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Cost-Benefit Analysis of the 2006 Air Force Materiel Command Test and Evaluation Proposal

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Summary

As with other military services, the Air Force must recapitalize its equipment, which is an expensive undertaking. In 2006, to make additional funds available for recapitalization, the Office of the Secretary of Defense issued Program Budget Decision 720 (PBD-720), which directed a $6.2 billion reduction in support contractors over FYs 2007 through 2011. Air Force Materiel Command’s (AFMC’s) share of this reduction totaled $839 million, of which $371 million was T&E’s share. To meet the $371 million budget objective, AFMC considered several options. One of these options, referred to as the “Organizational Streamline Approach,” focused on the consolidation and potential divestiture of U.S. Air Force T&E facilities and capabilities. This option was included in the FY 2008 budget process. The option proposed three things:

- consolidation of the 46th Test Wing at Eglin Air Force Base (AFB), Florida, with test organizations at Edwards AFB, California, primarily the 412th Test Wing
- full or partial divestiture of seven Air Force test facilities
- reduction in the T&E range capacity at Eglin AFB.

Congress, in the 2007 Defense Appropriations Act, directed the Air Force to study the potential costs and benefits of this option. The Air Force asked RAND Project AIR FORCE to help conduct the CBA.

Project Scope and Approach

The boundaries of this work were purposefully limited to the AFMC proposal articulated above. We did not propose ideas that we deemed to be more efficient or more effective than the alternatives presented to us for analysis. This was consistent with the direction that we received throughout the project from congressional staff and in discussions with personnel from the Air Force and the Test Resource Management Center. Specifically, we were asked to assess, in terms of the spirit and intent of the language in the appropriations act, the specific set of pro-

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1 Test personnel supporting command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); the Air Force Special Operations Command (AFSOC); and the Air Force Seek Eagle Office (AFSEO) were expected to remain in place at Eglin AFB.

2 Air Force organizations that were asked to implement this proposal inferred that this also meant preserving some ability to support deployed flight testing, if necessary. This assumption was the foundation on which Eglin AFB provided data to RAND for this analysis.
posals and the alternatives that AFMC had articulated. The only addition to the AFMC proposal that RAND considered was whether Edwards AFB and the Navy installations at Point Mugu and China Lake could accommodate the flight- and ground-test workload from Eglin AFB. Although the AFMC proposal did not specify explicitly, it did imply that, if the PBD-720 cuts significantly affected the Eglin range, the Air Force would need to conduct these activities elsewhere (e.g., Edwards AFB and the Navy range and facilities).

We drew our data from three primary sources. First, we visited the installations and other organizations the proposal would affect. In all, we interviewed over 200 people. Next, at each site, we collected data about facilities and range function and use, maintenance activities, flying hours, and so forth. Our third source of information was a review of the literature.

After collecting relevant data for the study, we constructed financial analyses that captured the economic benefits and costs of the proposal. Data were provided by the organizations that the AFMC proposal would affect, including test facilities, the test center staff, and customers. One key assumption of our work was that the demand for test-program content would remain constant. This meant that customers of Air Force T&E that were affected by the AFMC proposal would still have a requirement to test and would therefore require the capability to do so. This assumption ensured that we captured relevant alternative effects. Although we attempted to quantify T&E issues as much as possible, we were not able to do so in several cases. In these cases, we qualitatively assessed the potential for benefit or cost. The results of the economic analysis were compared with the qualitative findings to draw conclusions.

Results

Consolidation of 46th Test Wing (Eglin) with the 412th Test Wing (Edwards)

We analyzed the cost-benefit effects of a consolidation of the 46th and 412th Test Wings in three areas: their flying hour programs, maintenance functions, and support structures. With respect to the maintenance and staff support consolidations, we also analyzed how the movement of the 46th Test Wing would affect the 53rd Wing at Eglin, which has a combined maintenance function and combined test force (CTF) with the 46th Test Wing. The Future Years Defense Program (FYDP) savings from this consolidation are projected to be $43.2 million in current-year dollars. This savings includes the types and amounts of costs that the 53rd Wing would need to recapitalize its maintenance capability. Table S.1 summarizes our results.

Range Closings

We also drew conclusions about ground and open-air range (OAR) flight-test activities. With respect to ground ranges, we analyzed eight facilities that were dedicated primarily to ground tests on the range. In its original proposal, AFMC had not intended to close any facilities beyond those it had explicitly identified in the original options. AFMC was therefore unaware that reducing the range capacity would force the closure of ground-range capabilities—RAND uncovered these potential consequences during the early stages of the CBA.

Table S.2 summarizes the results. Because of the many uncertainties involved, we do not attempt to produce a total cost or savings for the entire set of facility closures. In general, there is no compelling reason to treat all these facilities as an indivisible whole; different cost-effective outcomes can be found for each.
<table>
<thead>
<tr>
<th>Summary Chart—Unified Set of Cost Accounts ($M)</th>
<th>Annual Savings</th>
<th>Annual Costs</th>
<th>Total Annual Savings</th>
<th>Nonrecurring Costs</th>
<th>Cost Savings Over FY 2007–2011 FYDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total for all 46th Test Wing consolidation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>71.7</td>
<td>30.4</td>
<td>41.3</td>
<td>58.3</td>
<td>43.2</td>
</tr>
<tr>
<td>53rd Wing total&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0</td>
<td>30.4</td>
<td>(30.4)</td>
<td>0.0</td>
<td>(91.2)</td>
</tr>
<tr>
<td>53rd operations support&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.0</td>
<td>3.5</td>
<td>(3.5)</td>
<td>0.0</td>
<td>(10.5)</td>
</tr>
<tr>
<td>53rd maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53rd flightline&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>15.6</td>
<td>(15.6)</td>
<td>0.0</td>
<td>(46.5)</td>
</tr>
<tr>
<td>53rd backshop&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>11.3</td>
<td>(11.3)</td>
<td>0.0</td>
<td>(33.9)</td>
</tr>
<tr>
<td>Combined 46th and 412th flightline maintenance&lt;sup&gt;c&lt;/sup&gt;</td>
<td>27.5</td>
<td>0.0</td>
<td>27.5</td>
<td>8.6</td>
<td>53.4</td>
</tr>
<tr>
<td>Combined 46th and 412th maintenance, backshop&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.8</td>
<td>0.0</td>
<td>3.8</td>
<td>40.1</td>
<td>(28.6)</td>
</tr>
<tr>
<td>Flying hour program&lt;sup&gt;e&lt;/sup&gt;</td>
<td>3.1</td>
<td>0.0</td>
<td>3.1</td>
<td>0.0</td>
<td>7.3</td>
</tr>
<tr>
<td>Support staff&lt;sup&gt;f&lt;/sup&gt;</td>
<td>37.3</td>
<td>0.0</td>
<td>37.3</td>
<td>9.6</td>
<td>102.3</td>
</tr>
</tbody>
</table>

<sup>a</sup> These totals include flightline scenario 2 and backshop scenario 1, as discussed in the maintenance section of Chapter Two.

<sup>b</sup> See Table B.12 for supporting information. Not included in AFMC plan.

<sup>c</sup> See Table B.11 for supporting information. AFMC’s planned reductions are not used in the RAND analysis and are explained further in Chapter Two. Two scenarios for cost reductions are provided in the text. The first maintains the current ratio of maintainers to aircraft using AFMC’s direction to exceed three F-16 aircraft as a result of consolidation.

<sup>d</sup> See Table B.8 for supporting information. AFMC’s planned reductions are not used in the RAND analysis and are explained further in Chapter Two. The current ratio of maintainers to aircraft is retained as workload is consolidated, using AFMC’s direction to exceed three F-16 aircraft. Nonrecurring costs include civilian recruitment, reduction to contractor workforce, support equipment moving costs, and military construction.

<sup>e</sup> See Table 2.2 for supporting information. The RAND analysis partially rejects the AFMC plan, as explained further in Chapter Two. The savings generated are less than AFMC and driven by the AFMC plan to reduce three F-16 aircraft.

<sup>f</sup> See Table B.5 for supporting information. The RAND analysis partially rejects the AFMC plan, as explained further in Chapter Two. AFMC’s savings appear to be overstated. RAND calculations are based on a 30-percent reduction of support staff as a combined operation, as opposed to AFMC’s 40-percent reduction.

The Air Armament Center (AAC) provided specific additional program costs for only two of these facilities: the BISS, at $50 million nonrecurring, and the HTF, at $5.12 million over the FYDP. However, these estimates are simply for recreating the facilities and so are not particularly informative for estimating additional costs to users. Although we do not have specific program costs for the other facilities, we do have a total for programs that use ground-test facilities. This can be compared to the total cost or savings of closing these facilities, as shown in Table S.2. The AAC estimate for three years of costs (2009, 2010, and 2011) following closure is $85.44 million. If we subtract the already considered BISS and HTF facilities, the additional costs total $30.32 million.<sup>3</sup> From Table S.2, the total for the remaining six facilities is a cost, not a savings, of $7.37 million. With the additional program costs of $30.32 million,

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<sup>3</sup> Two large programs, Large Aircraft Infrared Countermeasures and Other Infrared Countermeasures, account for $18.29 million of the total.
the cost of closing all six facilities would then total $37.69 million. This option is clearly not cost-effective. Note, however, that this does not preclude the cost-effectiveness of selected facility closures. Individual savings may be large enough and additional program costs small enough to make closure cost-effective despite this aggregate result.

In summary, closing BISS could produce good returns, but the results are misleading because of the lack of data on the costs of equipping alternatives and on possible additional costs to testers. More analysis is necessary. Transferring all costs to the limited number of test program users, as is already under way, is the most likely solution for reducing AFMC costs, but the overall cost to the Department of Defense (DoD) would remain unchanged. Even if DoD did obtain a cost benefit, AFMC is simply shifting costs to other parties. When this occurs, it shifts a portion of the burden created by PBD-720.

Closing PSSSEF and SMTA would likely produce a cost benefit for both AFMC and DoD. Closing GBTF, KEMTF, HTF, OGT/FGT, or STEM would offer little or no cost benefit, even with current cost and savings estimates. The HTF may be another good candidate for single-user status with its U.S. Army users, although this would simply transfer costs and not result in savings for DoD as a whole.

With respect to OAR flight-test activities, a savings of $149 million over the FYDP is possible.4 To inform this assessment, several stakeholders from Eglin AFB, Edwards AFB, Naval Air Warfare Center (NAWC) China Lake, and NAWC Point Mugu met to understand what types of flight operations could be conducted if OAR activities moved from Eglin to the western test ranges (WTR). This exercise specifically addressed capability (not range capacity) and

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4 See Tables S.3 and C.12 for details. Two areas of uncertainty are whether the Navy can really support additional activity at the WTR with the staffing it estimates and whether the Air Force would really decide to reduce the Eglin range by 689 positions. In Table C.11, we present a case in which the Navy’s staffing requirement is three times higher than in the base case and the Eglin range retains 748 staff, rather than the 509 staff retained in our base case. In that scenario, FYDP savings decrease to $78 million.
was predicated on 17 weeks of actual flight testing at Eglin. The stakeholders’ results showed that Edwards AFB and its range could not support the entire Eglin workload of this 17-week period. However, the combined capabilities of the WTR—specifically, Edwards, the Point Mugu sea range, and China Lake—could support almost all the Eglin workload, except possibly the telemetry. In the exercise, all the sorties were launched from Edwards. Sixty percent of the missions could be completed with Edwards capabilities alone. Twenty percent required additional support from the Point Mugu sea range, and another 19 percent also required additional support from China Lake and the R-2508 complex. About 1 percent required support from other ranges, such as White Sands Missile Range. Moving the Eglin open-air developmental testing would provide an opportunity for the Air Force to save substantial resources. These savings come from (a) test wing staff consolidation and (b) increased OAR efficiency.

The range activities cannot be shifted to the WTR in isolation or without risk. Movement of the OAR flight testing to the WTR must be linked with the consolidation of the 46th and 412th Test Wings, and in this light, the costs and benefits of range consolidation and wing consolidation can only be considered together. Wing consolidation can succeed only if the Navy supports expanded Air Force activity at the western Navy ranges. This consolidation of both wing and OAR flight-test activities would require significant planning and transition to minimize the effects on the customers. See Table S.3 for an OAR test summary.

**Facility Closings**

Our analysis of the seven facilities outlined in the AFMC proposal leads us to conclude that the Air Force should not divest itself of these facilities, with two exceptions: the National Full-Scale Aerodynamic Complex (NFAC) and the Joint Preflight Integration of Munitions and Electronic Systems (J-PRIMES). NFAC, a wind tunnel, is a specialized facility that few Air Force customers use and that has little direct benefit for the Air Force. J-PRIMES allows test-

### Table S.3

<table>
<thead>
<tr>
<th></th>
<th>Eglin</th>
<th>Edwards</th>
<th>China Lake</th>
<th>Point Mugu</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>698</td>
<td>64</td>
<td>10</td>
<td>5</td>
<td>619</td>
</tr>
<tr>
<td>Cost per person ($000)</td>
<td>91</td>
<td>100</td>
<td>91</td>
<td>100</td>
<td>301</td>
</tr>
<tr>
<td>Personnel transition costs ($000)</td>
<td>12,676</td>
<td>3,200</td>
<td>454</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Other transition costs ($000)</td>
<td>1,000</td>
<td>250</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurring costs ($000)</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total transition costs ($000)</td>
<td>12,676</td>
<td>4,200</td>
<td>704</td>
<td>350</td>
<td>17,930</td>
</tr>
<tr>
<td>Total recurring costs ($000)</td>
<td>63,378</td>
<td>6,400</td>
<td>978</td>
<td>500</td>
<td>55,500</td>
</tr>
</tbody>
</table>

NOTE: All costs are in 2007 dollars.

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5 These facilities should not be confused with the ground-range facilities articulated in the previous paragraph. The facilities referred to in this case are those that AFMC explicitly specified in its proposal.
ing of aircraft with radio frequency sensors and emitters in a simulated threat environment to exercise new and updated software. This facility is relatively inexpensive and is valuable for Army testing and flight-test programs at Eglin. However, if most flight testing is moved to the WTR, it would make sense for the Air Force to transfer the activities it does carry out at J-PRIMES to its Benefield Anechoic Facility or to the Navy’s testing facilities at Patuxent River Naval Air Station (NAS), Maryland, and to transfer J-PRIMES to the Army. For the other five facilities considered, we concluded that either (1) the facilities’ capabilities were too unique to allow their closure and that there was no adequate substitute or (2) customer costs would likely outweigh any savings if the facilities were closed. Table S.4 summarizes the results.

### Risk

Throughout this document, we highlight potential risks for the Air Force and DoD of implementing the AFMC proposal. In the aggregate, these risks are not trivial and indicate that the Air Force needs to study the details further and needs to develop an understanding of how the plan would affect customers, test organizations, and DoD. When possible, we include relevant and validated customer effects, in terms of the costs programs may incur. Admittedly, these costs do not include those for classified programs—more analysis and a change in the classification of this document would have been required to consider them.

We also discuss the risks associated with the consolidation of the 46th and 412th Test Wings and the transfer of OAR flight-test activities to the WTR. In both cases, significant coordination would be required to prevent testing from being hampered. The Air Force would need to work out details on how to merge the wings effectively. At the time we conducted this

<table>
<thead>
<tr>
<th>Facility</th>
<th>AFMC-Proposed Action</th>
<th>RAND Findings</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Inertial Guidance and Test Facility</td>
<td>Close or divest</td>
<td>Retain</td>
<td>No practical alternatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broad customer base</td>
</tr>
<tr>
<td>Guided Weapons Evaluation Facility</td>
<td>Close or divest</td>
<td>Retain</td>
<td>Insufficient alternative capacity</td>
</tr>
<tr>
<td>Joint Preflight Integration of Munitions Systems Facility</td>
<td>Close or divest</td>
<td>Consider divesting to Army if flight testing moves</td>
<td>Low cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Should be collocated with range</td>
</tr>
<tr>
<td>McKinley Climatic Laboratory</td>
<td>Mothball</td>
<td>Retain</td>
<td>Unique capability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High usage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low cost</td>
</tr>
<tr>
<td>Seeker-Signature T&amp;E Facility</td>
<td>Close or divest</td>
<td>Retain</td>
<td>Low cost</td>
</tr>
<tr>
<td>Benefield Anechoic Facility</td>
<td>Reduce</td>
<td>Restore if J-PRIMES divested and/or to retain network-centric test capability</td>
<td>Sole Air Force full-size anechoic chamber if J-PRIMES divested</td>
</tr>
<tr>
<td>National Full-Scale Aerodynamic Complex</td>
<td>Close or divest</td>
<td>Consider divesting to Army</td>
<td>Not related to core Air Force mission (policy decision)</td>
</tr>
</tbody>
</table>
study, the details were not fully refined. Similarly, this effort would require a thorough examination of the types of personnel required, as well as the selection of best practices for testing programs and maintaining and flying aircraft. With respect to the OAR, the Air Force would need to work closely with the Navy to ensure an equitable allocation of time on the range schedules at NAWC Point Mugu and NAWC China Lake. Although Air Force personnel at Edwards AFB routinely work with Navy colleagues to coordinate airspace and range activities in the WTR, the amount of OAR flight-test activities that the AFMC proposal would transfer would require a purposeful approach to ensure that the test activities can be accomplished.

As the Air Force looks to the future, there is a broader concern about the risk the service may incur by divesting itself of T&E infrastructure. If facilities or ranges are divested, the Air Force would be eliminating its capability to conduct future developmental testing at various locations. This in turn could lead to one of two possible outcomes:

1. greater reliance on contractors in the longer term for developmental testing, which could possibly offset savings from divestiture or consolidation
2. fewer tests, which could increase a program’s risks over its life cycle.

One of T&E’s current priorities is to find ways to do better and more-realistic developmental testing earlier to avoid problems later. It is possible that consolidation or divestiture could move the Air Force in the opposite direction, with more reliance on contractors and less-insightful developmental testing overall.

Limitations of This Analysis

As a significant caveat to our work, the results presented in this monograph are driven primarily by cost considerations. We do not attempt to quantify the value of benefits that would be lost in the future if the Air Force required the use of the affected ranges or facilities. For example, the Air Force might require more testing in the future at a specific facility or range. If that capacity were already in maximum use or no longer existed, the effects on programs and their ability to test would be negative.

We could not objectively quantify the potential for future operational surges or other associated benefits, such as increased capacity, that are available to the Air Force today. RAND’s findings about cost are driven primarily by data and estimates from the Air Force and from other government sources that we contacted and interviewed for this work. In many cases, we were not able to assess the quality of the cost and savings estimates provided to us. As previously stated, we used a series of repetitive inquiries to stakeholders and compared data sources and interviews to develop a more-complete picture for the analysis.

Because of the general uncertainty of the details in parts of the AFMC proposal, it was not uncommon for the test organizations to provide updated inputs to us as further consideration matured their thinking about possible consequences. We expect that, with more time and further study of this subject, the test enterprise will be able to continue to refine data collection and analysis.

All the data that was collected and presented in this analysis are unclassified. The AFMC proposal, as stated, addressed programs that were considered to be unclassified. We did not include consequences for classified programs or for facilities that address classified T&E activi-
ties. Consideration of how these programs would be affected would likely indicate that the Air Force will face higher costs and risks if the AFMC proposal were implemented.

Finally, we emphasize that not all the cost savings identified in the analysis should be interpreted as being available to meet the $371 million budget decrement that PBD-720 imposes on AFMC T&E over the FYDP. In some cases, the savings are in fact available to be taken without imposing burdens elsewhere in the DoD budget. In other cases, however, the AFMC proposal may allow the AFMC T&E to meet its savings goal by shifting the burden elsewhere in the Air Force or DoD.

Conclusions

In sum, analysis shows that the FYDP savings support consolidation of the 46th and 412th Test Wings discussed earlier. The wing consolidation would involve a substantial amount of effort, and more-detailed planning would be needed to ensure that all parties involved understood the plan and the sequence of events. The effects on the Eglin range are mixed. The demand for use of the ground-test ranges and the consequences for customers if the ranges are closed indicates that the ranges should remain open or be transferred to other services. The analysis of OAR flight testing shows potential savings over the FYDP, but transferring the flight-test activities would require considerable coordination between the Air Force and the Navy and could affect a myriad of other users. It is important to note that the consolidation of the 46th Test Wing and the OAR must be linked—that is, one cannot be done without the other. Analysis of the facilities shows a continuing need for them but not in all cases a need for the Air Force to control them.

The financial savings associated with both the consolidation and the transfer of the open-air flight testing from Eglin to the WTR must be tempered according to the type and amount of risk that the Air Force is willing to accept from the AFMC proposal. These risks are not trivial and include potential schedule delays for program testing, increased customer costs, and decreased T&E capacity. When possible, we have examined how the plan would affect customers but were limited by time and an inability to verify all potential consequences for customers. Many of these risks require further study and could not be definitively captured within the constraints of this analysis.