



## **CRS Report for Congress**

# **Mine-Resistant, Ambush-Protected (MRAP) Vehicles: Background and Issues for Congress**

Andrew Feickert  
Specialist in Military Ground Forces  
Foreign Affairs, Defense, and Trade Division

### **Summary**

In late 2007, the Department of Defense (DOD) launched a major procurement initiative to replace most uparmored High Mobility, Multi-Wheeled Vehicles (HMMWVs) in Iraq with Mine-Resistant, Ambush-Protected (MRAP) vehicles by FY2009. MRAPs have been described as providing significantly more protection against Improvised Explosive Devices (IEDs) than uparmored HMMWVs. DOD's decision not to procure MRAP IIs, MRAP logistical and readiness concerns, and MRAP rollover accidents could be potential policy issues for congressional consideration. This report will be updated.

### **Background**

MRAPs are a family of vehicles produced by a variety of domestic and international companies that generally incorporate a "V"-shaped hull and armor plating designed to provide protection against mines and improvised explosive devices (IEDs). DOD is procuring three types of MRAPs.<sup>1</sup> These include Category I vehicles, capable of carrying up to 7 personnel and intended for urban operations; Category II vehicles, capable of carrying up to 11 personnel and intended for a variety of missions such as supporting security, convoy escort, troop or cargo transport, medical, explosive ordnance disposal, or combat engineer operations; and Category III vehicles, intended to be used primarily to clear mines and IEDs, which are capable of carrying up to 13 personnel. The Army and Marines first employed MRAPs in limited numbers in Iraq and Afghanistan in 2003, primarily for route clearance and explosive ordnance disposal (EOD) operations. These route clearance MRAPs quickly gained a reputation for providing superior protection for their crews, and some suggested that MRAPs might be a better alternative for transporting troops in combat than uparmored HMMWVs.

---

<sup>1</sup> U.S. Government Accountability Office (GAO) Report, Subject: Rapid Acquisition of Mine Resistant Ambush Protected Vehicles, July 15, 2008.

# Report Documentation Page

Form Approved  
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>01 AUG 2008</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2008 to 00-00-2008</b>	
4. TITLE AND SUBTITLE <b>Mine-Resistant, Ambush-Protected (MRAP) Vehicles: Background and Issues for Congress</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Congressional Research Service, The Library of Congress, 101 Independence Avenue SE, Washington, DC, 20540-7500</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

**DOD Accelerates the MRAP Program.** Secretary of Defense Robert Gates directed that “the MRAP program should be considered the highest priority Department of Defense acquisition program.”<sup>2</sup> Secretary Gates established the MRAP Task Force to speed production and fielding of MRAPs and assigned the Marines to manage all MRAP procurement for DOD. The MRAP program was designated a “DX” program, giving it priority for resources.<sup>3</sup>

**DOD’s MRAP Requirement.**<sup>4</sup> DOD has approved the following MRAP acquisitions quantities by service and for other uses: Army, 12,000; Marine Corps, 2,225; Navy, 544; Air Force, 558; U.S. Special Operations Command (USSOCOM), 378; and ballistic testing, 133, for a total of 15,858 vehicles of all categories.

**MRAP Survivability.**<sup>5</sup> DOD officials have stated that the casualty rate for MRAPs is 6%, making it “the most survivable vehicle we have in our arsenal by a multitude.” By comparison, the M-1 Abrams main battle tank was said to have a casualty rate of 15%, and the uparmored HMMWV, a 22% casualty rate. DOD noted that in more than 150 attacks on MRAPs, seven MRAP occupants had been killed and an undisclosed number had been wounded.

## MRAPs Deployed to Iraq and Afghanistan

On July 3, 2008, DOD announced that the 10,000<sup>th</sup> MRAP had rolled off the assembly line and into government hands.<sup>6</sup> The following sections address MRAPs deployed to Iraq and Afghanistan.

**MRAPs in Iraq.** According to one report, as of June 25, 2008, 5,501 MRAPs had been fielded in Iraq and many hundreds more were in the MRAP “pipeline” bound for Iraq.<sup>7</sup> As of that date, 600 additional MRAPs were deprocessing in Iraq, with 107 of those ready for issue. An additional 780 MRAPs were en route by ship to the USCENTCOM area of operations (AOR) — a 23-day trip.

---

<sup>2</sup> Memorandum from Secretary of Defense Robert Gates, “MRAP Acquisition,” May 2, 2007.

<sup>3</sup> Jason Sherman, “Gates Establishes MRAP Task Force to Speed Up Production, Fielding,” *InsideDefense.com*, June 4, 2007, and Emelie Rutherford, “Gates Approves DX Rating for MRAP,” *InsideDefense.com*, June 4, 2007.

<sup>4</sup> U.S. Government Accountability Office (GAO) Report, Subject: Rapid Acquisition of Mine Resistant Ambush Protected Vehicles, July 15, 2008.

<sup>5</sup> Information in this section is taken from DOD Press Transcripts, “DOD News Briefing with Geoff Morrell,” May 15, 2008.

<sup>6</sup> DOD Statement on 10,000<sup>th</sup> MRAP Delivery, No. 565-08, July 3, 2008.

<sup>7</sup> Information in this section is from Marjorie Censer, “More Than 10,000 MRAP Vehicles Accepted by Pentagon as of Last Week,” *InsideDefense.com*, July 7, 2008.

**MRAPs in Afghanistan.**<sup>8</sup> According to Pentagon officials, there are currently about 800 MRAPs in Afghanistan. On July 17, 2008, the Pentagon announced a contract award for another 813 MRAPs and suggested that the entire order would be sent to Afghanistan. These additional MRAPs will likely be the 9-ton RG-31 Category I MRAPs, the smallest version, which is said to be better suited for Afghanistan's unimproved roads and rugged terrain. About 600 of the almost 800 MRAPs currently in Afghanistan are RG-31s. DOD is increasing the numbers of MRAPs being sent to Afghanistan due to increasing attacks by insurgents, requests from commanders in theater, and possibly in anticipation of the introduction of additional U.S. combat forces.

## MRAP Contract Activity

**Most Recent MRAP Order.**<sup>9</sup> As previously noted, the Pentagon placed a \$612 million order with General Dynamics and BAE Systems for MRAPs on July 17, 2008. This order includes 773 MRAPs with engineering change proposal (ECP) improvements to better protect against explosively-formed penetrators (EFPs), a type of stand-off improvised explosive device that employs a shaped charge against the sides of vehicles. An additional 40 MRAPs under this contract are for U.S. Special Operations Command. DOD plans to procure an additional 787 MRAPs as part of its final order of 1,600 vehicles required to complete DOD's total MRAP requirement.

**DOD Decides Not to Procure MRAP IIs.**<sup>10</sup> On July 31, 2007, the Marines issued a request for proposal for the MRAP II Enhanced Vehicle Competition. The MRAP II was intended to better address the threat of EFPs.<sup>11</sup> In December 2007, MRAP program officials announced that only two companies — BAE Systems and a team led by Ideal Innovations,<sup>12</sup> a consultant based in Alexandria, Virginia — were selected to provide six test vehicles each to be evaluated by DOD.<sup>13</sup> In June 2008, MRAP program officials were said to be unsure whether MRAP II testing would be completed in time so

<sup>8</sup> Jim Garamone, "Officials Seek More MRAPs for Afghanistan," American Forces Press Services, July 16, 2008; Associated Press, "GIs Get More Bomb Protection in Afghanistan," *MSNBC.com*, July 17, 2008; Marjorie Censer, "Pentagon Orders Nearly 800 More MRAPs for The Army; Trucks Likely Headed to Afghanistan," *InsideDefense.com*, July 17, 2008; Kris Osborn, "Lighter MRAPs in the Works," *Army Times*, July 28, 2008.

<sup>9</sup> Information in this section is from Emelie Rutherford, "Pentagon Orders 813 Mine-Resistant Vehicles from General Dynamics, BAE Systems," *Defense Daily*, July 18, 2008.

<sup>10</sup> Emelie Rutherford and Jason Sherman, "Solicitation Expected to be Released this Week for MRAP II Competition," *InsideDefense.com*, July 30, 2007, and Jason Sherman, "Pentagon Eyes More than a Dozen New Potential Vendors for MRAP II," *InsideDefense.com*, August 1, 2007.

<sup>11</sup> Tom Vanden Brook, "MRAPs May Need Extra Armor Face EFPs," *USA Today*, May 31, 2007 and "Add-On Armor Too Heavy for MRAPs," *USA Today*, July 17, 2007.

<sup>12</sup> The Ideal Innovations Team consists of Oskosh Truck from Oskosh, WI and Ceradyne from Costa Mesa, CA.

<sup>13</sup> Emelie Rutherford, "Two Companies Pass Muster in Testing for Next-Gen MRAP Vehicles," *Inside the Navy*, December 24, 2007.

that MRAP IIs could be included in the July 2008 MRAP order.<sup>14</sup> Despite the possibility of not being included in the 1,600-vehicle order for the Army, MRAP program officials stated that the MRAP II program would continue as currently planned.<sup>15</sup> In July 2008, DOD officials decided not to purchase the 30-ton MRAP IIs — after spending more than \$25 million and one year to develop them — supposedly because of mobility and safety issues.<sup>16</sup>

**Lighter MRAPs to Be Procured?**<sup>17</sup> DOD's final order of 787 MRAPs may include a lighter and shorter MRAP version to address rollover accidents and to improve mobility. The Pentagon is said to be studying engineering change proposals that will increase the MRAP's stability while preserving survivability. These lighter MRAPs would carry fewer passengers and crews, but a shorter and lighter MRAP could make MRAPs a little easier for drivers to handle and increase the vehicle's ability to negotiate different types of terrain. Commanders in the field have reported that current MRAP versions have difficulties operating in urban or dense environments and on unimproved roads and in cross country operations.

## MRAP Funding

According to DOD, there was no procurement or development funding requested for FY2009, as the MRAP acquisition objective would be achieved with FY2008 funds.<sup>18</sup> On May 22, 2008, the Senate approved an amended version of H.R. 2642, Supplemental Appropriation Act for 2008, appropriating \$1.7 billion for MRAPs.<sup>19</sup> In addition to MRAP procurement, these funds included funding for the ballistic testing, sustainment, and transport of MRAPs, and the committee also directed the Secretary of Defense to include future MRAP funding requests in the President's Budget Request starting in FY2010.<sup>20</sup> On July 3, 2008, the Pentagon Comptroller notified Congress that DOD intended to transfer \$1.737 billion out of its FY2008 MRAP Vehicle Fund to buy 1,576 MRAPs for the Army and 34 for U.S. Special Operations Command.<sup>21</sup>

---

<sup>14</sup> Daniel Wasserbly, "MRAP II Could Miss Upcoming July Contract Award, Young Says," *InsideDefense.com*, June 3, 2008 and Emelie Rutherford, "DOD Eyes Stretching Out Coming MRAP Order, Unclear if MRAP II Will Be Part," *Defense Daily*, June 4, 2008.

<sup>15</sup> *Ibid.*

<sup>16</sup> Kris Osborn, "Lighter MRAPS in the Works," *Army Times*, July 28, 2008.

<sup>17</sup> *Ibid.*

<sup>18</sup> DOD FY2009 Budget Request Summary Justification, February 4, 2008, p. 183.

<sup>19</sup> CRS Report RL34451, *Second FY 2008 Supplemental Appropriations for Military Operations, International Affairs and Other Purposes*.

<sup>20</sup> John Liang, "Senate Appropriators Approve \$1.7 Billion in MRAP Funding, \$3.6 Billion for C-17s," *InsideDefense.com*, May 15, 2008.

<sup>21</sup> Emelie Rutherford, "Pentagon Orders 813 Mine-Resistant Vehicles from General Dynamics, BAE Systems," *Defense Daily*, July 18, 2008.

## MRAP Operational Concerns

**MRAP Logistical and Readiness Issues.** At the program level, GAO notes that “operating, maintaining, and sustaining a fleet of 15,000 fielded vehicles by at least five different vendors could present significant challenges.”<sup>22</sup> In order to address this concern, the Army is trying to “pure fleet” its MRAPs in Afghanistan by acquiring the RG-31 variant from a single vendor. Because Afghanistan does not have the MRAP logistical support infrastructure that is available to U.S. forces in Iraq, this is considered a prudent strategy by many. Another concern is that, at present, much of the MRAP maintenance is being performed by contractors as DOD adjusts its long-term maintenance strategy so that maintenance will be performed by military personnel. During this transition period, it is possible that there might be contractor maintenance shortages in Iraq and Afghanistan.

It was recently reported that one in five MRAPs in Iraq were out of service (which correlates to an 80% readiness rate) primarily due to a lack of repair parts.<sup>23</sup> The Pentagon has disputed this claim and maintains that its operational readiness rate for MRAPs in Iraq is almost 92%.<sup>24</sup> Sufficient repair parts may also be a readiness concern in Iraq and Afghanistan, as DOD admits it is trying to “catch up” in terms of MRAP repair parts.<sup>25</sup> In the past, shortages of heavy duty transmissions, engines, axles, and tires have been cited as MRAP readiness issues.

**MRAP Rollovers.** The deaths of three U.S. Army Special Forces soldiers in Afghanistan on June 29, 2008, when their RG-31 MRAP rolled over into a river has renewed concerns about the high risk of MRAP rollover.<sup>26</sup> More than half of accidents involving MRAPs since November 2007 have been rollovers, and nearly 75% of these rollovers occurred in rural areas. Pentagon officials maintain that rollover risks are greatest in Afghanistan, where terrain makes movement more difficult, and it was also noted roads and road shoulders in the region do not meet U.S. standards and can collapse under the weight of MRAPs — particularly when the road is above grade. The MRAP’s high center of gravity, weight, and height further compound the rollover issue. There have also been reports that the MRAP’s height (including antennae) have resulted in it striking power lines, which could result in electrocutions.

---

<sup>22</sup> U.S. Government Accountability Office (GAO) Report, Subject: Rapid Acquisition of Mine Resistant Ambush Protected Vehicles, July 15, 2008.

<sup>23</sup> Suzanne Malveaux, “One Out of Five MRAPs in Iraq is Out of Commission,” CNN, July 8, 2008.

<sup>24</sup> Jason Sherman, “MRAP Operational Readiness Rates Exceed 90 Percent Goal; Nine Trucks Destroyed,” *InsideDefense.com*, July 11, 2008.

<sup>25</sup> *Ibid.*

<sup>26</sup> Information in this section is from Bryan Mitchell and Andrew Scutro, “MRAP Dangers,” *Army Times*, July 14, 2008, pp. 8-9.

## Potential Issues for Congress

**DOD's Decision to Not Acquire MRAP IIs.** There are potential issues associated with DOD's decision to not acquire MRAP IIs. Does this decision end any further development of MRAP IIs or is the program "on hold"? DOD was said to have spent more than \$25 million on the MRAP II before its July 2008 decision — did anything result from the expenditure of this \$25 million that will benefit the MRAP program as a whole, or is the money essentially lost? Will engineer change proposals for current production models of MRAPs that address EFPs be as effective as the proposed MRAP II designs? Are there other potential or emerging threats that might be better addressed by MRAP II designs?

**MRAP Logistics and Readiness.** GAO has expressed concern that "operating, maintaining, and sustaining a fleet of 15,000 fielded vehicles by at least five different vendors could present significant challenges."<sup>27</sup> While DOD contends that there is a degree of commonality between MRAPs from various vendors, there are likely considerable logistics and maintenance issues resulting from the mixed MRAP fleet. These issues could have significant readiness and cost issues that Congress might wish to review with DOD. While DOD's long-term goal is to transition from contractor to military maintenance for MRAPs, contractors are presently responsible for the majority of MRAP maintenance activities. Are there sufficient contractors in Iraq and Afghanistan to support the ever-growing MRAP fleets? Is the quality and availability of contractor MRAP maintenance comparable to military maintenance and is this a significant factor in MRAP readiness? DOD is currently "catching up" in terms of acquiring and stockpiling MRAP repair parts. Is this shortage a function of funding, the ability of the respective MRAP manufacturers to produce sufficient stocks of repair parts, of programmatic priorities, or a combination of factors?

**MRAP Rollovers.**<sup>28</sup> Primarily in response to MRAP rollovers, DOD is exploring design modifications and modifying driver training. Another possible solution might be to impose operational restrictions on MRAPs, which could further limit their tactical utility. DOD is putting its emphasis on improving driver training. It is possible that the MRAP rollover problem may be predominately a function of basic MRAP design and the current operational environment, and less a function of driver training and skill. If modifying MRAP design proves to be a significant mitigating factor in MRAP rollovers, is it possible to modify the thousands of deployed MRAPs and those already manufactured and in the MRAP pipeline? If these MRAPs can be modified, what are the associated funding issues? If these MRAPs can not be appreciably modified, this could result in two categories of MRAPs — those prone to rollovers and newer, safer models. This situation could result operational limitations for the various models and perceived inequities for those soldiers that operate and are transported in the more rollover-prone MRAPs.

---

<sup>27</sup> U.S. Government Accountability Office (GAO) Report, Subject: Rapid Acquisition of Mine Resistant Ambush Protected Vehicles, July 15, 2008.

<sup>28</sup> Donna Miles, "Officials Strive to Reduce Preventable MRAP Accidents," American Forces Press Service, July 28, 2008.