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DISSERTATION

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# Sustaining the Air Force Nuclear Enterprise through Officer Workforce Planning

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This document was submitted as a dissertation in January 2011 in partial fulfillment of the requirements of the doctoral degree in public policy analysis at the Pardee RAND Graduate School. The faculty committee that supervised and approved the dissertation consisted of Bart Bennett (Chair), Ray Conley, and Jim Quinlivan.



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## SUMMARY

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While highly proficient and vigilant through the Cold War, two prominent United States Air Force (USAF) nuclear-related accidents highlighted the steady erosion of credible United States (US) nuclear deterrence since the end of the Cold War. In 2006, classified nuclear-related Intercontinental Ballistic Missile (ICBM) components, labeled as helicopter batteries, were shipped to Taiwan in an arms sale. In 2007, a B-52 Stratofortress crew mistakenly flew six nuclear warheads from Minot Air Force Base (AFB), North Dakota, to Barksdale AFB, Louisiana, and left the missiles sitting relatively unsecured for nearly 10 hours. These incidents alerted the US Department of Defense (DoD) to even broader problems within USAF nuclear operations.

Several ensuing independent investigations revealed the serious erosion of nuclear mission readiness, resources, a vigilant nuclear culture, and expertise within the USAF Nuclear Enterprise. After reviewing and consolidating the myriad of recommendations designed to remediate these broad problems, the USAF established a strategic plan in 2008, titled “Reinvigorating the Air Force Nuclear Enterprise,” to restore high-quality USAF nuclear operations. But, the USAF does not know how or if personnel initiatives will sustain nuclear expertise. Specifically, USAF leaders do not know whether officers in nuclear-focused career fields are adequately prepared for their jobs. Assuming that human capital development is one relevant factor that helps produce effective nuclear operations, this dissertation supports the US national security and USAF objective of credible nuclear deterrence by capturing the benefits of properly developing officers in nuclear-oriented career fields. Specifically, this dissertation investigates how nuclear workforce policies might properly develop and sustain *useful* and *effective* human capital that provides the USAF with safe, secure, and credible nuclear operations.

Using competency-based workforce planning methods to examine the sustainability of the overall assignment and development of nuclear-oriented officer career fields, this dissertation concentrates on nuclear-oriented bomber pilots (i.e.,

11BX), bomber combat systems officers (i.e., 12BX) and missile combat crew officers (i.e., 13SXC).<sup>1</sup> This research

- Identifies the competencies – education, training, and work experience – that are necessary for officers to satisfactorily perform in a variety of jobs in nuclear-focused officer career fields (i.e., demand).
- Assesses the competencies the Fiscal Year (FY) 2009 officer workforce accumulated over their careers (i.e., supply).
- Measures and identifies the gaps between the demand and supply.
- Models status-quo officer assignment and development patterns in a variety of scenarios via simulation to determine how the competency gaps might change in the near future.

The results of the analyses are described below.

### **COMPETENCIES *REQUIRED* FOR NUCLEAR-RELATED JOBS**

Using competency models, this dissertation shows that nuclear-oriented, individual-level competencies can be systematically identified and linked to 11B, 12B, and 13SXC nuclear-related jobs. This research used focus groups with Air Force Personnel Center (AFPC) assignment managers to rate the importance of at least 80 specific competencies required to adequately perform approximately 2,500 11B, 12B, and 13SXC jobs in officer grades O-1 through O-6. The competencies are sorted in seven categories:

- *Operational experience*: tactical application of B-2, B-52, or space and missile systems.
- *Specialty experience*: identified according to the Air Force Specialty Code (AFSC) prefix structure.
- *Organizational experience*: group, wing, numbered air force, combatant command, and others related to specific organizations or organizational hierarchy.

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<sup>1</sup> Each of these career fields occupy most of the critical nuclear jobs and are likely to become the Nuclear Enterprise's future leaders. Because these career fields are inherently different in size, function, and development patterns, each had to be analyzed in slightly different manners to account for the inherent differences. Note that a total of five different career field specialties are analyzed in this analysis: B-2 and B-52 pilots, B-52 electronic warfare officers and B-52 navigators, and missile combat crew officers.

- *Functional experience*: functional duty such as acquisitions, standardization and evaluation, operations, operational requirements, plans, test, or nuclear operations.
- *Nuclear Special Experience Identifier (SEI) experience*: all nuclear-related SEIs to identify specific nuclear skills.
- *Command experience*: including flight, squadron, group, wing, or center command.
- *AFSC-specific SEI experience*: any SEI eligible for the officers in the career field to acquire and related to nuclear operations.

Because some jobs inherently require similar competencies, each of the 2,500 11B, 12B, and 13SXC jobs were categorized into nearly 200 job-groups using subject matter experts and the AFPC assignment managers to refine the groups based on the job's function and placement within organization hierarchy. AFPC assignment managers then rated each competency as critical, important, or not needed to achieve sufficient job performance in each of the 200 job-groups.<sup>2</sup> Because the 11B and 12B officers occupy similar jobs and utilize similar competencies, one competency model reflects the rated job-groups and competencies while another links the competencies with ICBM job-groups.

Although the USAF does not heavily rely on individual competencies listed within its career field classification structure to deliberately plan the development of its officers, the USAF may utilize this information to proactively match officers to nearly 200 job-groups. Lower echelon jobs typically require fundamental nuclear experience relevant to each career field and higher-echelon jobs require more specific competencies that supplement the fundamental competencies. While the average number of required competencies generally increases across grades, different competency types may be required more often in different officer grades. AFSC prefixes, command, and organizational competencies are required more often in higher grades whereas functional, operational, and SEIs are required more often in early grades. Beyond knowing the number and general type of jobs requiring each specific competency, understanding the

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<sup>2</sup> The competency models reflect how fundamental experts (i.e., AFPC assignment managers) understand the skill demands for jobs *now*, but competency requirements will likely change as the USAF adapts its nuclear deterrence mission to a dynamic security environment. If the USAF intends to utilize this integrated competency framework to develop its nuclear cadre, the USAF should continue to refine the competency models as the nuclear mission changes.

combinations of competencies for these jobs is even more important. Using hierarchical cluster analysis, the resulting clusters appear to characterize jobs according to three factors: 1. command or staff jobs, 2. organization level, and 3. nuclear-related or not.

Approximately half of 11B, 12B, and 13SXC O-4 and O-5 jobs merely require nuclear operations experience coupled with some other functional or AFSC prefix competency. Beyond these two competency types, the other half of O-4 and O-5 jobs require several more specific functional, command, or nuclear SEI competencies. Most of these jobs require at least four competencies and exist in higher-echelon staff and command billets such as 8<sup>th</sup> and 20<sup>th</sup> Air Force, Air Force Global Strike Command, or US Strategic Command. Most 11B, 12B, and 13SXC O-6 jobs require four or more competencies in combination with nearly all requiring nuclear operations experience, above squadron-level staff experience, specific functional experience (e.g., standardization and evaluation), and AFSC prefix. When matching officers to jobs, the USAF should recognize these groups of competencies relevant to certain clusters of jobs instead of attempting to match officers to jobs based on solitary competencies. Understanding jobs according to their broad requirement trends provides greater insight into job requirements while also allowing the USAF assignment process to more easily find suitable officers to occupy a job.

### **COMPETENCIES *ACQUIRED* FOR NUCLEAR-RELATED JOBS**

Using historical personnel records from AFPC at Randolph AFB, Texas, this research examined over 4,800 11B, 12B, and 13SXC officers' accumulated education, training, and experience according to the same nuclear competencies used to characterize nuclear-related job requirements.<sup>3</sup> Officers in all three career fields acquire a large number of new competencies in each officer grade, but the number of competencies typically varies according to the career field. Officers likely acquire a large number of competencies due to frequently changing jobs<sup>4</sup> as only 20 percent of officers across all

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<sup>3</sup> Officers included in the sample satisfied three criteria: 1. the officer had at least one tour in an 11B, 12B, or 13SXC job at any time since 1975, 2. the officer was on active duty in FY2009, and 3. the officer was in grades O-1 to O-6 in 2009.

<sup>4</sup> The high turnover rate provides officers plenty of opportunities to acquire new competencies, but simultaneously may encourage competency mismatches as officers may not occupy a job long enough to fully acquire some competencies. The USAF should monitor this turnover rate and assess whether the trend accurately reflects the desired career paths and patterns for officers in each career field.

five career field specialties held the same job in FY2008 and FY2009. Additionally, these career fields utilize officers from other career fields to either help with manning gaps or allow non-nuclear officers to acquire nuclear-related experience. The 11B career field more readily utilizes officers from other pilot career fields as compared to the 12B and 13SXC career fields and the 13SXC career field rarely utilizes officers outside of the 13S functional area except to occupy more technical jobs related to acquisition or engineering.

Although undergraduate education is not deemed critical to current or future job performance in these three career fields, most officers match the USAF-recommended academic backgrounds for each career field. However, a decreasing proportion of recent cohorts in several nuclear-oriented career fields meet these academic recommendations which may become problematic, particularly for these nuclear career fields, if this trend continues. Consistent with the view that undergraduate education is not critical for job performance in these nuclear career fields, the AFPC assignment managers did not identify academic education as a pertinent for sufficient performance in any job. However, academic education likely enhances an officer's job performance in certain jobs and these career fields should reexamine if nuclear-related jobs require specific academic education.

Officers from each functional area acquire a significant amount of nuclear operational experience from both staff and command jobs. When compared to their junior counterparts, the 11B and 12B senior officers acquired more operational experience with the B-1 on average as officers occupied bomber jobs for the B-1, B-2, or B-52 due to the B-1 being dedicated to the nuclear mission prior to 1997. Given that today's strategic bombing mission is dedicated to the B-52 and B-2, 11B and 12B junior officers are more likely to solely gain B-2 and/or B-52 operational experience and future 11B and 12B senior officer cohorts should be expected to have less B-1 experience. Similarly, prior to 2008, all 13SXC officers left the career field to gain space-related experience after serving in 13SXC fundamental jobs, but current policy directs a proportion will be retained to develop greater nuclear-related depth in the 13SXC career field.<sup>5</sup> Assuming the policy remains across several future 13SXC officer cohorts, a

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<sup>5</sup> The proportion has typically ranged between 25 and 35 percent.

higher proportion of the future, senior-level 13SXC officers will only have missile experience.

As a method to track the overall level of nuclear expertise in nuclear-oriented career fields, the USAF added several nuclear-oriented SEIs to its officer career field classification structure. These SEIs track an officer's accumulated time in operational and general nuclear-related jobs. However, the criteria for the operational-oriented SEIs incorrectly track how officers acquire nuclear operational experience. Because an incorrect SEI coding definition prevents officer records from accurately reflecting an officer's accumulated nuclear experience, the nuclear SEIs significantly underestimate the amount of nuclear operations experience in each officer career field.<sup>6</sup> These officers will simultaneously appear to lack sufficient nuclear experience for some jobs. Therefore, USAF nuclear-oriented officer career fields will not be capable of accurately monitoring aggregate nuclear operations experience and future officer development policies could be based on incorrect analysis unless the SEI criteria are refined.

11B, 12B, and 13SXC officers acquire nuclear experience from both staff and command positions, but a larger share of 11B officers occupy command positions compared to 12B and 13SXC officers. As of FY2009, senior 12B officers do not appear as competitive for nuclear command positions since a greater proportion of 11B officers acquire flight command and nuclear operational squadron command jobs compared to 12B officers. Note that 13SXC officers do not compete with officers from other career fields for operational command jobs and most receive command experience from ICBM flight or squadron command.

Because the nuclear deterrence mission is no longer the "tip of the spear" in USAF operations and because of the strict operational environment where one mistake could cost an officer their career, the USAF may not be able to attract officers with the inherent personal characteristics that the nuclear deterrence mission requires. As of FY2009, only two and four percent of all 12BXD (Electronic Warfare Officers) and 12BXE (Navigators) officers attained distinguished graduate (DG)-status from their commissioning source and approximately six percent of all 13SXC officers are DGs as of

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<sup>6</sup> Although officers may be actively acquiring nuclear mission operations experience in nuclear operational jobs, the SEI coding definitions prevent an officer from acquiring the SEI competency until the officer occupies a non-nuclear job.

FY2009.<sup>7</sup> Note that B-2 and B-52 pilots contain 23 and 12 percent DGs respectively. The overall decline in the proportion of DG-status officers may be attributed to fewer DG officers entering the career fields. For example, fewer than five percent of each 12B and 13SXC accessing cohort were DGs from FY1998 to FY2009 (bomber pilots averaged 10 percent during the same time period). Although the respective collegiate order of merit is not known for non-DG officers within the Nuclear Enterprise, this pattern suggests these career fields are acquiring fewer top-quality officers compared to other, non-nuclear career fields. While officers can be trained to sufficiently perform their duties regardless of DG-status, the nuclear-related 11B, 12B, and 13SXC career fields will be at a disadvantage if relatively fewer top-quality officers enter these nuclear career fields compared to the USAF's other career fields.

### **GAPS BETWEEN DEMAND AND SUPPLY**

11B, 12B, and 13SXC officers accumulate a large number of competencies by serving in a variety of jobs, but officers do not possess all the necessary competencies to sufficiently match nuclear-related job requirements. Certain competency types tend to match job requirements far more on average, however. The best matches for 11B, 12B, and 13SXC officers were for nuclear SEIs, operations, and career-field specific experience. The poorest matches came from AFSC prefixes, organizational, and command experience. Many of these matches are likely the result of poor assignment matches, but career development patterns also prevent enough officers from acquiring the competencies needed for certain nuclear-related jobs. Note that the incorrect criterion in the nuclear operations SEIs indicates significant competency gaps exist, but assuming the USAF revises the criterion, nearly all competency gaps no longer exist for the nuclear operations SEI competencies. Additionally, because most field grade officers within the rated career field acquire more than five years of nuclear operations experience, the USAF should add a third nuclear missions operations SEI to classify nine or more years of nuclear mission operational experience to further differentiate the amount of nuclear experience within the nuclear workforce. The additional nuclear SEI provides the

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<sup>7</sup> DG status is normally restricted to the top 10 percent.

additional benefit of tracking more specific aggregate and singular officer nuclear experience at the relatively low cost adding a solitary SEI to the 572 other SEIs.

Analyzing competency gaps in aggregate form is useful, but this research categorized each nuclear-related job into five different groups based on the job's overall function within the Nuclear Enterprise to determine the effect of competency gaps on the nuclear deterrence mission capability:

- *Tactical Employment*: fundamental jobs responsible for tactically employing nuclear weapons.
- *Primary Oversight*: jobs responsible for training and monitoring tactical operational performance.
- *Auxiliary Support*: staff jobs within nuclear operational units that support the operational commander's directives and bolsters tactical operations via planning, scheduling, and overseeing operations.
- *Operational Command*: command jobs within the nuclear operational units.
- *Strategic Guidance*: non-AFGSC nuclear jobs providing strategic nuclear guidance and non-operational support for the nuclear operational units.

Significant competency gaps exist across the four operational and strategic job categories. Many of the competency mismatches in auxiliary support staff jobs result from nuclear inexperience and lack of specific functional expertise. Particularly within the B-2 community, large shares of FY2009 B-2 officers in auxiliary support staff jobs transferred to the B-2 career field from a non-nuclear career field and therefore lack any nuclear operational experience. This trend is further problematic when officers without nuclear experience serve as the primary instructors for officers in nuclear tactical employment jobs. A large share of officers serving in primary oversight staff jobs also lacks functional experience related to the job's primary oversight function. Some competency gaps exist for leadership positions, but the 11B, 12B, and 13SXC career field appear to select the best officers for command and thereby typically meet the competency demands for the command billets. Lastly, broad, strategic functional expertise is often missing when officers serve in strategic nuclear jobs across all three career fields. Many of these gaps exist at the O-6 level where an insufficient number of officers acquired the

required functional experience to meet the overall job demands which thereby indicates problems with officer career development patterns.

Although a solitary job-category's competency gaps has not been shown to significantly contribute to the type of nuclear accidents the USAF seeks to prevent, the current competency gaps within the primary oversight jobs appear explicitly important. Because primary oversight jobs are responsible for training and guiding tactical employment jobs to adhere to strict operational standards, poor primary oversight job performance will likely be magnified in the tactical employment jobs as officers could be either trained incorrectly or remain unaware of certain critical operational standards. Note that competency gaps across the job categories could collectively contribute to a nuclear accident, but the abundant competency gaps within primary oversight jobs in FY2009 appear the most problematic to achieve safe, secure, and credible nuclear operations in the near future.

Career development patterns appear to prevent enough officers from acquiring necessary experience because of on-the-job-training style jobs. Officers must first serve in several strategic guidance-category jobs to acquire the competencies required for those jobs. Because officers cannot acquire the necessary competencies from any other job, officers do not match the competency requirements during their first job, but subsequently acquire and better match those requirements after serving in that on-the-job-training style job. Additionally, the USAF process of assigning personnel to jobs may also contribute to competency mismatches. Only 9.1, 8.8, and 12.5 percent of officers in the 11B, 12B, and 13SXC career fields perfectly matched the job requirements in FY2009. Despite the USAF's proactive steps to monitor nuclear expertise within the nuclear workforce, the USAF assignment process does not typically utilize SEIs to match personnel to jobs. If the USAF intends to effectively monitor nuclear experience within the nuclear workforce, the USAF must integrate the nuclear SEIs into the assignment process.

Besides career development and assignment problems, manning imbalances may be hindering the competency match. Several of the officer career fields addressed within this analysis are either undermanned entirely or sufficiently manned albeit with manning imbalances within the officer grades. Under-manning creates two competency-related

problems: 1. Too few officers may acquire competencies and 2. Officers may be assigned to critical, under-manned jobs contrary to anticipated jobs within normal career development patterns. Although the second aspect potentially ensures immediate, viable mission capability within the career field, officers assigned to these jobs do not typically match the required competencies very well. These poor competency matches result from officers assigned to these jobs as either 1. Officers from other, non-nuclear-oriented career fields or 2. Nuclear-oriented officers in the correct career field, but assigned to a job designated for a higher-ranking officer. While key nuclear jobs can be manned with an unqualified officer at minimum, the added strain of insufficient personnel or an excess number of unskilled personnel places unneeded strain on senior, skilled personnel and likely inhibits the unit's overall nuclear operational capability and performance.

### **IMPROVING NUCLEAR-ORIENTED OFFICER ASSIGNMENTS AND DEVELOPMENT PATTERNS**

The FY2009 competency match snapshot is likely to change and this dissertation used a finite-horizon, discrete-event, stochastic simulation model to project future competency matches. Several macro policy factors such as promotion, retention, and accession rates significantly affect a career field's ability to adequately develop its personnel and changes to any of these factors could either exacerbate or potentially improve the FY2009 competency gap snapshot. This analysis examined eight scenarios that reflect both peace- and war-time promotion, retention, and accession rates to determine how competency gaps might change in anticipated, future scenarios.

The baseline simulation results show similar competency gaps exist across officer grades, nuclear job categories, and career fields as found in the FY2009 competency gap snapshot. The simulation model demonstrates that if the officer assignment process would more clearly match jobs requiring specific competencies to officers possessing those specific competencies, then the results show the mean competency match for several nuclear job categories improves compared to the FY2009 values. The simulation results indicate each career field can adequately man and achieve fairly high competency matches in primary oversight and auxiliary support jobs, but 11B career fields continue to lack adequate competency matches for strategic guidance jobs since an insufficient

number of officers acquire the necessary competencies for those jobs. The baseline competency matches could be improved further with enhanced officer-to-job assignment matches.

Although changes to promotion, accession, and retention rates do not appear to substantially change competency matches, reducing the values of any of these macro policy levers significantly affects a career field's ability to man its jobs. Because under-manning leads to poor competency matches, lower retention, accessions, or promotions quantitatively induce dramatic competency match changes as too few personnel acquire the skills necessary for nuclear-oriented jobs. Specifically, retention rates exhibited during Major Combat Operations (MCO) dramatically affect the ICBM and 11B communities by decreasing overall manning levels and interrupting stable and proper officer development patterns. Low retention occurs because large shares of ICBM and 11B officers separate at their first retention point leaving relatively few officers to promote to subsequent grades. The B-52 pilot community also suffers competency gaps as a consequence from poor retention exhibited during Peacetime Contingency Operations (PCO) scenarios. Fortunately, command jobs for every career field appear resilient to changes in the wartime environment.

Two scenarios examined how quickly under-strength career fields could rebuild via expected schoolhouse rates when subjected to either PCO or MCO promotion and retention rates. Obviously, the Nuclear Enterprise could man these career fields with officers from other career fields as observed in practice, but *borrowing* from other career fields is neither a long-term solution nor likely effective to achieve error-free nuclear operations in the short-term. Already under-manned in FY2009, both 11B career fields will remain under-strength when facing MCO retention rates whereas the B-2 career field can solve under-strength manning problems with expected schoolhouse rates over several years with PCO retention rates.

As an alternative to using macro policy levers such as retention, accession, or promotion rates, two policies should significantly improve the critical competency match for most nuclear-oriented jobs: 1. Reducing the number of non-nuclear jobs required of 11B, 12B, and 13SXC officers or 2. Reducing the time-in-job (TIJ) for certain nuclear-oriented jobs such as primary oversight. Reducing the number of non-nuclear jobs

required of 11B, 12B, and 13SXC officers allows those officers to acquire and refine their nuclear expertise by comparatively serving in more nuclear-oriented jobs. Reducing the TIJ for primary oversight jobs allows more officers within the 11B, 12B, and 13SXC career fields to acquire limited competencies and thereby broaden their set of acquired competencies. Although several potential limitations exist with these policies, both represent viable alternatives to improve the competency matches beyond the FY2009 snapshot.

If the USAF instituted a personnel policy to assign officers to jobs based on competencies such as the simulation demonstrates, the policy effort would require additional data collection and personnel analysis. AFPC would develop competency profiles for each officer and develop accurate competency models similar to those shown in this analysis. Even if the USAF observed the advertised competency matches, the USAF should ensure those improved competency matches result in improved job performance. Because the relationship between competency matches and job performance is not well understood, the USAF will need to collect further, accurate job performance data and analyze that relationship empirically.

## **CONCLUSIONS AND RECOMMENDATIONS**

Although a satisfactory amount of 11B, 12B, and 13SXC officers possessed most of the required competencies in FY2009, many officers either lacked the backgrounds needed for their jobs or occupied jobs that did not effectively utilize the officer's skill-set. The overall match between job requirements and officer skills could be substantially improved by assigning officers to jobs utilizing their backgrounds more effectively and by emphasizing the deliberate development of several competency combinations. Additionally, the Nuclear Enterprise should account for exogenous factors such as retention rates when planning future officer development as these factors significantly alter the competency matches for several nuclear job categories and officer career fields.

The Nuclear Enterprise could achieve even better results beyond the recommendations in this dissertation with a few extra steps. Because the overall results of competency-based analysis are only as valid as the underlying competency model, refining and verifying the competencies for each career field would substantially increase

the accuracy of this analysis. Additionally, nuclear-related career fields could also benefit from more precise planning and definitive career guidance. Specific, immediate steps to achieve both these goals include the following:

- The Nuclear Enterprise Advisory Panel (NEAP)<sup>8</sup> and Air Force Career Field Managers (AFCFMs) should refine the competency model in coordination with AFPC by reviewing the competencies with senior, expert field-grade officers within each of these career fields. If the competencies are to be refined, these offices should utilize focus groups rather than surveys to achieve efficiency, consistency, and accuracy for the competency models.
- The USAF Office of Manpower and Personnel (AF/A1) and AFPC should review the fundamental nuclear competencies within the competency model and add more relevant competencies for rated career fields. Ensure the criteria accurately allow the competency to reflect its intended purpose and ultimately allow the USAF to track nuclear experience.
- Senior leadership involved in the NEAP and AFCFMs should develop specific targets for competency combinations within each career field and officer grade. These offices should work with AF/A1 to ensure enough officers acquire skills to adequately man jobs that require more rare competencies.
- The NEAP and AFCFMs should update and publish specific career guidance for the nuclear-focused career fields. Prior guidance adequately reflects an officer's expected career field path, but the guidance does not include officer development related to the nuclear mission.
- AF/A1, in coordination with the NEAP, should eliminate the manning shortages within the understrength career fields to prevent improper career development patterns and potential poor job performance due to unqualified personnel assigned to demanding jobs.
- AF/A1 and AFPC should review and improve the job-assignment process based on optimizing competency matches across the career field when accounting for constraints such as available jobs and career paths.

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<sup>8</sup> The NEAP provides force development oversight for officers, enlisted, and civilian personnel in nuclear-oriented career fields.

Whereas the above policy recommendations provide added benefits for the USAF beyond the recommendations in this dissertation, the methods employed in this analysis are equally pertinent for other officer and enlisted career fields. Using a competency-based personnel management system may be applied *within*, and, as demonstrated with this dissertation, *across* career fields. To employ this method for other career fields and mission areas, the USAF personnel system should consider the following recommended further analyses:

- AF/A1 and AFPC should carefully examine the methods employed in this analysis and identify, develop, and evaluate possible extensions to enhance this analysis for the USAF. Combining simulation with optimization methods will likely prove beneficial to achieve specific Nuclear Enterprise goals amidst a variety of anticipated future scenarios.
- AF/A1, the USAF Office of Strategic Deterrence and Nuclear Integration (AF/A10), and the NEAP, in coordination with AFPC, could determine which career field “health” statistics accurately indicate the capability of each career field to contribute to the respective mission area beyond those addressed in this analysis.
- The NEAP, AF/A1, and AFPC could expand the competency-based analysis to address the other nuclear-related officer and enlisted career fields. These personnel deserve similar consideration and policies should be developed to specifically guide their development and utilization.
- The NEAP, and AFCFMs, in coordination with AF/A1, AF/A10, and AFPC could analyze other potentially effective policy levers besides reducing the number of non-nuclear jobs to improve the competency match within each career field. For example, senior leadership could evaluate if accessing personnel with specific academic backgrounds or instituting retention incentives for officers with more rare skillsets might improve the competency matches and resulting job performance. These offices should address whether the policy solution is robust by accounting for possible, future scenarios such as consistent manning shortages when using more career-field specific data such as promotion rates. If these offices implement a potentially beneficial

policy, these offices may also prefer to have additional information (i.e., via data collection) to follow the officers affected by such a change. The resulting data could be analyzed to reveal subsequent retention, job satisfaction, performance, or other effects.

- AFPC and AFCFMs should better understand the relationship between officer job performance and competency matches. Officer performance should be further integrated into simulation analysis to examine how career field policy levers simultaneously affect competency matches and officer job performance in the future.