers Relieved of Duty over Lose Nukes”, *CNN*, 19 October 2007, accessed 17 January 2016, <http://www.cnn.com/2007/US/10/19/loose.nukes/index.html>.

⁸⁸ Robert Burns, “Nuclear Mishap Withheld by Air Force from Review Team”, *Associated Press*, 25 January 2016, Accessed on 17 February 2016, <http://news.yahoo.com/nuclear-mishap->

[withheld-air-force-review-team-082945204.html](https://www.withheld-air-force-review-team-082945204.html); Robert M. Gates, *Duty Memoirs of a Secretary of War*, 2014, p. 452.



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