TESTIMONY

STATEMENT BY
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of the
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Mr. Chairman, members of the Committee, it is a pleasure to appear before you today to offer my suggestions on ways to enhance multilateral arms-control regimes to cope with the prospect of weapons of mass destruction (WMD) in the hands of both non-state and state actors. You are to be commended for raising this important issue. Using traditional counter-proliferation means, the Department of Defense is doing much—as it indeed should—to address proliferation of WMD and their means of delivery. However, we have fallen short in adapting existing non-proliferation mechanisms to cope with rapid changes in the technologies underlying those items we seek to control.

Let me illustrate my assertion by focusing on the example of the proliferation of land-attack cruise missiles. As a delivery means for WMD, land-attack cruise missiles, compared with ballistic missiles, are more accurate by at least a factor of ten, are at most half the cost, and are substantially more effective in delivering chemical or biological payloads (e.g., they enlarge the lethal area for biological attacks by at least ten times). However, to date, ballistic missiles have dominated the missile-proliferation scene, and only recently has concern grown about the emergence of the cruise-missile threat.

Concern about the spread of land-attack cruise missiles is driven by two realities: first, the quantum leap in dual-use technologies supporting cruise-missile development (including satellite navigation and guidance, high-resolution satellite imagery from commercial vendors, unregulated flight management systems for converting aircraft into unmanned aerial vehicles, and digital mapping technologies for mission planning); and second, the fact that the 33-nation Missile Technology Control Regime (MTCR) is much less effective at controlling the spread of cruise missiles and UAVs than ballistic missiles.

Originated in 1987 by the US and its Group of Seven (G-7) partners, today's 33-nation MTCR is a politically rather than legally binding agreement among member states to restrict the proliferation of rockets, unmanned aerial vehicles and related technologies capable of carrying a payload of at least 500kg for at least 300km. In 1993, the regime's guidelines were expanded to include missile-delivery systems capable of carrying biological and chemical warheads regardless of payload.

The MTCR is much more effective in controlling ballistic than cruise missiles for several reasons. First, there is a reasonably solid consensus among members for restricting ballistic missiles, while the same does not yet hold for cruise missiles and other UAVs. Second, loopholes in systematic exemptions for all civilian and military aircraft can be used to circumvent many of the regime's restrictions on UAVs. Third, the inherent modularity of cruise missiles makes determining their true range and payload, and trade-offs between the two, difficult (though not impossible). In

particular, variations in cruise-missile flight profiles—especially those taking advantage of more fuel-efficient flight at higher altitudes—can lead to substantially longer ranges than manufacturers and exporting countries advertise. Finally, and perhaps more important, the provisions of the MTCR's equipment and technology annex—particularly as it applies to cruise missiles and UAVs—simply have not kept pace with the extraordinarily rapid expansion in commercially available technology facilitated by today's globalized economy. To take the most egregious example: new aerospace companies are now being formed specifically to provide fully integrated flight management systems, along with an array of support services, which can enable the transformation of manned aircraft into entirely autonomous UAVs.

Barring reforms in the way the MTCR currently addresses cruise missile and related technology transfers, a variety of sources will exist to acquire land-attack cruise missiles.

- Direct purchase from industrial suppliers. In some ways this avenue is the easiest, and certainly the most worrisome, way to acquire highly sophisticated land-attack cruise missiles from a growing list of industrial-world suppliers, now numbering at least nine. This area is where ground rules for determining the true range and payload of cruise missiles are so essential.

- Conversion of short-range anti-ship cruise missiles into land-attack ones. Frequently cited as a major concern because of the huge worldwide inventory of roughly 75,000 anti-ship cruise missiles, this avenue may have much lower potential than first meets the eye. Only a small fraction may have the potential for transformation into land-attack cruise missiles with ranges over 300km.

- Conversion of unarmed UAVs, target and reconnaissance drones into land-attack cruise missiles. These are increasingly being used not only in tactical military systems but also in non-military commercial, civic and scientific applications. Of the 40 nations indigenously producing UAVs today, only 22 are members of the MTCR.

- Conversion of small manned kit airplanes into weapons-carrying, fully autonomous cruise missiles. There is a dizzying array of kit airplanes in today's marketplace (by one recent count, nearly 100,000 copies of 425 systems produced by worldwide manufacturers). Their average characteristics include a cruising speed of around 75 knots, a range of 500km, a maximum weight of just under 900 pounds, fuel and payload capacity of 450 pounds, a very short takeoff distance averaging 75 meters, and a beginner build time of around 260 hours. The biggest challenge to converting such manned airplanes into autonomous unmanned systems is flight navigation, but, as noted above, there are now available fully autonomous flight management systems designed to convert manned aircraft into UAVs. But what makes this option most attractive are the low cost (perhaps no more than $50,000 for acquisition of the kit airplane, reciprocating engine, and autonomous flight controls) to achieve such a capability, and the difficulty of detecting such slow-flying planes. Sophisticated lookdown radars on today's legacy systems eliminate slow-moving targets on or near the ground to prevent their data processing and display systems from being overtaxed. This means that large numbers of propeller-driven kit airplanes flying at under 80 knots would be ignored as potential targets. Thus, the kit airplane avenue may well represent the "poor man's cruise missile arsenal" of the future.

- Indigenous cruise-missile development. Indigenous development is not only the longest route to acquiring militarily significant cruise-missile capabilities, it is also unlikely to lead developing states to true autarky or anything beyond low-tech designs. Foreign assistance is a critical variable affecting the pace

and quality of indigenous development.

The consequences of not taking appropriate actions to improve non-proliferation policy in regard to cruise-missile proliferation should not be taken lightly. If the use of large numbers of land-attack cruise missiles becomes a widespread and dominant feature of military operations in the twenty-first century, or if terrorist groups turn fully to exploiting modified, hard-to-detect kit airplanes, the strategic implications could be profound.

Consider, for a moment, three historical examples of small *manned* aircraft that successfully managed to reach critical political or military targets undetected, or without interference. In 1987, a 19 year-old German boy, Mathias Rust, flew his Cessna aircraft undetected from Hamburg, Germany to the heart of Red Square in Moscow, notwithstanding the Soviet Union's enormous investment in a multi-layered national air defense system. In September 1994, a deranged pilot flew his commandeered Cessna onto the White House grounds, crashing eventually just below the President's bedroom. Although the Cessna was picked up on radar at Washington National Airport, Secret Service agents weren't warned of the aircraft's approach. And most recently, in early January of this year, a 15-year-old student pilot flying a stolen Cessna flew undetected over MacDill Air Force Base before slamming his aircraft into a downtown Tampa, Florida office building. Reportedly, Central Command authorities at MacDill did not learn of the flight until after the plane crashed.

No more prescient an analysis of the implications of such events exists than the one offered by the renowned strategist, Albert Wohlstetter, in a forward to a monograph I co-authored in 1995.* Referring to the 1994 Cessna crash, Wohlstetter observed that:

> One should not draw comfort from a belief that such penetrations require a deranged pilot on a suicide mission. An unmanned air vehicle doesn't need a pilot, deranged or not; and unmanned air vehicles can be cheaper, smaller, stealthier and harder to detect than a manned vehicle—with, perhaps, radar cross-sections two or three orders of magnitude less than that of a Cessna. And they can be extremely precise and effective. They might be launched from concealed land locations at modest distances from their targets; or brought within range and launched from freighters, diesel or nuclear-propelled submarines or other boats so numerous and so varied that they would be hard to distinguish and track. Such "two-stage" delivery of cruise missiles could present a threat here at home as well as threats to our forces or allied forces or civilians abroad. Moreover, they might be part of a serious but isolated terrorist threat, or they might be one important component of a widespread military attack.

Notably, the January 2002 National Intelligence Estimate on the Ballistic Missile Threat to the United States concludes that if prestige, deterrence, and coercive diplomacy are set aside as primary objectives for acquiring an attack means against the United States, then land-attack cruise missiles and other non-missile means of delivering WMD offer a more attractive alternative than ballistic missiles. Terrorists, of course, prefer anonymity and thus covert rather than overt means of WMD delivery. Considering the enormous benefits accruing to the delivery of biological payloads using unmanned air vehicles, their proven record of going undetected, their extremely lost cost and the minimal technical barriers to transforming manned into unmanned attack means, kit airplanes, other modified UAVs, or ship-launched cruise missiles

could become the terrorist's weapon of choice for WMD delivery against the American homeland.

Any effort to construct a homeland defense against cruise missiles emanating from offshore launching sources would depend greatly on acquiring warning-of-attack information with a minimum of false alarms and on exploiting progress made in theater air defenses against cruise missiles. However, any limited homeland defense against offshore cruise missiles is likely to cost tens of billions of dollars.

Significant numbers of land-attack cruise missiles in the hands of state adversaries would have no less profound implications for U.S. interests. The emergence of land-attack cruise missiles to complement ballistic missile strike systems could conceivably bolster an adversary's willingness to oppose U.S.-led interventions in strategically important ways. Adding cruise missiles to the threat picture gives states that wish to deter or affect the outcome of such interventions not just political but also important new military leverage. Not least of the military advantages is the capacity of cruise missiles to enlarge the effective lethal area of chemical and biological attacks greatly compared to ballistic missiles. Moreover, the potentially high accuracy of land-attack cruise missiles means that even conventionally armed systems may be able to achieve significant damage against exposed area targets. Finally, the low cost of cruise missiles, notably modified kit airplanes, makes the cost-per-kill arithmetic of cruise-missile defense stark. Whether a *Patriot* PAC-3 missile costs $5,000,000 or the desired $2,000,000 per copy, the figure compares unfavorably with either a $200,000-per-copy cruise missile or large saturation attacks of $50,000-per-copy modified kit airplanes. Quite simply, because ballistic and cruise missile defenses depend largely on the same high-cost air-defense interceptors, complementary cruise and ballistic missile attacks, especially saturation ones and those delivering WMD payloads, will present enormous challenges for the defense.

Certainly, these potential proliferation outcomes demand a variety of different non-proliferation and counter-proliferation responses. In virtually every reference to the kinds of new threats facing the Department of Defense, Secretary Rumsfeld includes cruise-missile proliferation high on his list. Non-proliferation policy is the first line of defense. At present, however, it is perhaps the least effective one. Missile non-proliferation policy focuses almost entirely on controlling the spread of ballistic missiles. Take, as just one example, current MTCR efforts to promote an international code of conduct intended to stem the spread of ballistic missiles and related technologies. The draft code makes no mention cruise missiles, despite the fact that the MTCR's guidelines deal equally with ballistic missiles and unmanned aerial vehicles. However noble such a code of conduct might be, the absence of cruise missiles will fortify their second-class status at exactly the wrong time—before such systems have spread widely to affect regional and international security.

To be sure, ballistic missiles receive top priority because they are already widely proliferated, while land-attack cruise missiles have only begun to emerge as a threat. But that is precisely the reason why improved controls on cruise missiles are so critical now. Were the gaping deficiencies in the way current MTCR provisions handle cruise-missile transfers eliminated, the MTCR could conceivably do as well with cruise missiles as it has with controlling the spread of highly sophisticated ballistic missiles. Effective controls on the spread of cruise missiles and related technologies that greatly improve performance would not only make the threat more predictable and slow its emergence, but it would also greatly reduce the cost of missile defenses—against both cruise and ballistic missiles. My message is simple: letting cruise missiles proliferate will ultimately not only present its own set of unique demands, but will make effective ballistic-missile defenses more costly and demanding, too.

To have any positive effect on controlling the spread of land-attack cruise missiles, the MTCR membership should, without delay, strengthen the provisions of

the regime in the following areas:

Uniform Standards for Determining Cruise-Missile Range and Payload. If consistent national implementation of MTCR controls is to occur, the most urgent priority is for MTCR members to strengthen ground rules for determining cruise-missile range and payload. As to range, existing rules were written primarily with ballistic missiles in mind. They involve a straightforward calculation of a ballistic missile's maximum range trajectory. Cruise-missile manufacturers frequently expressed a missile's range using low flight profiles. But the truth is that cruise missiles needn't fly their entire distance using such low flight profiles; they can be launched at or reach a range-maximizing altitude and then drop to a terrain-hugging profile when they become more susceptible to detection. There are several other factors that contribute to determining the true range and payload capability of cruise missiles and other UAVs. However complex these factors may appear individually and in combination, they comprise a workable set of inputs for consistent implementation of MTCR controls on cruise missiles and UAVs. The MTCR membership has examined the issue in the past, particularly in the aftermath of the Anglo-French decision to transfer the *Black Shaheen* cruise missile to the UAE. Thus far, however, it has failed to arrive at a consensus on appropriate ground rules. Absent uniform standards, the danger is that Russia and China might decide to take advantage of current confusion to consummate unwanted transfers of similarly sophisticated cruise missiles.

Tighter Controls on Stealthy Cruise Missiles. The application of stealth technology to cruise missiles gives them the same characteristics of ballistic missiles that inspired the MTCR: difficulty of defense, short-warning time and shock effect. Calls for tighter controls on stealthy cruise missiles are longstanding, but the membership has struggled to reach consensus on precisely what level of control to impose. Because of their inherent risk, Category I systems are automatically subject to a strong presumption of denial. The best approach to controlling stealthy cruise missiles would be to subject those missiles with greater than 300km range, which are presently covered by Category II controls, to the same presumption of denial as Category I missiles. Cruise missiles capable of such ranges need not carry 500kg payloads to represent an extremely dangerous proliferation threat. Indeed, they are significantly more effective in delivering small biological and chemical payloads than even Category I ballistic missiles. Coverage should be tightened on such stealthy cruise missiles.

Controls on UAV Flight Management Systems. There are no controls governing the transfer of very light, manned kit aircraft. This is all the more reason for the MTCR membership to consider how to bring commercially available UAV flight-management systems under case-by-case review. The most challenging engineering requirement needed to transform a manned kit airplane into an unmanned cruise missile involves design and integration of a flight-management system for unmanned flight. But even if improved controls on such systems were implemented under the MTCR, they would only apply to foreign exports, not domestic acquisition of such systems. Thus, in any event, the FBI should pay close heed to prospective purchases of such systems by possible domestic sources of terrorism.

Controls on Specially Designed Countermeasure Equipment. The addition of end-game countermeasure equipment, such as towed decoys or terrain bounce jammers, can greatly complicate cruise-missile defenses. Since countermeasures' effectiveness is higher as a missile's radar signature diminishes, incentives for using them will rise as radar cross-section values for cruise missiles fall

lower and lower. Since such countermeasure equipment is used to enhance manned aircraft survivability, at first glance it would appear that such items might be exportable under Category II controls as parts of manned aircraft. But to achieve their intended synergistic effect with stealthy cruise missiles, countermeasure devices must be specially designed or modified to fit their companion vehicle. This suggests that such devices could perhaps be captured under the existing framework, and that the membership should investigate precisely how the regime might be modified to bring them under control.

Broadened Parameters Covering Jet Engines. The capability of a jet engine is the most critical variable in determining the range of a cruise missile. Commercial and military engines with slightly above 2,000 pounds of thrust are fully usable in cruise-missile development or conversion programs. Yet the MTCR currently does not subject them even to minimal control. Broadening the MTCR's current parameters covering jet-engine thrust under Category II would impose only a slight administrative burden on export-control organizations to review licensing applications that are commonly used in manned aircraft. Such case-by-case review would greatly enhance the membership's capacity to monitor the diversion of jet engines to cruise-missile applications with Category I capabilities.

None of the above changes are possible without the determined leadership of senior executive-branch decision-makers, as well as more rigorous and consistent management of the inter-agency process by the National Security Council. Committed senior leadership is also essential to forge changes in MTCR policy, which requires consensus among 33 partner states. Leaders of key MTCR states must come together to convince the broad partnership of the benefits of enhanced MTCR controls on cruise-missile proliferation. If regime partners can be convinced that the spread of these missiles to regions of common vital interest is undesirable, efforts to strengthen the MTCR will be feasible. Without these changes, an uncertain proliferation setting could greatly increase the WMD threat to the United States, its allies, and its friends.

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* K. Scott McMahon and Dennis M. Gormley, *Controlling the Spread of Land-Attack Cruise Missiles* (American Institute for Strategic Cooperation, Marina del Rey, CA, 1995).