PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

for

FIELDING AND USE OF MINE RESISTANT AMBUSH PROTECTED VEHICLES AT ARMY INSTALLATIONS IN THE UNITED STATES

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Approval Authority

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EXECUTIVE SUMMARY

This Programmatic Environmental Assessment (PEA) evaluates potential direct, indirect, and cumulative effects of using Mine Resistant Ambush Protected (MRAP) vehicles at Army installations in the United States. The basis of issue for MRAP vehicles is determined by regional training locations at major installations upon release of assets by the Department of the Army. This allows flexibility for selective use of MRAP variants for mobilization, new equipment training (NET) and unit sustainment training at the regional pre-deployment training site (RPTS) prior to collective training at the combat training centers (CTCs). The RPTS training strategy is supported by new equipment training teams and on site field service representatives (US Army 2009).

Approximately 1000 MRAP vehicles across 18 or more installations are expected to be used for MRAP home station training (HST) (US Army 2009). To assist installations in analyzing the impacts associated with MRAP vehicles; this PEA provides a general overview of the environmental effects for their operation. This PEA also has a checklist to be used to determine whether the expected installation-specific impacts of the proposed training are adequately covered by this PEA, allowing the use of an installation-level record of environmental consideration (REC).

Mine Resistant Ambush Protected (MRAP) Vehicles were developed to counter the threats of the 21st century fluid battlefield. When the U.S. military entered Afghanistan (2001) and Iraq (2003) most of the U.S. Army and Marine Corps tactical vehicles were unarmored. Trucks and High Mobility Multipurpose Wheeled Vehicles (HMMWV) were soft-skinned because there had been no requirement for armor in past operations. There had been no threat that offset the weight gain and loss of situational awareness that result from armor protection.

MRAPs are a family of vehicles manufactured 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 (IED). The Department of Defense (DoD) is procuring three types of MRAP vehicles.

These include; Category I vehicles capable of carrying six passengers; Category II vehicles, capable of carrying ten passengers; and Category III vehicles, intended to be used primarily to clear mines and IEDs, capable of carrying up to twelve passengers (Category III is not covered in this document) . The Army and Marines first employed MRAP vehicles in limited numbers in Iraq and Afghanistan in 2003, primarily for route clearance and explosive ordnance disposal (EOD) operations. These route clearance MRAP vehicles quickly gained a reputation for providing superior protection for their crews, than the up-armored HMMWV (UAH).

MRAP vehicles are providing a substantial increase in force protection and enhancing the confidence of Warfighters engaging the enemy. In many cases, Warfighters have survived attacks that would have completely destroyed other armored vehicles. This level of protection did not come without trade-offs in performance. The MRAP vehicle's

size, weight, and height above ground contribute to its armor to make it a very survivable vehicle; however, they also affect its overall maneuverability and mobility.

As a result of examination for applicability to using the MRAP vehicles, certain resource areas have been eliminated from further analysis in this PEA, including:

- infrastructure (potable water supply, electricity, wastewater treatment, steam and process heat, telecommunications);
- land use;
- groundwater;
- socioeconomics;
- environmental justice;
- solid waste;
- traffic and transportation, and
- airspace management.

Resource areas analyzed in this PEA include:

- Air Quality
- Cultural Resources
- Noise
- Natural Resources and Soils
- Threatened and Endangered Species
- Water Resources
- Facilities
- Hazardous Materials and Hazardous Waste
- Energy

Given the wide spatial distribution of mobile emission sources, using the MRAP vehicles should have a minor to moderate effect on air quality. The level of effect largely depends on the current status of regional air quality near an installation receiving MRAP vehicles. There is no indication there would be any substantial change in the numbers of “process” emissions from maintenance shops and other sources resulting from the proposed change. Best Management Practices (BMPs) for dust suppression should mitigate any potential problems caused by fugitive dust.

Operation of MRAP vehicles on paved or unpaved roadways is not likely to have an effect on historical or cultural resources. The MRAP is expected to operate within established boundaries of existing training and maneuver areas. These areas have been used by other and heavier tactical vehicles. Normal operations of the MRAP within the boundaries of established training and maneuver areas will have no effect on historic and cultural resources as long as these areas have been surveyed.

Normal operations of the MRAP will have minor effect on noise. Using the MRAP is not expected to substantially increase ambient noise levels. Noise sensitive land uses,

such as housing, schools, and medical facilities, should be avoided near Zone I areas. The MRAP employs the same weapons as similar tactical vehicles. It is expected to fire from the same ranges. The noise will be no greater than currently experienced with vehicles such as the HMMWV. Noise emissions from driving are less than those of equipment transports and are similar to other vehicles such as dump trucks that have similar engines and gross vehicle weights.

Using the MRAP vehicles may have a minor localized negative effect on soil and vegetation resulting from off-road operations. Increased soil compaction, and associated damage to vegetation could contribute to increased levels of soil erosion. The level of impact will depend on the MRAP being used however it can be assumed that CAT II MRAP vehicles will have a greater impact as they are generally larger and heavier than CAT I MRAP vehicles. Potential MRAP impacts on soil resources are attributable to the maneuver of MRAP vehicles on and off road during training, and fielding activities. Minor impacts to biological resources (disturbances to vegetation/habitat and wildlife) could also occur. These effects can be mitigated through adherence to local installation regulations and BMPs. Soil erosion and compaction due to MRAP vehicle operation over unimproved surfaces will be addressed by site-specific NEPA documentation. Installation personnel have the responsibility of conducting an evaluation and preparing that NEPA documentation.

Implementation of the installation integrated natural resources management plan (INRMP), sustainable ranges program (SRP) and integrated training area management (ITAM) program, and consultation, when necessary, with the United States Fish and Wildlife Services (USFWS) or National Marine Fisheries Services (NMFS) will help ensure that the proposed action avoids or has minimal impact on listed species and their habitat with in the action area. Using existing roads and operating within established limits on existing training ranges and maneuver areas will minimize any potential adverse affects of the action on the listed species and their habitat.

Using the MRAP would have minor to moderate effect on surface water quality. Using the MRAP would not have any effect on groundwater quality. Because of their additional size and weight, the MRAP Vehicles have a greater potential for degrading stream channels and banks during fording operations, than lighter tactical vehicles such as the HMMWV. The MRAP vehicles will likely have minimal impact on surface water quality since the majority (up to 85%) of its operations will be on established roadways. The SRP program, mandated by Army regulations (U.S. Army, 2005) is designed to identify and restore natural resources and lands damaged by training operations. The MRAP vehicles will likely have little, if any, effect on surface water quality as it should be using hardened stream crossings.

There are no anticipated effects on facilities relating to weapons firing ranges or on maneuver training areas from using MRAP vehicles at Army installations in the United States. There may be some limited effects on facilities within the cantonment area regarding the size of existing motor pools and size of existing maintenance facilities. The footprint of MRAP vehicles may be larger than existing vehicles. This, along with a

greater turning radius may require a unit to make a minor expansion of the motor pool. Addition of impervious surface may require an installation to modify its stormwater management plan. Standard operating procedures and/or regulations governing bridges and vehicle operations on the installation should be updated if any bridge(s) on an installation has a lower than necessary weight rating. It is possible that the MRAP vehicles may not fit within some of the existing vehicle bay doors of maintenance facilities. If this situation exists, an installation may be required to modify an existing bay door, build a new facility, or conduct maintenance in another building. This is unlikely as other common vehicles such as the 2½ ton and 5 ton trucks have similar silhouettes to the MRAP vehicles.

An MRAP equipped unit is expected to generate more waste oil per year than a unit equipped only with current vehicles such as the HMMWV. The presence of MRAP vehicles will require the unit to store and manage additional hazardous material, such as petroleum, oil and lubricant (POL) products and waste oil. POL required for the MRAP are either the same type required by the HMMWV (e.g., engine oil, transmission fluid), or are standard materials used in other military vehicles (e.g., hydraulic fluid). However, the MRAP may require increased volume of many of the same products due to its increased size. The increased number or volume of POL products may require the unit to increase storage, or require more frequent delivery, of those products. Using the MRAP vehicles will require proper management and storage of POL products, or for more frequent collection of related waste and waste oil. Installations receiving MRAP vehicles currently manage such products and waste material and will not require developing new processes, procedures and education programs to effectively manage these products. The potential effect on human health or the environment of additional volumes of POL products and waste oil is minor.

Using MRAP vehicles will have minimal effect on facility energy requirements if it is determined additional maintenance facility is required, and only if existing maintenance facilities (which accommodate other tactical vehicles) are too small for MRAP vehicles. If an additional structure or modification of existing structures is needed, there will be some minor to moderate increase in energy to provide heat lighting to the facility. There will be no effect on facility energy if additional maintenance facilities are not required. The additional fuel required for MRAP vehicles may require either construction of additional fuel storage assets in the cantonment area or more frequent deliveries of fuel. Despite the additional fuel consumption, with its relatively long range (300 mile minimum) the MRAP vehicles will require less frequent re-fueling than other similar vehicles.

Cumulative effects from using MRAP vehicles will include the potential of multiple vehicles on an installation. Cumulative impacts from using MRAP vehicles will be site specific and are not readily addressed by a PEA. Rather, such cumulative impacts should be evaluated using the 11 CEQ steps for each effected valued environmental component (VEC) (NEPA Analysis Guidance Manual Chapter 2.1). Quick Look questions found in Chapter 4 of the NEPA Analysis Manual for each VEC will assist users of this PEA in determining the relevant direct and indirect effects at their ranges.

Using MRAP vehicles under the conditions of Alternative 1 (The MRAPs operates on all roads, and established ranges and maneuver areas) would have a substantial and positive effect on the mission and the survivability of Soldiers. Soldier and unit training under Alternative 1 would be enhanced and would permit soldiers to train as they fight, which is current Army training doctrine. Using MRAP vehicles only on established paved roads (Alternative 2) or on paved and unpaved roads (Alternative 3) would not allow Soldiers or units to conduct the full spectrum of training that is inherent with their mission.

This PEA demonstrates that using the MRAP vehicle at installations in the United States will not have significant affects on humans or the natural environment. Therefore a Finding of No Significant Impact will be issued for this action's programmatic implementation.

Potential environmental affects resulting from the proposed action and alternatives, including the No Action Alternative, are identified in this PEA. Under the Proposed Action, it has been determined that no significant environmental impacts would result, providing that site-specific conditions and criteria are met and that specified mitigation measures are implemented. If these specified mitigations cannot be implemented to reduce potentially significant impacts, or, if site-specific conditions are not consistent with this PEA, supplemental NEPA analysis and documentation will be required.

SECTION 1.0:
PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Mine Resistant Ambush Protected (MRAP) vehicles were developed to counter the threats of the 21st century fluid battlefield. When the U.S. military entered Afghanistan (2001) and Iraq (2003) most of the U.S. Army and Marine Corps tactical vehicles were unarmored. Trucks and High Mobility Multipurpose Wheeled Vehicles (HMMWV) were soft-skinned because there had been no requirement for armor in past operations. There had been no threat that offset the weight gain and loss of situational awareness that result from armor protection.

The enemy in Iraq and Afghanistan quickly discovered this weakness and soon the leading cause of casualties in those theaters was the IEDs or, later, more sophisticated shaped charges. Initially the threat was from roadside IEDs that created a blast effect and shrapnel to the side of the vehicle. The military response was the M1114 up-armored HMMWV (UAH) as well as additional armor for cargo vehicles (doors, side panels).

Again, the enemy adapted, migrating the threat to shaped charges known as explosively formed projectiles (EFP) capable of penetrating light armor and the use of higher powered explosives directed at the underbody of the vehicle. By early 2006, there was a clear need for vehicles that offered better protection than the M1114 UAH.

MRAPs are a family of vehicles manufactured 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 IEDs. The Department of Defense (DoD) is procuring three categories of MRAP vehicles.

These include; Category I vehicles, capable of carrying six passengers; Category II vehicles, capable of carrying ten passengers; and Category III vehicles, intended to be used primarily to clear mines and improvised explosive devices (IEDs), capable of carrying up to twelve passengers. The Army and Marines first employed MRAP vehicles in limited numbers in Iraq and Afghanistan in 2003, primarily for route clearance and explosive ordnance disposal (EOD) operations. These route clearance MRAP vehicles quickly gained a reputation for providing superior protection for their crews than the UAH.

The existing ground tactical vehicle fleet did not have the survivability needed to support and sustain operations on the modern battlefield. While the US had superior intelligence collection, training, and tactical skill, the enemy continued to exploit the vulnerability of the unarmored vehicle fleet. The most likely threat the ground tactical vehicle fleet (GTVF) was expected to encounter was a combination of mines and small arms employed by unconventional forces operating in a non-contiguous battlespace. The legacy GTVF was not designed

to withstand this threat. The GTVF was designed to support the Cold War linear battlefield. (US Army 2008)

1.2 SCOPE AND METHODOLOGY

This programmatic environmental assessment (PEA) evaluates potential direct, indirect, and cumulative effects of using MRAP vehicles at Army installations in the United States. If the considerations and analyses in the PEA are applicable to local conditions and if no additional issues are identified, requirements of the National Environmental Policy Act (NEPA) can be met through the use of this PEA and the completion of the specified Record of Environmental Consideration (REC) checklist (Appendix A), and subsequent REC. Because the proposed action would be to "use the MRAP vehicles at installations nationwide" the Army is analyzing the action in a programmatic approach. Approximately 1000 MRAP vehicles across 18 or more installations are expected to be used for MRAP home station training (HST) (US Army 2009). To insure proper utilization of this PEA, as well as compliance with the President's Council on Environmental Quality (CEQ) guidance (40 CFR Parts 1500-1508) and the Army's NEPA rule (32 CFR Part 651), a specific REC checklist is included and provides a framework for identifying NEPA requirements beyond the scope of this PEA for using the MRAP vehicles. If the conditions of the checklist are met, and if procedures and mitigations are adopted at the installation level, a REC may be prepared that references this PEA and the proposed action may proceed. Otherwise additional site specific NEPA documentation would be prepared.

The purpose of this PEA is to facilitate compliance with the Army's NEPA regulations (32 CFR Part 651) at installations receiving the MRAP vehicles, or where the MRAP vehicles may conduct training, by providing (1) a framework to address the impacts of this type of action, (2) a procedure to certify a complete understanding and mitigation plan (when required) for all impacts addressed in this PEA through the use of an installation specific REC, and (3) a procedure to facilitate the preparation of a focused supplemental NEPA document when site specific (tiered) analyses identify the need. This PEA provides the public and decisions-makers with the information and analysis required to understand and evaluate the potential environmental consequences of using the MRAP vehicles at installations receiving the MRAP vehicles, comprehend the need for required mitigations and certify their viability, and identify where further site-specific review and analysis may be necessary.

Potential environmental effects resulting from the Proposed Action and alternatives, including the No Action Alternative, are identified in this PEA. Under the Proposed Action, it has been determined that no significant environmental impacts would result, providing the site-specific conditions and criteria are met and that specified mitigation measures are implemented. If these specified mitigations cannot be implemented to reduce potentially significant impacts, or, if site-specific conditions are not consistent with this PEA, supplemental NEPA analysis and documentation will be required.

Table 1.1 provides a list of Army installations that will receive the MRAP vehicles. This is not an all-inclusive list. Additional installations may receive MRAP vehicles as fielding locations are finalized and new mission requirements are identified. See section 2.5.4 Basis of Issue for stationing methodology

Table 1.1 Army Installations receiving MRAP Vehicles for HST

Installation Name, State	Installation Name, State
NTC Fort Irwin, CA	Fort Hood, TX
JRTC Fort Polk, LA	Fort Stewart, GA
Fort McCoy, WI	Fort Riley, KS
Fort Drum, NY	Red River Army Depot, TX
Fort Bragg, NC	Fort Lewis, WA
Fort Dix, NJ	Fort Carson, CO
Camp Atterbury, IN	Fort Campbell, KY
Fort Shelby, MS	Fort Sill, OK
USAG, HI	Fort Wainwright, AK
	Fort Richardson, AK

The document provides a comprehensive, programmatic evaluation that is broad enough in scope to assist in the evaluation of potential effects of using MRAP vehicles at installations. See appendix F for initial fielding quantities.

1.3 REGULATORY AUTHORITY

This PEA has been prepared in compliance with the NEPA of 1969, as implemented by the President's CEQ regulation governing NEPA (40 CFR Part 1500-1508), and the US Army's rule governing NEPA, Environmental Effects of Army Actions (32 CFR Part 651).

1.4 PUBLIC REVIEW PROCESS

The public's participation is essential to a successful NEPA analysis. The Council on Environmental Quality (CEQ) and 32 CFR 651 regulations provide opportunities for the public to participate in the EA process. In accordance with these public notification requirements, the Army announced the availability of the draft EA in public web and print media on August 5, 2009 and has made the draft EA and draft Finding of No Significant Impact (FNSI) available for review at http://aec.army.mil/usaec/nepa/topics00.html for a 30 day review period prior to signing of this FNSI.

1.5 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed action is to establish home station training (HST) sites in order to train units at Army installations in the United States with MRAP vehicles, which provide increased survivability for small units conducting typical counterinsurgency missions while maintaining mobility.

1.6 NEED FOR THE PROPOSED ACTION

The Army identified a need to provide a vehicle with a significant increase in force protection that is more resistant to asymmetric threats. The UAH is not designed to provide the type of protection that our soldiers need in today's current theater of operations specifically related to IEDs and other threats. In response, the Army developed the MRAP vehicle. MRAP vehicles are superior to the UAH for the reasons discussed in section 2.5.1.

The operation of MRAP vehicles has not occurred on installations outside of existing theaters of operations. This vehicle is substantially heavier and has a different environmental footprint as such it will have different impacts to:

- Soil impact
- Vegetation
- Air quality
- Cultural Resource
- Roads and Maneuver Area
- Maintenance
- Waste stream

The MRAP will be integrated into Modified Tables of Organization and Equipment (MTOE) and consequently will be part of training and maintenance requirements.

SECTION 2.0
DESCRIPTION OF THE PROPOSED ACTION

2.1 INTRODUCTION

This section provides in detail the operational characteristics of MRAP vehicles and their operational missions.

2.2 PROPOSED ACTION AND IMPLEMENTATION

The proposed action is to field, equip and train Soldiers with MRAP vehicles and to use the vehicles on all roads (paved and unpaved) and on established training ranges and maneuver areas on Army installations for HST purposes. Distribution of MRAP vehicles to installations in the U.S. will follow the Basis of Issue as discussed in Section 2.5.4.

2.3 OPERATIONAL MISSION

This category of vehicles has the mission to support operations in urban and other restricted/confined spaces, to include mounted patrols, reconnaissance, communications, and command and control.

Its mission role is similar to the Stryker Armored Vehicle in many respects. It will provide small units conducting typical counterinsurgency missions with protected mobility and mounted firepower. Squads and platoons use MRAP vehicles to conduct both mounted and dismounted missions. Typical mission sets supported by MRAP vehicles include the following:

- Cordon and search
- Raids
- Mounted combat patrol
- Traffic control points
- Convoy security
- Escort
- Medical evacuation (MEDEVAC)
- Protected personnel transport

MRAP vehicles may replace many UAHs currently used to conduct these missions; however, units will want to retain some UAHs for operations in terrain where MRAP vehicles are unsuitable. MRAP vehicles are divided into three categories based on the number of occupants the vehicle holds and mission-specific mine/improvised explosive device clearance operations. Category I and Category II will be covered in this PEA.

CAT I - MaxxPro

CAT II – RG33L (6x6)

M1114 Up Armored HMMWV

Stryker Armored Vehicle

Category (CAT) I MRAP vehicles are fire team-size vehicles designed to hold six occupants, including the driver, vehicle commander, and gunner. CAT I MRAP vehicles provide units with a protected maneuver capability in urban areas and other restricted terrain. They primarily serve as armored personnel carriers for fire teams and weapons carriers for medium and heavy machine guns. Reconnaissance units use CAT I MRAP vehicles to conduct mounted reconnaissance while employing the Long Range Scout Surveillance System from the vehicle.

CAT II MRAP vehicles are a squad-size vehicle designed to hold ten occupants, including the driver, vehicle commander, and gunner. The CAT II MRAP vehicle is considered a multi-mission vehicle and provides units with protected transport between secure areas. Sapper and rifle squads use the CAT II MRAP vehicle for protected maneuver and movement when it is necessary to mass Soldiers rapidly for a mission such as a quick reaction force. The purpose-built armored ambulance used by MEDEVAC units conducting ground MEDEVAC is a CAT II vehicle. (US Army 2008)

2.3.1 Off-Road Operations

Because of it's weight and reduced off road mobility the majority of MRAP vehicles missions will be conducted on roads (approximately 75-85%). The remaining 15-25% of off road travel will likely be where most of the impact occurs.

2.4 UNIT AND SOLDIER TRAINING

Every soldier, noncommissioned officer (NCO), warrant officer, and officer has one primary mission – to be trained and ready to fight and win our nation's wars (U.S. Army, 2002b, pg 1-1). Success in battle does not happen by accident; it is a direct result of tough, realistic, and challenging training. The Army exists to deter war, or if deterrence fails, to reestablish peace through victory in combat wherever U.S. interests are challenged. Training is the process that melds human and materiel resources into these required capabilities. The Army has an obligation to the American people to ensure its soldiers go into battle with the assurance of success and survival. This is an obligation that only rigorous and realistic training, conducted to standard, can fulfill. The Army has adopted a "train the way we fight" philosophy because its historical experiences show the direct correlation between realistic training and success on the battlefield (U.S. Army 2002b).

To "train the way we fight", commanders and leaders at all levels must conduct training with respect to a wide variety of operational missions across the full spectrum of operations. These operations may include combined arms, joint multinational and interagency considerations, and span the entire breadth of terrain and environmental possibilities. Commanders must strive to set the daily training conditions as closely as possible to those expected for actual operations (U.S. Army 2002b, pg 1-2).

2.5 OPERATIONAL CHARACTERISTICS OF MRAP VEHICLES

2.5.1 Description of the MRAP Vehicles

The acronym "MRAP" does not mean any one specific vehicle. It is a generic term intended to apply to vehicles from different manufacturers that meet a common set of capabilities. Several manufacturers are producing the MRAP vehicle. Each variant is distinctly different from another, but they all provide the following similar capabilities and general levels of protection:

- Designed from the ground up to reduce casualties and increase crew and passenger survivability as a result of mine explosions, IED detonations, and small-arms fire.
- Armored vehicles with blast-resistant body design (characterized by a V-shaped hull, integrated armor, raised chassis, and blow-off wheels).
- Blast forces are deflected away from the crew by the vehicle's V-shaped hull.
- Can operate on all terrain and in all weather.

- Troop capacity includes a driver and up to nine combat-equipped Soldiers.
- Armament may include several automatic weapons.
- Accessories may include objective gunner protection kit, driver vision enhancer, radio jammer and AN/VRC 92 dual long-range radio system, “Blue Force Tracker”, and a warrior aid and litter kit.
- Can operate in extreme temperatures (-25 to 120 degrees Fahrenheit).
- Can operate to a minimum range of 300 miles without refueling.
- Air transportable by C-17.
- Can cross water obstacles up to 36 inches deep.
- Can negotiate up to a 60 percent grade and 30 percent side slope.
- Equipped with run-flat tires, anti-lock brakes, and a fire-suppression system.

Individual characteristics of the common variants are displayed in Appendix B.

2.5.2 Capabilities and Mission of the MRAPs

In response to an identified operational need the MRAP family of vehicles emphasizes protection and survivability over mobility and transportability. It protects the occupants from IEDs, mines, and small arms fire with a V-shaped hull and blast resistant underbody that is raised to separate Soldiers from blasts.

MRAP vehicles are providing a substantial increase in force protection and enhancing the confidence of Warfighters engaging the enemy. In many cases, Warfighters have survived attacks that would have completely destroyed other armored vehicles. This level of protection did not come without trade-offs in performance. The MRAP vehicle's size, weight, and height above ground contribute to its armor to make it a very survivable vehicle; however, they also affect its overall maneuverability and mobility. (US Army 2008)

2.5.3 Weapons Systems on MRAP vehicles

The MRAP fields similar weapons systems as the HMMWV. The following weapons systems can be used by MRAP vehicles:

- M2 50-caliber heavy machine gun is effective against infantry, unarmored or lightly-armored vehicles and boats, light fortifications, and low-flying aircraft with a maximum effective range of 6561 feet or 2000m
- MK-19 automatic grenade launcher allows the gunner to engage direct and indirect targets to a maximum effective range of 4920 feet or 1500 meters.
- M249 squad automatic weapon with a maximum effective rage of 3281 feet or 800m.
- M240 medium machine gun is highly regarded for reliability and used extensively by infantry, as well as ground vehicles, watercraft, and aircraft with a maximum effective range of 3600 feet or 1100m.

2.5.4 Basis of Issue for MRAP vehicles

The basis of issue is the method by which the Department of the Army issues equipment, vehicles and weapons systems to individuals and units to meet their mission requirements.

The basis of issue for MRAP vehicles is based on regional training locations at major installations upon release of assets by the Department of the Army. This allows flexibility for selective use of MRAP variants for mobilization, new equipment training (NET) and unit sustainment training at the Regional Pre-Deployment Training Site (RPTS) prior to collective training at the Combat Training Centers (CTCs). The RPTS training strategy is supported by new equipment training teams and on site field service representatives (US Army 2009).

2.6 ARMY SUSTAINABLE RANGE PROGRAM AND POLICIES

The effects of off-road travel by military vehicles are managed through the Army's Sustainable Range Program (SRP), which is mandated by Army Regulation (AR) 350-19, "The Army Sustainable Range Program" (U.S. Army, 2005). This regulation establishes the objectives, responsibilities, and policies for the Army's SRP to achieve optimum and sustainable use of Army training lands. This comprehensive program requires Army installations to implement a uniform land management regimen, including the periodic inventory and monitoring of land conditions, integration of training requirements with land carrying capacity, education of land users to minimize adverse impacts, and the provision of required training land rehabilitation and maintenance. The Army's SRP outlines how each component program contributes to the overall sustainability of the natural and cultural resources on Army training lands. The training constraints overlay is a tool to manage training lands and control training area land use. This overlay, provided to each military unit using military training lands identifies areas off-limits to training, and off-limits to vehicle maneuver (U.S. Army, 2005; paragraph 5-5). This Geographic Information Systems overlay is updated regularly by the installation and issued to training units before every field training engagement. The off-limits areas prohibit soldier training or vehicle operations based on the presence of cultural resources, threatened or endangered species, critical habitat, or training lands in various stages of restoration or re-growth.

Recognizing that the management of single training events had historically proven inadequate to sustain these ranges over time, this more comprehensive approach focuses on "carrying capacity" of the land (total stress on these ranges) and the relationship between use (maneuver impact miles), condition of the land, and required maintenance to meet desired goals. The Army approach focuses on the cumulative erosion conditions on the training lands. This approach has been articulated in Army policy (U.S. Army, 2005) which (1) estimates training land carrying capacity to support maintenance and optimal use for realistic training, and (2) establishes mechanisms to predict and secure required land

rehabilitation and maintenance requirements based on training usage. This approach ensures the active and ongoing characterizations of the land conditions and allows for analysis of stresses, thresholds, and cause-effect mechanisms. It also evaluates the establishment of baseline conditions, analysis of the magnitude and significance of effects, mitigation design and implementation. This approach allows for monitoring of predicted effects of training activities. The Army approach has expanded to include establishing stress thresholds based on the ability of the landscape, under various conditions, to support levels or intensities of military activity (Anderson and Sullivan, 2000).

The long-term Army range maintenance policies and guidelines constitute a proactive approach. Supported by considerable Army research on the fundamental mechanisms for analyzing such significance (Vaughn, 1983; Riggins, 1979), the concept of “carrying capacity” can now be used to eliminate or manage major (significant) effects to training lands by managing training stresses on the landscape (Anderson and Sullivan, 2000).

SECTION 3.0:
DESCRIPTION OF ALTERNATIVES CONSIDERED

3.1 Alternative 1. Preferred Alternative. The MRAPs operate on all roads, all ranges and maneuver areas.

The MRAP vehicles would operate at the proposed installations described in Table 1.1 above. These vehicles would be used on all roads and trails (paved, improved, and unpaved), all weapons ranges and all established tactical maneuver and training areas including off road. As stated in 2.3.1 the majority of MRAP vehicles missions will be conducted on roads (approximately 75-85%) the remaining 15-25% will be off road travel. This is the preferred course of action.

3.2 ALTERNATIVES TO THE PROPOSED ACTION

The following discussion describes the alternatives considered for using the MRAP vehicles. Three alternatives address different operational limitations when units operate the MRAP vehicles at Army installations in the United States.

3.2.1 Alternative 2. The MRAPs operate only on the installations paved roadways.

The MRAP vehicles would operate only on paved roadways. Operations, including those in ranges and training areas, on both unpaved roads and off-road would be prohibited. This course of action would reduce the readiness of Soldiers to operate MRAP vehicles to their combat potential.

3.2.2 Alternative 3. The MRAPs operate only on the installations roadways.

The MRAP vehicles would operate only on the installation's established paved and unpaved roadways. Off-road operations would be prohibited. This alternative would not allow Soldiers to learn the necessary skills to operate MRAP vehicles across all terrains.

3.2.3 No Action Alternative. Continued use of the up-armored HMMWVs.

Under the No Action Alternative MRAP vehicles would not be used at Installations in the United States. This would lead to degradation of the training and readiness of units in the U.S. Army. The vehicle has been developed in order to fulfill an identified gap in the force protection of Warfighters engaging the enemy. Without MRAP vehicles, there would be a gap in Soldier training requirements. This alternative provides a baseline for comparison of environmental impacts among the Proposed Action and other alternatives listed in this section.

3.3 EVALUATION CRITERIA

This section lists the Valued Environmental Components (VEC) used to evaluate the alternative courses of action. These VECs will provide the framework that determines the environmental effects and their significance. The evaluation will

use comparison, contrast and description of effect for all the alternatives considered in detail.

- Air Quality
- Cultural Resources
- Noise
- Natural Resources and Soils
- Threatened and Endangered Species
- Water Resources
- Facilities
- Hazardous Materials and Hazardous Waste
- Energy
- Land use
- Airspace
- Infrastructure
- Hazardous Wastes Site Contamination and Clean Up
- Solid Waste
- Traffic and Transportation
- Socioeconomics
- Environmental Justice

3.4 SIGNIFICANT IMPACT CRITERIA BY RESOURCE

Provided below is a list of significant impact criteria that were used for this document.

Air Quality

Impacts to air quality would be considered significant if the proposed activities were to:

- increase ambient air pollutant concentrations above any NAAQS at the installation boundary; contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS;
- impair visibility within any federally mandated PSD Class I area; or
- produce emissions of hazardous air pollutants exceeding state or federal emission levels at the installation boundary.

Cultural Resources

Significant impacts to cultural resources from the alternatives were assessed by evaluating the degree to which impacts would:

- Cause adverse effects to a NRHP-eligible or listed historic property, of which examples include: altering the look or use of contributing resource of a historic district; demolishing historic buildings or structures; damaging, or neglecting to prevent damage to, an archaeological site in a training

area; or restricting access to TCPs, including plant or animal resources associated with ceremonial or religious purposes, particularly during specific times of the year when such resources are traditionally used, collected, or visited;
- Jeopardize compliance with ARPA or RCW 27.53 through actions including, but not limited to: construction in areas that have not been cleared for archaeological resources; unauthorized digging of emplacements or other actions for training purposes; accidental or willful disregard for Siber-staked archaeological sites in training areas by soldiers or contractors; or failure to report damage to archaeological sites;
- Jeopardize compliance with AIRFA by creating conditions that prevent the use of sacred or religious sites or resources, such as restricting access to times that conflict with their traditional use, or by increasing noise to levels incompatible with their use.

Noise

The significance of the impacts is determined by the comparison of affected receptors to the acceptable compatible land uses. Sensitive receptors include residential areas, hospitals, and schools. Considerations used while evaluating noise impact significance include:

- Whether land use compatibility problems would be created (AR 200-1), Environmental Protection and Enhancement); and
- Whether peak noise and random blast noise levels are exceeded 15 percent of the time and would be likely to cause significant annoyance to individuals in incompatible land uses (USACHPPM evaluation of blast noise complaints)

Natural Resource and Soils

Factors considered when determining whether an alternative would have a significant impact on soil erosion were evaluated and distinguished by the degree to which the impact would:

- Impair the ability of the Army to sustain land resources to maintain effective training grounds and ranges;
- Result in loss of soil (through increased erosion) that exceeds the amount of soil loss at which the quality of a soil as a medium for plant growth can be maintained; and
- Conflict with existing federal, state, or local statutes or regulations.

Threatened and Endangered Species

<u>Vegetation</u>

Impacts to vegetation would be considered significant if Army actions resulted in:

- a long-term loss or degradation of unique or high quality plant communities;
- a measurable reduction in diversity within high quality plant communities;
- take of federally listed species or increased mortality of proposed or candidate plant species; or

- local extirpation of rare or sensitive species not currently listed under the Endangered Species Act.

Fish and Aquatic

For the purposes of this analysis, impacts to fish resources would be considered significant if Army actions resulted in:

- a take of a federally listed species or a species proposed for listing;
- a loss of designated critical habitat;
- a long-term (greater than 2 year) impact on populations and/or habitat of federal or state species of concern that would result in a trend toward endangerment or the need for federal listing;
- a long-term loss of habitat for single or multiple common fish species; or
- a creation of a fish barrier.

Wildlife

For the purposes of this analysis, impacts to wildlife would be considered significant if Army action resulted in:

- A substantial, long-term (greater than 2 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species;
- injury or mortality to common wildlife species, such that species populations would not recover within 2 years;
- a reduction in the population, habitat, or viability of a federal or state species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing;
- any loss of critical habitat, or nesting habitat critical to birds under the Migratory Bird Treaty Act, on the installation; or
- mortality to a listed species or species proposed for listing that could result in a “take” under the ESA.

Water Resources

Factors considered when determining whether an alternative would have a significant impact on water resources include the extent or degree to which its implementation would:

- Degrade surface or groundwater quality in a manner that would reduce the existing or potential beneficial uses of the water;
- Reduce the availability of, or accessibility to, one or more of the beneficial uses of a water resource;
- Alter the existing pattern of surface or groundwater flow or drainage in a manner that would adversely affect the uses of the water within or outside the project region;
- Be out of compliance with existing or proposed water quality standards or with other regulatory requirements related to protecting or managing water resources; or
- Violate the Clean Water Act.

Facilities
Factors considered in determining whether an alternative would have a significant impact on real estate, facilities, or infrastructure would include the extent or degree to which its implementation would result in the following:

- Interrupt or disrupt public services or utilities, as a result of physical displacement and subsequent relocation of public utility infrastructure, to the extent that the result would be a direct, long-term or permanent disruption of essential public utilities; or
- Result in an increase in demand for public services or utilities beyond the capacity of the utility provider to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary.

Hazardous Material and Waste, Hazardous Site Clean Up
Factors considered in determining whether hazardous material and waste associated with each project alternative would result in a significant impact include the extent or degree to which the alternative's implementation would:

- Endanger the public or environment during the storage, transport, or use of ammunition;
- Expose military personnel or the public to areas potentially containing UXO without adequate protection;
- Cause a spill or release of a hazardous substance (as defined by Title 40, CFR Part 302 [CERCLA], or Parts 110, 112, 116 and 117 [CWA]);
- Expose the environment or public to any hazardous condition through release or disposal (for example, exposure to toxic substances including pesticides/ herbicides or open burn/open detonation disposal of unused ordnance);
- Adversely affect contaminated sites or the progress of IRP remediation activities;
- Cause the accidental release of friable (easily crumbled by hand pressure) asbestos or LBP during the demolition or renovation of a structure; or
- Generate either hazardous or acutely hazardous waste, resulting in increased regulatory requirements over the long term.

All of the action alternatives would result in an increase in the use of hazardous materials and subsequent generation, handing, storage and disposal of larger quantities of wastes, including hazardous wastes. The Army follows strict SOPs for storing and using hazardous materials; therefore, no new procedures would need to be implemented to store or use the construction-related or operation related hazardous materials.

Energy
Factors considered in determining whether an alternative would have a significant impact on energy demand, generation, delivery systems, or costs would include the extent or degree to which its implementation would result in the following:

- Increased demand for energy beyond the current capacity of generation or delivery systems to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary or result in substantial deterioration over current conditions.

Land Use

Impacts on land use in general and on training areas resulting from implementation of the proposed action and its alternatives would be considered significant if the action results in any of the following:

- changes to existing land use designations within the installation; or
- conflicts with non-military land uses to include outdoor recreation activities and tribal access to cultural and natural resources.

Air Space

Factors considered in determining whether an alternative would have a significant impact on airspace, based in part on FAA Order 7400.2G, Procedures for Handling Airspace Matters (FAA 2008), include the extent or degree to which its implementation would result in the following:

- Reduce the amount of navigable airspace;
- Lead to the assignment of new special use airspace (including prohibited areas, restricted areas, warning areas, and military operations areas) or require the modification of special use airspace;
- Change an existing or planned instrument flight rules (IFR) minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure, or require a visual flight rules operation change from a regular flight course or altitude;
- Restrict access to or affect the use of airports or airfields available for public use, or if it would affect commercial or private airfield or airport arrival and departure traffic flows; or
- Create an obstruction to air navigation.

Infrastructure

Factors considered in determining whether an alternative would have a significant impact on infrastructure such as potable water, wastewater treatment, steam and process heat, telecommunications, electricity, and solid waste disposal including the extent or degree to which its implementation would result in the following:

- Result in an increase in demand on infrastructure to the point that substantial expansion or improvements would be required

Solid Waste

Factors considered in determining whether solid waste associated with each project alternative would result in a significant impact include the extent or degree to which the alternative's implementation would:

- Result in an increase in demand for solid waste disposal services beyond the capacity of the provider to the point that substantial expansion would be required

Traffic and Transportation

Factors considered in determining whether each project alternative would have a significant impact to traffic / transport include the extent or degree to which its implementation would result in:

- Intersection operations - increase congestion at intersections currently operating at (or anticipated to operate at) capacity;
- Roadway segment operations – increased traffic on public roads that would disrupt or alter local circulation patterns;
- Construction traffic effects - lane closures or impediments that would disrupt or alter local circulation patterns; or
- Increase parking demand exceeding the supply.

Socioeconomics, Environmental Justice, and Protection of Children

Factors considered in determining whether an alternative would have a significant impact on the socioeconomic structure would include the extent or degree to which its implementation:

- Change the local housing market or vacancy rates, particularly when compared to the availability of affordable housing;
- Increase student enrollment beyond the capacity of the local schools;
- Change any social, economic, physical, environmental, or health conditions so as to disproportionately affect low-income or minority populations; or
- Disproportionately endangers children in areas on or near the proposed project activities or installations.

SECTION 4.0:
ENVIRONMENTAL CONDITIONS AND CONSEQUENCES

4.1 INTRODUCTION

This PEA evaluates the potential environmental effects of using the MRAP vehicles at an Army installation and determines if any site-specific conditions would require more detailed analyses.

The PEA has considered several environmentally-related resource areas, which for the purpose of evaluation, have been identified as program resource areas, as well as those which have been eliminated from further consideration.

4.2 RESOURCE AREAS ELIMINATED FROM FURTHER CONSIDERATION

Analysis of potential environmental effects associated with a PEA typically addresses numerous resource and legal requirements that may be affected by implementation of proposed actions. In the case of using the MRAP vehicles certain environmental resource areas that typically receive attention have been initially examined and determined not to warrant further analysis. These areas are infrastructure, hazardous waste site contamination and cleanup, groundwater, socioeconomics, to include environmental justice and protection of children, traffic and transportation, and airspace management.

If the environmental effects are so small as to be immeasurable at the installation level or they are virtually identical for all alternatives the analysis does not consider them in detail.

Infrastructure. The proposed action will not likely impose a significant demand on an installation's infrastructure, such as potable water supply, electricity, wastewater treatment, steam and process heat, telecommunications, solid waste disposal.

Installations should be aware of the MRAP vehicles weight and plan accordingly. Some MRAP vehicles will require a higher bridge classification—20 tons or greater depending on the category of vehicle and final load of troops and equipment. MRAP vehicles operators must ensure bridge classifications are for wheeled vehicles. Avoid moving too close to the edges of roads that may collapse and cause the vehicle to tip over.

Hazardous Waste Site Contamination and Cleanup. Past practices related to the handling and disposition of hazardous waste generated by an Army installation have occasionally resulted in the creation of waste sites that require remediation under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Since passage of the Superfund Amendments and Reauthorization Act in 1986, federal facilities have been subject to CERCLA to the same extent as private sector sites. Waste sites at Army installations have been identified and are now being addressed by remedial program efforts. Using

the MRAP vehicles at military installations in the United States would not affect, or be affected by, such remediation actions.

Environmental Justice. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations requires the Army to make achieving environmental justice part of its missions by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The Proposed Action is for a combat vehicle that is operated almost exclusively within the confines of the military installation. Using the MRAP at an Army installation in the U.S. would not affect minority or low-income populations.

Socioeconomics. Economic development and sociological environment are often affected by Army actions insofar as proposed actions may alter economic development (employment and income), population, housing, public health and safety, school enrollment, social services, recreational and community facilities, and visual and aesthetic resources with a region of influence. Using the MRAP vehicles would not alter aspects of the human environment typically classified as part of the socioeconomic environment.

Land Use. Land use addresses the effects of an action on how land is used, and the potential effect an action has on adjoining lands uses. The MRAP vehicles may incorporate the MK19 automatic grenade launcher, M2 .50 caliber machine gun, or M240 medium machine gun. The MRAP vehicles will be employed during training maneuvers in much the same manner as the HMMWV on a basis that is restricted to meet resource protection needs. They will fire the same weapons systems on the same ranges as the HMMWV. The employment of MRAP vehicles will not cause any changes in land use planning on weapons firing ranges, on maneuver training areas, or have any impact on adjacent land uses. The MRAP vehicles will likely be parked in the same motor pools as the other wheeled tactical vehicles, and will not affect the land use of current unit parking, current maintenance facilities, or that of adjoining land.

Airspace. The MRAP is a ground combat weapons system. The MRAP weapons systems (Section 2.5.3) are direct fire, and will be used exclusively on ranges specifically designed for those weapons systems. Employment of the MRAP at Army installations will have no effect on airspace management.

Traffic and Transportation. This topic evaluates the potential effects of a proposed action on the traffic and transportation network, and what effect, if any, the proposed action has on the level of service (LOS). LOS characterizes the operating conditions on the facility in terms of traffic performance measures related to speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Assigning MRAP vehicles should not substantially increase the number of soldiers, and thus have little affect the number of

privately-owned vehicles on the road network of either the Army installation or the local community. Using MRAP vehicles on an Army installation will have minimal affect on the traffic and transportation.

Solid Waste. Solid waste management is primarily concerned with the availability of landfills to support a population's residential, commercial, and industrial needs, and the quantity of solid waste associated with a proposed action. Alternative means of waste disposal may involve waste-to-energy programs or incineration. Recycling programs for various waste categories (e.g., glass, metal, and paper) reduce reliance on landfills for disposal. The MRAP vehicles will be employed during training and weapons firing in a manner similar to that of other tactical vehicles such as the HMMWV. Because the MRAP vehicles are larger than the HMMWV it is possible that routine vehicle maintenance will generate more solid waste, such as rags and similar consumables. The Army has mature, well-established programs to effectively manage this waste. The MRAP may generate a higher volume of solid waste than lighter tactical vehicles but the waste is similar in nature. The amount of change in a solid waste stream would likely not be measureable at the installation level.

4.3 AFFECTED PROGRAM RESOURCE AREAS

A program resource area is a resource area that is applicable to all, or nearly all, locations at which the MRAP would be used. Resource areas in this category are natural resources and soils, air quality, noise, hazardous material and waste oil, facilities, energy, surface water, threatened and endangered species, and cultural resources.

4.3.1 Air Quality

Affected Environment. The Clean Air Act (CAA) has historically regulated air pollution sources through three primary programs: (1) ambient air quality regulation of new and existing sources through emission limits contained in states implementation plans (SIPs); (2) more stringent control technology and permitting requirements for new sources; and (3) specific pollution problems, including hazardous air pollution and visibility impairment. The 1990 amendments to the CAA (CAAA-90) not only modified these three programs but also addressed new air pollutants and added a fourth category – a comprehensive operating permit program. The comprehensive operating permit program helps to establish in one place all CAA requirements that apply to a given stationary source of air emissions.

The CAA, the primary federal statute regulating air emissions, applies to the Army and all of its activities. The CAA categorizes regions of the United States as non-attainment areas if air quality within those areas does not meet the required ambient air quality levels set by the National Ambient Air Quality Standards (NAAQS). The NAAQS consists of primary and secondary standards

for “criteria air pollutants”: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter.

States have the authority to establish emission source requirements to achieve attainment of the NAAQS. These requirements may be uniform for all sources or may be specifically tailored for the individual sources. To be approved as federally enforceable measures in a State Implementation Plan (SIP), the requirements must be consistent with the CAA. Source emission requirements in SIPs may be established for stationary and mobile sources. Implementation of the Act’s requirements, for the purpose of achieving NAAQS, is achieved primarily through SIPs and various federal programs. The CAA requires states to develop SIPs that establish requirements for the attainment of NAAQS within their geographic areas. SIPs must identify major sources of air pollution, determine the reductions from each source necessary to attain NAAQS, establish source specific and pollution-specific requirements as necessary for the area, and demonstrate attainment of NAAQS by the applicable deadlines established in the CAA. If a state fails to submit a SIP that attains the NAAQS, then EPA imposes a federal implementation plan for that region.

In addition to ambient air standards, the CAA establishes standards and requirements to control other air pollution problems. Standards for hazardous air pollutants (HAPs), an acid rain reduction program, and a program to phase out the manufacture and use of ozone-depleting chemicals are the other major programs regulating emissions of air pollutants. The prevention of accidental release and minimization standards including, but not limited to, the substances published under the Emergency Planning and Community Right-to-Know Act of 1986 are also required under the CAA.

The Army has broad compliance responsibilities under the CAA. It must comply with all federal, state, interstate, and local requirements; administrative authorities; and processes and sanctions in the same manner and to the same extent as any nongovernmental entity. This compliance requirement includes any reporting, recordkeeping, permitting requirements, and payment of service charges and fees set forth in regulations or statutes. It also includes cooperating with EPA or state inspections. Federal facilities must comply with the applicable provisions of a valid automobile inspection and maintenance program, although military tactical and combat vehicles are exempt.

Under Section 176(c) of the CAA, the Army is prohibited from engaging in, supporting, providing assistance for, or approving activities (e.g., issuing a license or permit) that are inconsistent with SIP requirements. This is known as the General Conformity Rule. According to Section 176(c), activities must conform to an implementations plan’s purpose of “eliminating or reducing the severity and number of violations” of NAAQS and achieving “expeditious attainment” of such standards. Such activities must not cause or contribute to a new violation; increase the frequency or severity of an existing violation; or delay

timely attainment of any standard, required interim emission reduction, or other milestone. As a result, conformity determinations are required to ensure that state air quality standards would not be exceeded and that the action would comply fully with the SIP. The proponent compares the emission levels of the Proposed Action to current baseline emissions. Where increases in emission levels exceed thresholds established in the General Conformity Rule, a conformity determination must be prepared. In support of the conformity determination, additional air quality modeling may be required to illustrate the proposed action's impacts on air quality in the region.

Installations must consider the effects that planned projects and activities will have on air quality both on and off post. There are two independent legal requirements that address air quality management: (1) NEPA and (2) the general conformity provision of the CAA section 176(c), including EPA's implementation, of the General Conformity Rule. Depending on the action and the air quality conformity attainment status of the installation (or other affected property), an installation might have to complete a separate conformity analysis in addition to the NEPA analysis. Applicability of the two requirements must be considered separately. Exemption from one requirement does not automatically exempt the action from the other requirement, nor does fulfillment of one requirement constitute fulfillment of the other. Although installations should integrate compliance efforts to save time and resources, the two requirements are very different, necessitating separate analyses and documentation.

The DoD strategy for air quality compliance includes prevention, control, and abatement of air pollution from stationary and mobile sources. The CAAA-90 provides the framework for the majority of air quality regulations and guidelines with which Army installations must comply. The CAAA-90 is implemented by detailed federal, state and local regulations. The CAAA-90 requirements are incorporated within Army's AR 200-1 (U.S. Army 2007a). The Air Pollution Abatement Program in AR 200-1 includes activities to control emissions and cooperation with appropriate regulatory agencies. The objectives are to:

- Identify and monitor air pollution sources, determine types and amounts of pollutant emissions, control pollutant levels to those specified in the applicable regulations or to protect health;

- Procure commercial equipment and vehicles with engines that meet applicable standards and regulations and that do not present a health hazard (exceptions are those vehicles or engines specifically excluded or exempted by EPA regulations or agreements);

- Ensure that each piece of military equipment is designed, operated, and maintained so that it meets applicable regulations;

- Monitor ambient air quality in the vicinity or Army activities per applicable regulations;

- Cooperate with EPA and state authorities to achieve the requirements of the CAA 1977 and applicable regulations issued according to this act, applicable state and local air pollution regulations, air pollution control provisions in other federal and state environmental laws and regulations, including RCRA of 1976, as amended, the Toxic Substances Control Act (TSCA) of 1976, CERCLA of 1980, Superfund Amendments and Reauthorization Acts of 1986 (SARA of 1986), and applicable State and local environmental regulations

Conclusion of the effect. Given the wide spatial distribution of mobile emission sources, using the MRAP vehicles should have a minor to moderate effect on air quality. The level of effect largely depends on the current status of regional air quality near an installation receiving MRAP vehicles. There is no indication there would be any significant change in the numbers of "process" emissions from maintenance shops and other sources resulting from the proposed change. Best Management Practices (BMPs) for dust suppression should mitigate any potential problems caused by fugitive dust.

Alternative 1. Preferred Alternative.
The MRAP vehicles operate on all roads, ranges and maneuver areas. Operating the MRAP vehicles on paved, unpaved, and off-road during training operations would likely have moderate effect on air quality. The MRAP would generate more fugitive dust while operating on unpaved roadways. Installations should continue implementing BMPs to minimize fugitive dust resulting from vehicle operations on unpaved roads.

Alternative 2. The MRAP vehicles operate only on the installation's paved roadways. This alternate course of action will have a minor effect on air quality. Operating the MRAP vehicles only on paved roads may reduce the total vehicle exhaust emissions because the vehicle would be limited to operations only within the installations cantonment area and the few paved roads on the installations training and maneuver area. This is a reasonable assumption understanding that operational profile for MRAP vehicles is 50% on improved (paved) roads. Under these conditions, it is likely the MRAP will actually operate fewer hours. While operating only on paved roads, the MRAP will not contribute fugitive dust that would be generated while operating on unpaved roadways or off-road.

Alternative 3. The MRAP operates only on the installations roadways.
Operating on both paved and unpaved roadways would generate virtually the same vehicle exhaust emissions as Alternative 1. Under Alternative 3, no off road vehicles operations would occur; thus, the MRAP vehicles are likely to spend the majority of their maneuver training miles on unpaved roads. This would likely increase the fugitive dust generated on the installation. This alternative course of action would likely have a moderate effect on air quality.

Installations should continue implementing best management practices to minimize fugitive dust resulting from vehicle operations on un-paved roadways.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants.

Discussion. As stated earlier the MRAP would produce localized short term elevated air pollutant concentrations that should not result in any sustained significant impacts on regional air quality.

Installations with air emissions inventories close to current regulatory thresholds would have to pay very close attention to the potential affects that MRAP vehicles might have on the local airshed. Analyses prepared for site and project-specific proposals would have to include full compliance with the General Conformity Rule. As discussed earlier, installations classified as major sources of air pollutants in NAAQS attainment or maintenance areas require a Conformity Determination when the total direct and indirect emissions caused by an action that would equal or exceed thresholds specified by the EPA. Even if the proposed action meets the definition of one of the exemptions or when emissions would not exceed de minimis thresholds, Army policy requires preparation of a "Record of Non-applicability" to reflect a proponent's consideration of the Conformity Rule's requirements.

Army installations maintain appropriate programs to ensure and document compliance with local and state air quality requirements, and these on-going efforts should prove sufficient. In some cases, site-specific analyses, and further coordination with federal, state and local regulators, may be required. Such regulations include those addressing visible emissions, particulate emissions, and VOC emissions; and applicability will be a site-specific, local determination.

Fielding/Training sites located in non-attainment and maintenance areas are regulated by the General Conformity Rule. Installation personnel will perform an air conformity analysis, as required by the rule, to ensure that the additional vehicles and activities associated with those vehicles will not impact conformance to the air quality initiatives established in the applicable state implementation plan.

Each of the engines was certified to a particular (non-current) EPA or European Union emission standard. Table 4.1lists the engine types and emission standards the engines were certified to.

Table 4.1. MRAP Variant Compression Ignition Engine Types and Emission Standards

MRAP Variant	Engine	hp	Emission Standards
RG31	Cummins QSB FR 91421	275	Euro 3 & US Tier 3 Non-road
RG33 CAT II	Cummins ISL, 8.9L	400	Euro 3
Caiman	Caterpillar C-7, 7.2L	330	EPA 2004 On-highway*
MaxxPro	International DT530 engine	300	EPA 1998 On-highway

*Only the first 1,192 vehicles have EPA 2004 certified engines. At that point the engine was recalibrated to meet performance requirements and is no longer EPA certified.

Dust generation at training and fielding locations would depend on the type of soil present, the extent and type of vegetation cover, precipitation and vehicle speed. The operation of the MRAP vehicles, however, would occur on a periodic basis and for a limited duration. Additionally, the operators of the vehicles comply with installation requirements to minimize the generation of air borne particulate matter. Since MRAP training and fielding sites are located on military facilities, are relatively remote from population centers, and operations would occur on established ranges with a limited number of vehicles, there is little potential for excessive amounts of dust generation.

Each training and fielding facility is required to comply with the environmental impact analyses requirements of NEPA, and thus this area of potential impact should be addressed by each respective training and fielding site. Personnel at each installation will evaluate any impact cross-country driving will have on the installation's air quality. If the analyses show that the location of MRAP vehicles at that sight does not risk violation of CAA standards such as the general conformity procedures, air quality will not constitute and extraordinary circumstance requiring detailed analysis in an environmental assessment.

4.3.2 Cultural Resources

Affected Environment. A wide variety of cultural resources are found on Army installations. Properties are classified as:

- Buildings - primarily constructed for human activity.
- Structures - constructed for purposes other than shelter.
- Objects - artistic in nature or relatively small in scale.
- Sites - often the location of a valued significant event, prehistoric or historic occupation or activity, or a standing location that possesses those values. Sites may also be natural landmarks strongly associated with significant prehistoric events or patterns of events.
- Districts - a significant concentration or continuity of sites, structures and objects.

Installations with historic or cultural resources operate under an Integrated Cultural Resource Management Plan (ICRMP), a five-year plan for compliance with requirements of Army Regulation 200-1, Environmental Protection and

Enhancement (U.S. Army 2007a). The ICRMP is an internal Army compliance and management plan that integrates the entire installation's cultural resources management program with ongoing mission activities. Army Regulation (AR) 200-1 (U.S. Army, 2007a) addresses Army compliance with the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, the Archeological Resources Protection Act, the Archeological and Historic Preservation Act and other federal and state regulations.

Conclusion of effect. Operation of MRAP vehicles on paved or unpaved roadways is not likely to have an effect on historical or cultural resources. The MRAP is expected to operate within established boundaries of existing training and maneuver areas. These areas have been used by other and heavier tactical vehicles. Normal operations of the MRAP within the boundaries of established training and maneuver areas should have no effect on historic and cultural resources.

Alternative 1. Preferred Alternative.
The MRAP operates on all roads, ranges and maneuver areas: On-road operations of the MRAP should have no effect on historical or cultural resources. Off-road operation within established boundaries of existing training areas will have minimal effect on surface historical or cultural resources because they are inventoried and mitigated prior to use.

Alternatives 2 and 3 Operating MRAP vehicles only on installation roads.
Normal operations of MRAP vehicles on both paved and unpaved roads on the installation are not likely to have an effect on historic or cultural resources on an Army installation.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants.

Discussion. While operating on paved or unpaved roadways the vehicle should have no effect on historic or cultural resources. Off-road operations will be conducted within established training ranges and maneuver areas on Army installations. The MRAP will operate on land previously used by other heavier tactical vehicles. Normal operations of the MRAP on established training and maneuver areas should have no effect on cultural resources.

Analysis of subsurface cultural resource potential and the amount of potential maneuver area that has no cultural resource inventory is needed on an installation basis. If the risk to cultural resources from subsurface impacts could constitute a significant impact to cultural resources this would constitute an significant impact that needs further analysis and documentation on an installation basis. Similarly if areas that have not been inventoried for cultural

resources are potential maneuver areas for MRAP vehicles appropriate inventory and evaluations may be necessary before cross country MRAP maneuver is appropriate.

4.3.3 Noise

Affected Environment. Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or that diminishes the quality of the environment. Community response to noise is generally not based on a single event, but on a series of events over time. Factors that have been found to affect the subjective assessment of the daily noise environment include the noise levels of individual events, the number of events per day, and the times of the day at which events occur.

Sound is usually measured using the decibel (dB). The descriptor of a 24-hour noise environment is the day-night average sound level (DNL). DNL is an average measure of sound, taking into account the loudness of a sound-producing event, the number of times the event occurs and the time of day. Night noise is weighed more heavily because it is assumed to be more annoying. The DNL descriptor is accepted by federal agencies as a standard for estimated impact and establishing guidelines for compatible land use.

The use of average noise levels over a protracted time period usually does not adequately assess the probability of community noise complaints. The metric PK 15(met) accounts for statistical variation in received single event peak noise level that is due to weather. It is the calculated peak noise level, without frequency weighting expected to be exceeded by 15 percent of all events that might occur. If there are multiple weapon types fired from one location, or multiple firing locations, the single event level used should be the loudest level that occurs at each receiver location. Installations assess noise from small arms ranges using a single even metric, either PK 15(met) or A-weighted sound exposure level (ASEL). Installations use the land use planning zone (LUPZ) contour to better predict noise impacts when levels or operations at airfields or large caliber weapons ranges are above average. Installations also manage noise-sensitive land use, such as housing, schools, and medical facilities as being acceptable within the LUPZ and noise zone I, normally not recommended in noise zone II, and not recommended in noise zone III (Table 4.2)(U.S. Army 2007a).

Table 4.2 Department of the Army Noise Limits for Noise Zones

Noise Zone	Noise Limits (dB)		
	Aviation ADNL	Impulsive CDNL	Small Arms PK 15 (met)
LUPZ	60-65	57-62	N/A
I	<65	<62	<87
II	65-75	62-70	87-104
III	>75	>70	>104

Reference AR 200-1, able 14-1, page 44, (U.S. Army 2007a)

Noise from transportation sources (e.g., vehicles and aircraft) and from continuous sources (e.g., generators) is assessed using the A-weighted DNL. Impulsive noise resulting from firing armor or artillery weapons and demolition activities are assessed in terms of the C-weighted DNL (CDNL). The A-weighted scale is oriented towards the frequencies heard by the human ear, whereas the C-weighted scale measures low frequency components that cause buildings and windows to rattle and shake.

Conclusion of effects. Normal operations of the MRAP will have minor effect on noise. Using the MRAP is not expected to significantly increase ambient noise levels. Operation near or adjoining zone I areas (such as housing, schools, and medical facilities) should be avoided.

The MRAP employs the same weapons as similar tactical vehicles. It is expected to fire from the same ranges. The noise will be no greater than currently experienced with vehicles such as the HMMWV. Noise emissions from driving are smaller than those of equipment transports and are similar to other vehicles such as dump trucks that have similar engines and gross vehicle weights.

Alternative 1. Preferred Alternative.
The MRAP operates on all roads, ranges and maneuver areas: When operating on roadways, training ranges and maneuver areas the noise of MRAP vehicles will likely have minimal effect. Noise generated from normal operations of MRAP vehicles will be no greater than that from weapons mounted on similar vehicles such as the HMMWV.

Alternative 2. The MRAP operates only on the installations paved roadways.
Limited to paved roadways, the effects of normal operations of the MRAP on noise would be minimal. The minimal effects would be localized and temporary. The effect of noise generated from weapons firing would be the same as that described in Alternative 1, above.

Alternative 3. The MRAP operates only on the installations roadways.
Noise from normal operations of the MRAP would be limited to paved roadways and unpaved roads, such as tank trails. The minimal effects of noise from normal operations of the MRAP would be localized and temporary. The effect of noise generated from weapons firing would be the same as that described in Alternative 1, above.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants. Disturbance to sensitive receptors such as hospitals, residential neighborhoods, etc, would be unchanged.

Discussion. Potential sources of high impulse noise include the weapons systems of the MRAP variants. Each weapon on an MRAP is also capable of being used on other tactical vehicles such as the HMMWV (Section 2.5.3). The number of rounds of ammunition fired from each weapon on the MRAP will be comparable to the number of rounds fired from an HMMWV variant and done on the same ranges. There will be no additional noise generated from firing weapons on MRAP vehicles, which fires the same weapons as on the HMMWV.

A-weighted noise data for several MRAP vehicles is included in Appendix C.

4.3.4 Natural Resources and Soils

Affected Environment . This discussion and analysis of the impacts of the proposed action focuses on natural resources and soil conditions in the maneuver and training areas of an Army installation. This would include specifically the potential affects the proposed action may have on soils and vegetation. Consideration of the potential affects on threatened and endangered species are discussed and evaluated separately in this document.

The conditions and setting of the natural environment regionally vary across the United States. Bailey (1995) provides general descriptive information on soils, climate, flora and fauna for all ecosystem provinces in the United States. Ramos (2006) provided similar information and identifies a number of Army installations in selected ecological provinces.

Soil disturbance resulting from military vehicles causes environmental damage by decreasing plant development. Many researchers have investigated the effects of vehicle traffic on soil and environmental damage. Soil puddling, displaced surface horizons, rut formation, increased soil density, decreased macropore space, reduced soil strength and structure, restricted water movement and physical damage to root systems are potential consequences of vehicle traffic. These soil changes can result in restricted root growth and restricted movement of gasses, water and nutrients. The physical disturbances affect not only vigor and increased mortality of vegetation but also may affect site recovery (Sullivan and Anderson, 2000).

The duration of impact is related to the climate, productivity, and vegetation of a site. Dry sites that have little precipitation take longer to recover because vegetation may not have sufficient moisture to germinate seeds and reoccupy the disturbed ground. Productive sites can generate enough growth that the organic litter of leaves, stems and other material may cover disturbed ground and prevent surface erosion. Sites with little vegetation diversity are sometimes slow to recover because there may not be a species that will colonize the disturbed site with its altered micro-climate. Spread of undesirable plants (weeds) is a risk from all disturbances that leaves soils bare.

Conclusion of effect. Using the MRAP vehicles may have a minor localized negative effect on soil and vegetation resulting from off-road operations. Increased soil compaction, and associated damage to vegetation could contribute to increased levels of soil erosion. The level of impact will depend on the MRAP being used however it can be assumed that CAT II MRAP vehicles will have a greater impact as they are generally larger and heavier than CAT I MRAP vehicles.

Potential MRAP impacts on soil resources are attributable to the maneuver of MRAP vehicles on and off road during testing, training, and fielding activities. Minor impacts to biological resources (disturbances to vegetation/habitat and wildlife) could also occur. These effects can be mitigated through strict adherence to local installation regulations and BMPs. Soil erosion and compaction due to MRAP vehicle operation over unimproved surfaces will be addressed by site-specific NEPA documentation. Installation personnel have the responsibility of conducting an evaluation and preparing that NEPA documentation.

Alternative 1. Preferred Alternative.
The MRAP operates on all roads, ranges and maneuver areas: When operating on roadways, training ranges and maneuver areas the MRAP vehicles will likely have minimal effect as it would be operating on established ranges and roads.

Alternatives 2 and 3. The MRAP operates only on the installations paved and unpaved roadways.
Limited to established roadways, MRAP vehicles would have little effect on soil erosion or other resources.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants.

Discussion. The potential affects of MRAP vehicles on natural resources and soils will likely derive from its off-road operations. The mission profile for MRAP vehicles is to operate primarily on roads. While operating on paved or unpaved roadways the vehicle will have little or no effect on soils.

Army Infantry units would operate MRAP vehicles on ranges and training/maneuver areas currently, or previously, used by other, and possibly heavier, tactical vehicles (e.g., M2 Bradley Fighting Vehicle, M1A1 Abrams Tank). As such, any disturbance to subsurface habitat or life forms would likely have already occurred from previous training and maneuver operations. Operating MRAP vehicles will likely not have significant effect on subsurface habitat or life forms on existing training and maneuver areas.

Soil erosion effects are caused when surface area is removed, and soil particles are subsequently dislodged (by wind or water), and the transport of these soil particles creates numerous indirect (or secondary) effects. These indirect effects are generally more important than the direct effect (the actual soil erosion) as sediment. While disruption of the vegetative cover and soil surface is inevitable, soil erosion can often be contained using BMPs. While these general effects may occur, their severity and potential significance will vary by installation. As discussed in Bailey (1995) and Ramos (2006), some of the natural resources are more resilient than others. For example, southeastern U.S. ecosystems are more diverse and resilient, and can quickly recovery from stresses and disruptions, while the southwestern U.S. ecosystems are much more fragile and require more time for recovery. Other potentially affected ecosystems recover at a slower or faster rate, depending on natural resilience, and the other stresses on the affected landscape. As noted earlier, the Army's Sustainable Range Program is focused on identifying, mitigating if possible, and ensuring land restoration due to off-road activities of military vehicles.

4.3.5 Threatened and Endangered Species

Affected Environment. The Army is required by the Endangered Species Act (ESA) to conserve federally-listed threatened and endangered (T&E) species that occur on its lands, and to ensure that any action authorized, funded, or carried out by the Army does not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. As of October 1, 2006 the Army has recorded 174 federally-listed T&E species on 99 installations. The Army has 13 installations with designated critical habitat occurring for one or more, and two of these installations have unoccupied critical habitat (Rubinoff, et al., 2007).

Due to their importance and sensitivity, impacts to T&E habitats are, as much as practical, avoided and/or minimized. The Army consults with the U.S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) on actions that may affect federally listed species or for their assistance in assessing impacts of actions on listed species. Management and conservation of T&E species and their habitat is accomplished through implementation of the installations Endangered Species Management Component (ESMC) of the Integrated Natural Resources Management Plan (INRMP) (Army Regulations 200-1; U.S. Army 2007a). The INRMP supports the Sustainable Range Program (SRP) and Installation Training Area Management (ITAM) program, which are mandated to sustain Army training and maneuver areas (Army Regulation 350-19; U.S. Army 2005). These programs implement the conservation measures identified in the ESMC to avoid or minimize impacts on the T&E species and their habitat to ensure compliance with the ESA and promote mission sustainability. Installation ESMCs are the Army's primary means of ensuring compliance with the ESA and balancing mission requirements (U.S. Army, 1995, pp. 20).

The areas to be impacted by the proposed action fall within existing mission footprints. The operational profile of the MRAP vehicles will be approximately 75-85% on road depending on the variant used.

Conclusion of effect. Implementation of the installation INRMP, SRP and ITAM program, and consultation, when necessary, with the USFWS or NMFS will ensure that the proposed action avoids or has minimal impact on listed species and their habitat with in the action area. Using existing roads and operating within established limits on existing training ranges and maneuver areas will minimize any potential adverse affects of the action on the listed species and their habitat.

Alternative 1. Preferred Alternative.
The MRAP operate on all roads, ranges and maneuver areas: Any potential effect to endangered species by operating the MRAP will likely be during off-road operations. The operational profile for the vehicle is mostly on road (75-85%). The drive-by noise level is not expected to have a noticeable effect on T&E species. Off-road operations will be within established boundaries of existing training areas and will have the minimal effect on T&E species.

Alternatives 2 and 3 Operating MRAP vehicles only on installation roads.
Normal operations of the MRAP on either paved and unpaved roads on an Army installation will have minimal, if any, effect on threatened and endangered species.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants.

Discussion. Installations would utilize their ESMC and INRMP for planning purposes so as to avoid or minimize potential impacts of actions on listed species and their habitat. For actions that may affect listed species, installations will seek assistance from the USFWS or NMFS on ways to avoid and/or minimize impacts. Installations will initiate consultation when impacts are unavoidable or to obtain concurrence on determinations that an action may affect, but is not likely to adversely affect listed species or critical habitat.

Considering that vehicle maneuvering should occur primarily (75-85%) on existing roadways it is not anticipated that implementation of this action will exceed the level of current impacts. Soil compaction and erosion, and damage to vegetation will be similar to existing use of the area; therefore, the impacts of the proposed action on listed species and any designated critical habitat is not anticipated to be any greater than baseline levels. It is possible that any such species would soon be habituated to the noise levels as they were for existing mission use of the travel corridors.

4.3.6 Water Resources

Affected Environment Water resources include all surface water bodies, such as streams, rivers, ponds, lakes within the potential area of affect of the proposed action as well as potential groundwater resources. Using the MRAP on Army installations is not expected to have any affect on groundwater resources. Army installations, and Army operations on training ranges and maneuver areas must comply with provisions of the Clean Water Act, as well as Executive Orders governing wetlands (EO 11990) and floodplains (EO 11988) and off-road vehicles on public lands (EO 11644). The primary issue regarding the using of MRAP vehicles is the potential effect its operations may have on the landscape during off-road operations that may contribute to erosion, and thus increased sedimentation in surface waters. The potential effects of erosion are addressed in Section 4.3.4.

Conclusion of effect. Using the MRAP would have minor to moderate effect on surface water quality. Using the MRAP would not have any effect on groundwater quality. Because of their additional size and weight, the MRAP vehicles have a greater potential for degrading stream channels and banks during fording operations, than lighter tactical vehicles such as the HMMWV. MRAP vehicles will likely have minimal impact on surface water quality since the majority of its operations will be on established roadways. The SRP program, mandated by Army regulations (U.S. Army, 2005) is designed to identify and restore natural resources and lands damaged by training operations. The MRAP vehicles will likely have little, if any, effect on surface water quality if it uses hardened stream crossings.

Alternative 1. Preferred Alternative.
The MRAP vehicles would operate on all roads, ranges and maneuver areas: Operating the MRAP vehicles on paved, unpaved roads, and off-road during training operations will likely have a minor to moderate effect on surface water quality. The MRAP vehicles are heavier, and their physical characteristics are likely to contribute to conditions that support soil erosion, such as soil compaction and loss of vegetation or retarding vegetative re-growth. This overall effect will be relatively minor since the majority of its operations are expected on existing roadways. Because of its size and weight, the MRAP may contribute to stream sedimentation at non-hardened fording sites.

Alternative 2. The MRAP vehicles operate only on the installation's paved roadways.
By limiting operations to paved roadways, normal operations of the MRAP are not likely to affect surface water quality at an installation.

Alternative 3. The MRAP vehicles operate only on the installations roadways.
By limiting operations to established roadways, normal operations of the MRAP vehicles are not likely to affect surface water quality at an installation.

Alternative 4. The No Action Alternative.
Under the No Action Alternative, there will be no additional impacts to water resources; the effects will be the same as currently experienced with the UAH variants.

Discussion. While operating on paved or unpaved roadways the vehicle are not likely to effect surface water, wetlands or floodplains. The MRAP vehicles are heavy and will have a higher bearing pressure on the soil. The MRAP vehicles can ford hard-bottom water crossings up to a depth of 36 inches (U.S. Army, 2009). MRAP vehicles off-road operations will be conducted on established training ranges and maneuver areas on Army installations. The potential impacts could include loss of benthic habitat, disruption and erosion of the stream bottom, and destruction of streamside vegetation, which would increase the susceptibility of stream banks to erosion. Vehicles operating in streams during fording also have the potential to leak fluids into the water which can have direct impacts upon water quality (U.S. Army, 1998b).

To alleviate the potential environmental effects of fording military vehicles, many installations are building "hardened" crossings at fording sites. A hardened crossing is an engineering practice using either heavy course aggregate or concrete designed to provide a hard-surface for vehicles crossing a small water body, such as a creek or stream. The hardened crossing reduces the effect vehicles have on stream banks and beds during fording operations. When using hardened crossing sites, an MRAP will cause little or no negative effect to stream banks or bottom and will not negatively affect the quality of surface waters. It is not anticipated that using the MRAP will have any effect on groundwater quality.

Monitoring the conditions of streams and stream banks at fording locations is an established component of the SRP. This program, operated at the installation-level is mandated by an Army regulation (U.S. Army, 2005) to identify and restore natural resources and lands damaged by training operations.

4.3.7 Facilities

Affected Environment "Facilities" encompasses all aspects of Army real property management. Army real property includes lands, facilities and infrastructure. This includes land (and interests in land), leaseholds, standing timber, buildings, improvements and appurtenances. Facilities are buildings, structures, and other improvements, to include ranges, to support the Army mission. Infrastructure is the combination of supporting systems, such as roadways and bridges, which enable the use of this land and resident facilities.

Conclusion of effect. There are no anticipated effects on facilities relating to weapons firing ranges or on maneuver training areas from using MRAP vehicles at Army installations in the United States.

There may be some limited effects on facilities within the cantonment area regarding the size of existing motor pools and size of existing maintenance facilities. The footprint of MRAP vehicles may be larger than existing vehicles. This, along with a greater turning radius may require a unit to make a minor expansion of the motor pool. Addition of impervious surface may require an installation to modify its stormwater management plan.

Standard Operating procedures and/or regulations governing bridges and vehicle operations on the installation should be updated if any bridge(s) on an installation has a lower than necessary weight rating.

It is possible that the MRAP vehicles may not fit within the existing vehicle bay doors of maintenance facilities. If this situation exists, an installation may be required to modify an existing bay door, build a new facility, or conduct maintenance in another building. This is unlikely as other common vehicles such as the 2½ ton and 5 ton trucks have similar silhouettes to the MRAP vehicles.

Alternatives 1, 2 and 3.
The operating range MRAP vehicles as described in the three alternative courses of action will be the same on facilities. There will be no anticipated changes of range facilities to support weapons firing for any of the three alternative courses of action. Some units may need to expand their motor pool to accommodate the additional footprint and turning radius of MRAP vehicles, which may require amending the installation's storm water management plan. The overall effect of MRAP vehicles on facilities is minor.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants.

Discussion. MRAP vehicles have the same weapon systems as other tactical vehicles such as the HMMWV and training with those weapon systems will occur on ranges that are already functioning for that purpose on Army installations. MRAP vehicles, while providing more protection for its crew with its IED resistant hull, have the same basic mission as the HMMWV or Stryker. It is unlikely that new ranges for weapons training will be required to support MRAP vehicles.

Some MRAP vehicles may have a larger turning radius and vehicle footprint than other vehicles. The additional area required for parking MRAP vehicles, and the vehicle's larger turning radius, may require some units to expand the size of their motor pool to meet the additional parking space and maneuver requirements posed by MRAP vehicles.

Expansion of a motor pool could have nominal short-term effects due to noise and fugitive dust generated during construction. If additional paving is required, this would cause a slight increase in surface water runoff of water that might

otherwise percolate to groundwater. Modification of the installation's stormwater management plan may be necessary.

MRAP vehicles may be larger and heavier than other vehicles, and may have a larger engine (Appendix 2). An increase in fuel consumption may require either more frequent delivery of fuel or installing additional fuel storage assets. Any new fuel storage tanks would be built in compliance with Subtitle I, of the Resource Conservation Recovery Act (RCRA). More frequent delivery of fuel would be accomplished in same manner as current fuel deliveries.

While the weight of MRAP vehicles is greater than the HMMWV, its weight is within the range of many other common tactical wheeled vehicles. The MRAP should not cross bridges with a weight classification of less than 20 tons. The MRAP vehicles will not have a significant negative effect on roads or bridges with a weight rating greater than 20 tons. Standard Operating procedures and/or regulations governing bridges and vehicle operations on the installation should be updated if an installation has bridge(s) with a weight rating of 20 tons or less.

4.3.8 Hazardous Materials and Hazardous Waste

Affected Environment This category evaluates the proposed action's potential impact on all aspects of transporting or generating hazardous materials or hazardous waste. For military vehicles, this relates to the storage and management of hazardous material, such as POL products and waste oil. These materials, when not properly transported or stored could cause negative effects on human health and the environment. The U.S. Army, as a used oil generator, must comply with federal regulations (Title 40 CFR, Part 279) which prescribe all aspects of managing used oil and used oil filters.

Conclusion of effects. An MRAP equipped unit will generate more waste oil per year than a unit equipped only with current vehicles such as the HMMWV. The presence of MRAP vehicles will require the unit to store and manage additional hazardous material, such as POL products and waste oil.

POL required for the MRAP are either the same type required by the HMMWV (e.g., engine oil, transmission fluid), or are standard materials used in other military vehicles (e.g., hydraulic fluid). However, the MRAP may require increased volume of many of the same products due to its increased size. The increased number or volume of POL products may require the unit to increase storage, or require more frequent delivery, of those products.

Using the MRAP vehicles will require proper management and storage of POL products, or for more frequent collection of related waste and waste oil. Installations receiving MRAP vehicles currently manage such products and waste material and will not require developing new processes, procedures and education programs to effectively manage these products. The potential effect on

human health or the environment of additional volumes of POL products and waste oil is minor.

Alternatives 1, 2, and 3: The effects of using MRAP vehicles will be the same on all alternative courses of action. Army vehicles require preventive maintenance on a scheduled basis, regardless of where they operate. Installations receiving MRAP vehicles will have to adjust existing programs and procedures to manage additional volumes of POL products and waste oil. Using MRAP vehicles will have a minor effect on hazardous material or waste oil management.

Alternative 4. The No Action Alternative.
The No Action Alternative would not increase the amount of hazardous wastes. Hazardous waste levels would remain as currently experienced with UAH variants.

Discussion. The principal hazardous wastes associated with hull maintenance pertain to engine oil and hydraulic fluid. For both hull and turret maintenance solvents are also infrequently used to clean vehicle parts as well as tools used by maintenance personnel. Standard operating procedures to control release of POL products include using drip pans to prevent fluids from falling on the ground. Rags are used liberally in maintenance procedures. Upon completion of maintenance activities, spent fluids and rags are collected and stored for disposal in accordance with standard operating procedures that are based on regulatory requirements to preclude environmental contamination.

Frequency of lubrication services are increased when operating abnormal conditions, such as high or low temperatures, prolonged high speed driving, or extended cross-country operations (U.S. Army, 1996; U.S. Army, 2003a). Such operating conditions would require more frequent preventive maintenance services, and accordingly, generate more used oil.

As a large quantity generator of used oil, Army installations must comply with the provisions of 40 CCFR, Part 279; Standards for the Management of Used Oil. This regulation prescribes all aspects of managing waste oil and waste oil filters. The increased volume of waste oil generated by MRAP equipped units may require some combination of increased frequency to pick-up the material or increased storage capacity.

Other liquids used in vehicle operations are either consumed (diesel fuel), or are within closed systems that are changed only with major overhauls. As such, they generate minimum quantities of waste oils that must be managed under the provisions of existing federal regulations (40 CFR 279). Petroleum, oils and lubricants required for the MRAP vehicles are either required for the HMMWV, or are standard products used in other vehicles (e.g., hydraulic fluid).

The MRAP vehicles air conditioning units contain R-134a as the refrigerant. The MRAP variants' Technical Manuals (TM) specify the evacuation and recovery of the refrigerant prior to environmental control unit/air conditioner system refrigerant maintenance. The TMs also require reuse of the recovered R-134a. This recovery and reuse of the refrigerant would limit the need to purchase additional R-134a refrigerant and potential to release the refrigerant into the environment. This refrigerant is commercially available, is broadly used in commercial and stationary applications, and has an American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) safety classification of A1 (DuPont, 2007).

The increased quantities of petroleum products may require either increased frequency of delivery, or increased storage capacity for these products at the maintenance company of MRAP equipped units.

4.3.9 Energy

Affected Environment. This subject area evaluates the potential for the proposed action on energy requirements. This includes changes to fixed facilities that may require increased energy consumption for heating or cooling, as well as energy requirements for mobile (vehicle) sources.

Conclusion of effect. Using MRAP vehicles will have minimal effect on facility energy requirements if it is determined additional maintenance facility is required, and only if existing maintenance facilities (which accommodate other tactical vehicles) are too small for MRAP vehicles. If an additional structure or modification of existing structures is needed, there will be some minor to moderate increase in energy to provide heat lighting to the facility. There will be no effect on facility energy if additional maintenance facilities are not required.

The additional fuel required for MRAP vehicles may require either construction of additional fuel storage assets in the cantonment area or more frequent deliveries of fuel. Despite the additional fuel consumption, with its relatively long range (300 mile minimum) the MRAP vehicles will require less frequent re-fueling than other similar vehicles.

<u>Alternative 1. Preferred Alternative. MRAP vehicles operate on all roads, ranges and maneuver areas</u>
Operating MRAP vehicles on paved, unpaved roads, and off-road during training operations will likely have a minor effect on energy. There may be some additional facility energy required if additional vehicle maintenance facilities need to be built.

<u>Alternative 2. MRAP vehicles operate only on the installation's paved roadways</u>.
The MRAP vehicles operational profile is approximately 50% on paved roads, 30% on unpaved roads and 20% off-road. Operating MRAP vehicles only on paved roads may reduce the total amount of fuel required because the vehicle

would be limited to operations only within the cantonment area or the limited amount of paved roads in the installation's training and maneuver area. Under these conditions, it is likely that it will actually operate fewer hours, and require less total fuel. Operating MRAP vehicles only on paved roads would have a minimal effect on energy.

Alternative 3. MRAP vehicles operate only on the installations roadways.
Operating the MRAP vehicles on paved and unpaved roadways on an installation constitutes approximately 75-85% of the vehicle's operational profile. Under these conditions, the MRAP vehicles will consume almost as much fuel as that consumed under alternative 1. Operating MRAP vehicles on paved and unpaved roads would have a minor effect on energy.

Alternative 4. The No Action Alternative.
The No Action Alternative would have the same effect as currently experienced with UAH variants. The no action alternative would consist of the continuation of current inadequate ballistic protection capabilities.

Discussion. Energy consumption is a major budgetary and infrastructure issue for the Army. In the context of an Environmental Assessment, this subject would normally include the issue of energy consumption necessary to support real property (heating, air conditioning, and lighting of buildings). This issue is relevant only if an installation is required to construct, or significantly modify, existing structures to conduct maintenance operations on MRAP vehicles. The primary energy issue relating to the proposed action is the potential effect(s) of additional fuel consumption of MRAP vehicles compared with the No Action Alternative.

The additional fuel required for the MRAP vehicles may require construction of additional fuel storage assets in the cantonment area or require more frequent deliveries of fuel. Due to its relatively long range (300 miles) MRAP vehicles may require less frequent refueling than similar tactical vehicles. This creates a slight positive factor for MRAP vehicles particularly during field training maneuvers where refueling while on pervious surfaces poses a higher risk to the environment than refueling at a fixed facility with a concrete surface. The total amount of fuel consumed by an MRAP equipped unit is directly related to its operational temp. Operational tempo is a measure of the number of hours and miles it operates its vehicles. A more detailed site-specific analysis of fuel consumption will require installation-level data of historic operational temperatures of its units.

4.4 CUMULATIVE EFFECTS

4.4.1 Introduction

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and

reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative effects from using MRAP vehicles will include the potential of multiple units on an installation. Cumulative impacts from using MRAP vehicles will be site specific and are not readily addressed by a PEA. Rather, such cumulative impacts should be evaluated using the 11 CEQ steps for each effected VEC (NEPA Analysis Guidance Manual Chapter 2.1). Quick Look questions found in Chapter 4 of the NEPA Analysis Manual for each VEC will assist users of this PEA in determining the relevant direct and indirect effects from BES use at their ranges.

Installations receiving MRAP vehicles will need to consider all other reasonably foreseeable actions with the region of influence to adequately assess whether or not there is a significant cumulative impact.

4.4.2 Cumulative Effects Analysis Requirements for this PEA

The MRAP vehicles are a tactical combat vehicle. The geographic scope for this analysis is Army installations located within the United States that have been designated as Home Station Training (HST) sites. The vehicle's primary use on an Army installation will be training on the weapons ranges, and training and maneuver areas designated for that purpose. It will normally be kept at the established parking area (motor pool) of its owning unit along with the units' other vehicles. Repairs and preventive maintenance will be performed in existing facilities used by the units' current wheeled vehicles. MRAP vehicles can be expected to be used at the same operational level (e.g., number of operating hours or miles) as many HMMWV variants. The baseline conditions for cumulative effects analysis would be the same units equipped only with current vehicles. MRAP vehicles are expected to operate with specified loads under an on-road/off-road mission profile of approximately 50% primary (paved) roads, 30% secondary (unpaved) roads and 20% off-road operations.

The MRAP vehicle may be heavier than vehicles currently in use (Appendix B) and will have a higher bearing pressure on the soil. The average weight of some MRAP vehicles is approximately 20 tons. It is very probable MRAP vehicles will operate on land previously used by other, and heavier, tactical vehicles.

4.4.3 Air Quality

Conclusion of effect: Combustion emissions resulting from training would be primarily from mobile sources and be widely distributed both spatially and temporally and not likely cause a cumulative effect on air quality. The presence of multiple MRAP equipped units on an installation would increase both combustion emissions and fugitive dust. Fugitive dust emissions remain a localized issue and should be addressed as an opacity issue if activities are

close enough to installation boundaries that visible emissions leave the installation.

Discussion: Combustion emissions resulting from training would be primarily from mobile sources and be widely distributed both spatially and temporally. The presence of multiple MRAP equipped units would increase the level of exhaust emissions. Fugitive dust emissions remain a localized issue and should be addressed as an opacity issue if activities are close enough to installation boundaries that visible emissions leave the installation. Given the wide distribution of emissions, it is not anticipated that regional air quality would be significantly affected; however, the installation environmental office should evaluate the potential effects of using MRAP vehicles, based on the proposed operational use of MRAP equipped units and the local/regional air quality conditions.

4.4.4 Cultural Resources.

Conclusion of effect. The presence of multiple MRAP equipped units should not have any cumulative effects to cultural resources.

Discussion. Off-road operations of MRAP vehicles will be a minimal portion of its operating time (approximately 15-25%), and operate within established limits on existing training ranges and maneuver areas on Army installations. Other larger and heavier tactical vehicles have earlier traveled the same training ranges and maneuver areas. It is unlikely MRAP vehicles will have a cumulative effect on cultural resources. Traveling on established roadways, both paved and unpaved will have no effect on cultural resources.

4.4.5 Noise

Conclusion of effect: Increased noise from operating MRAP vehicles will be localized and temporary, and the cumulative effects of increased numbers of MRAP equipped units would be minor. Weapons firing from MRAP equipped units will not generate larger volume of noise than from currently equipped vehicles (i.e. HMMWV equipped units) however; MRAP equipped units will generate the same volume of noise. Any time when increased noise is generated it is expected to have little or no effect on the noise contours from these ranges.

Discussion: MRAP vehicles have the same basic mission of the UAH, except it provides increased protection for the crew. It is not expected to increase the level or intensity of military training. With the same mission and weapon systems as the as the HMMWV, the MRAP vehicles will operate in the same firing ranges and training areas as the HMMWV.

Firing the same weapons from an MRAP on the same ranges will not generate more noise than when the weapons are fired from the HMMWV. This will have minimal, if any, affect on the noise contours on either the 40mm GMG or a .50 caliber machine gun range. Over a period of time, multiple MRAP equipped units

will each spend time on the ranges to train and qualify their crews on the weapon system. The net result is not an increased volume of noise

Noise levels from operating MRAP vehicles are given in Appendix C. Noise caused by a moving vehicle is spatial and temporary. The noise levels of this vehicle under normal operations will not alter existing noise contours on an installation. Under normal operating conditions, MRAP vehicles may generate slightly higher levels of noise than other tactical vehicles; however, increased noise from operating MRAP vehicles will be localized and temporary, and will not cause negative cumulative effects on either the natural or human environment. Increased numbers of MRAP vehicles on an installation may increase the noise in the immediate area near the vehicle, but should not increase noise level to the extent that installation noise contours would change. The cumulative effect of multiple MRAP equipped units on noise levels would be minor.

4.4.6 Natural Resources and Soils

Conclusion of effect: MRAP vehicles will have a minor localized cumulative effect on soil and vegetation resulting from increased soil compaction. The overall effect and risk to increasing soil erosion is relatively minor due to the limited potential for disturbance to vegetation and wildlife habitat in the training areas.

Discussion: The overall effect and risk to increased soil erosion is relatively minor considering: (1) the small number of MRAP vehicles in a unit and (2) the small amount (15-25%) of off-road operations performed. Multiple MRAP equipped units would likely have a minor negative effect on natural resources and soils, which would be mitigated through continued effective implementation of the installation's sustainable range program, mandated by Army regulation (U.S. Army, 2005).

The potential effect of increased soil compaction is mitigated, to an extent, by the expected off-road use of MRAP vehicles of approximately 20% of its overall operations. The effects of MRAP operations off-road are only cumulative to the time when that land is taken out of the training cycle and land restoration actions implemented. The presence of MRAP vehicles on training lands may increase the level of effort, and associated cost, required to restore training lands.

4.4.7 Threatened and Endangered Species

Conclusion of effect. With its low off-road usage (15-25%) of MRAP vehicles within established limitations on existing training ranges and maneuver areas used by other Army tactical vehicles, it would have minimal effect on the soil, or any subsurface species or T&E plants. The higher noise levels may cause a minor cumulative effect on endangered species with habitat near maneuver areas. If so, it may be necessary for the installation to modify its operational range for MRAP vehicles.

Discussion. The operational profile anticipates approximately 20% of MRAP operations will be off-road. Off-road operations are expected to occur on existing training ranges and maneuver areas. Even with multiple MRAP equipped units, with the full spectrum of existing Army tactical vehicles operating on the same terrain, MRAP vehicles are not expected to have significant additional negative effect on T&E species. It is possible the noise level may affect an endangered species, and the installation may need to adjust its operational overlays accordingly. With its low off-road operational profile and operate within established limits on existing training ranges and maneuver areas on Army installations it is unlikely the vehicle will have cumulative effect on endangered plants or sub-surface species.

4.4.8 Water Resources

Conclusion: The presence of multiple MRAP equipped units could have a minor to moderate cumulative effect on surface water resulting from fording operations. A possible mitigation action would be to limit MRAP fording operations to hardened crossings. The MRAP will have no effect on groundwater resources.

Discussion: Because of larger size and weight, MRAP vehicles may have a moderate effect on stream banks and stream bottoms during fording operations. The presence of multiple MRAP equipped units on an installation may cause the cumulative effect to increase. Monitoring the condition of training lands, and developing and implementing corrective/restorative actions is the purview of the Sustainable Range Program (SRP). The SRP, mandated by Army regulation (U.S. Army 2005), will have a positive effect on assessing site-specific risks from MRAP fording operations. The SRP can assess the conditions and identify and program corrective actions as needed.

4.4.9 Facilities

Conclusion. The presence of multiple MRAP equipped units on an installation should have minor cumulative effects on facilities. The presence of multiple MRAP equipped companies may require expansion of motor pools, construction of additional fuel storage facilities, and establishing routes to avoid facilities (bridges) with weight rating of less that 20 tons. In each case, an installation will modify or amend existing practices or policies, such as storm water management plans. The presence of multiple MRAP equipped units on an installation should have minor cumulative effects on facilities.

Discussion. The increased size and turning radius of MRAP vehicles may require an MRAP equipped unit to increase either the size of their motor pool or maintenance facility, or both. Widening the vehicle bay door of a building would have no effect on the environment. Increasing the size of a unit motor pool will increase impervious surface that will generate increased level of storm water runoff for the life of the facility. This, in-turn, may require modification of storm water management infrastructure, and of the installation's storm water management plan. If expansion of motor pools is required, an installation will

modify existing stormwater management plans, and apply current BMPs to the expanded motor pool(s).

MRAP vehicles have the same weapon systems as similar tactical vehicles such as the HMMWV, and will fire the same weapons on the same ranges. The presence of additional units will require more frequent weapon firing, and the increased number of weapons in a unit will require additional time to process each weapon through its respective range. The presence of additional MRAP equipped units may require more frequent maintenance and repair actions on weapons ranges. An MRAP equipped unit consumes additional diesel fuel. MRAP vehicles additional fuel consumption may require an installation to either build additional storage assets, or require more frequent deliveries of fuel. Any new fuel storage facility would be built in compliance with appropriate specifications and standards.

MRAP vehicles have an average vehicle weight of 20 tons which is not significant considering that a large number of current tactical vehicles have comparable weight values. However, if an installation has a bridge or other facility with a weight rating of less than 20 tons, it should develop new, or modify appropriate existing, guidance preventing the MRAP from using that facility.

The operation of MRAP vehicles should not have a cumulative effect on existing roadways, either paved or unpaved.

4.4.10 Hazardous Materials and Hazardous Waste.

Conclusion. Regularly scheduled preventive maintenance services in an MRAP equipped unit will annually generate additional waste oil. This may require an installation to provide either additional storage or more frequent collection of waste oil.

Discussion. MRAP vehicles use many of the same petroleum, oil and lubricant (POL) products as other tactical vehicles; however it may be in larger quantities. MRAP vehicles are air conditioned and use R-134a as the refrigerant. The presence of multiple MRAP equipped units on an installation will cause a proportional increase in the waste oil generated, and petroleum products required to service and maintain the vehicle.

The presence of additional MRAP equipped units increases the volume POL products and waste oil an installation has to manage. It does not require an installation to develop new education or environmental compliance programs. MRAP vehicles may require additional POL products, and generate increased volumes of waste oil, but the presence of multiple MRAP equipped units represents a minor effect on the natural or human environment.

4.4.11 Energy

Conclusion. The cumulative effect of either alternative (more storage or more frequent delivery of fuel) will have a minor cumulative effect. Less frequent fueling of MRAP vehicles and will pose a lower risk to the environment.

Discussion. Information about fuel consumption of MRAP vehicles is provided in Appendix 2. The presence of multiple MRAP equipped units would cause a proportional increase in total fuel consumption on the installation. The additional fuel required for an MRAP equipped company may require more frequent delivery of fuel, or installation of additional fuel storage faculties. Building more storage or more frequent delivery of fuel will have a minor cumulative effect. With its extended range (300 miles) MRAP vehicles will require less frequent refueling. This is a slight advantage and will have a nominal positive cumulative effect because less frequent fueling will pose a lower risk to the environment from fuel spills.

4.4.12 Conclusions

Using MRAP vehicles will have some cumulative effects on the environment, primarily as a result of off-road operations. These effects include increased soil compaction, resulting in increased damage/mortality to vegetation. These conditions, in turn create the potential for increased soil erosion. An increase of MRAP vehicles conducting fording operations at non-hardened fording sites will likely have a moderate cumulative effect on surface water quality. Operations of multiple MRAP equipped companies within established limits on existing training and maneuver areas will have minor cumulative effects on facilities, hazardous materials and waste oil, noise and threatened and endangered species. MRAP vehicles are not expected to have any effect on cultural resources. Potential mitigation to the moderate cumulative effects of multiple MRAP equipped units on an installation include requiring the vehicle limit fording operations to hardened crossings, and ensure effective implementation of the installations Sustainable Range Program.

4.5 PROPOSED ACTIONS EFFECTS ON CLIMATE CHANGE

The greenhouse effect is the result of heat absorption by certain gases in the atmosphere (called greenhouse gases because they effectively 'trap' heat in the lower atmosphere) and re-radiation downward of some of that heat. Water vapor is the most abundant greenhouse gas, followed by carbon dioxide and other trace gases. Human activity has been increasing the concentration of greenhouse gases in the atmosphere (mostly carbon dioxide from combustion of coal, oil, and gas; plus a few other trace gases). The global concentration of CO_2 in our atmosphere today far exceeds the natural range over the last 650,000 years. Global surface temperatures have increased about 0.74°C (plus or minus 0.18°C) since the late-19th century, and the linear trend for the past 50 years of 0.13°C (plus or minus 0.03°C) per decade is nearly twice that for the past 100 years (NOAA Satellite and Information Service website: http://lwf.ncdc.noaa.gov/oa/climate/globalwarming.html).

The proposed action will emit greenhouse gases to the earth's atmosphere from the MRAP vehicles. Cumulatively, the proposed action and other reasonably foreseeable future actions at installations receiving the MRAPs could result in an minor increase in carbon dioxide emissions due to reductions in forest cover, additional energy generation associated with energy service to additional buildings, and additional vehicles at the installation. The expected increase associated with MRAP vehicles would be minor and, therefore, the net change to greenhouse gas concentration in a regional or global context is virtually unchanged.

It is also important to place any potential carbon emissions associated with the proposed action in the context of gaining installations' participation in the federal government's overall plan to reduce carbon emissions. E.O. 13423 sets as a goal for all federal agencies the improvement in energy efficiency and the reduction of GHG emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline to the agency's energy use in fiscal year 2003. The U.S. Army Energy Strategy for Installations (DoD 2005b) also contains strategies to reduce energy waste and improve efficiency.

> According to EPA's Office of Air and Radiation,
>
> > To date, research on how emissions of CO2 and other GHGs influence global climate change and associated effects has focused on the overall impact of emissions from aggregate regional or global sources. This is primarily because GHG emissions from single sources are small relative to aggregate emissions, and GHGs, once emitted from a given source, become well mixed in the global atmosphere and have a long atmospheric lifetime. The climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source, and [EPA is] not aware of any scientific literature to draw from regarding the climate effects of individual, facility-level GHG emissions.

(Letter from Meyers [EPA's Office of Air and Radiation] to Hall and Lecky, 10/3/08)

Current measurements and modeling can observe and verify warming at global to continental scales. Climate, and correspondingly environmental, impacts, are observed on a local level, but cannot be modeled at this time using existing models. It is currently beyond the scope of existing science to connect a specific source of GHG emissions with specific climate impacts at an exact location.

(USGS Memo 5/14/08 “The Challenges of Linking Carbon Emissions, Atmospheric Greenhouse Gas Concentrations, Global Warming, and Consequential Impacts; summarizing IPCC Fourth Assessment Synthesis Report and CCSP Synthesis and Assessment Product 1.1)

Based on the limitations on available science in determining environmental impacts from a single source of additional GHG emissions, any such impacts from the proposed action cannot be determined with scientific confidence.

SECTION 5.0
CONCLUSIONS

Using the MRAP vehicles and authorizing its use on all roads, training ranges and maneuver areas will have a minor effect on soil erosion and surface water. Overall, the MRAP vehicles exhaust emissions considered are minor because the vehicle is a mobile source whose emissions are spatially and temporally dispersed. The potential effect on air quality is site specific and largely depends on the site specific conditions of air quality at each installation where the MRAP vehicles are used. There would be a minor effect on noise, air quality, hazardous materials, facilities, and threatened and endangered species. The effect on cultural or historic resources will also be site specific but is expected to be minor to no effect

Using the MRAP vehicles under the conditions of Alternative 1 (The MRAP vehicles operates on all roads, training ranges and maneuver areas) would have a significant and positive effect on the survivability of Soldiers. Soldier and unit training under Alternative 1 would be enhanced and would permit soldiers to train as they fight, which is current Army training doctrine. Using the MRAP vehicles only on established paved roads (Alternative 2) or on paved and unpaved roads (Alternative 3) would not allow Soldiers or units to conduct the full spectrum of training that is inherent with their mission.

Using the MRAP vehicles, and restricting their use to either paved roads (Alternative 2), or paved and unpaved roads (Alternative 3), would have slightly less effect on the valued environmental components discussed above. However, both of these alternatives would have lasting, and significant negative effects on unit and Soldier readiness, and would be a detrimental effect on the ability of the Soldiers to achieve their mission.

Based on a review of valued environmental components on a broad-scale evaluation of impacts associated with the Army implementation of the proposed action, and given the existing Army management and control systems; the proposed action, implemented in compliance with existing environmental regulations and BMPs, will have no significant direct, indirect, or cumulative impact on the human or natural environment. A checklist and REC, attached in Appendix A, can be used to validate and certify the assumptions, analyses, and determinations in this PEA.

Once this REC checklist has been completed and the appropriate determinations have been made, the REC can constitute final statutory and regulatory compliance with NEPA, as well as the provisions in 32 CFR 651. Installation environmental and proponent staff will be able to use these screening and evaluation criteria to evaluate what changes or modifications to infrastructure, and/or processes necessary to insure that appropriate steps are being taken to safeguard the environment. The REC signature page certifies that the installation

proponent and environmental office understands these requirements and are committed to meeting specified technical and economic (or fiscal) requirements.

Table 5.1 provides a matrix showing the potential effects of using the MRAP vehicles under the four alternative courses of action (See Section 3.0).

Table 5.1 Matrix of Potential Environmental Effects of Using the MRAP Vehicles

	Soldier & unit Training	Natural Resources & Soils	Air Quality	Noise	Hazardous Materials	Facilities	Energy	Water Resources	Cultural Resources	Threatened & Endangered Species
1. MRAPs operates on all roads, ranges and maneuver areas.	+	⊘	⊙	⊙	⊙	⊙	⊙	⊘	○	⊙
2. MRAPs operates only on paved roadways	⊗	○	⊙	⊙	⊙	⊙	○	○	○	○
3. MRAPs operates only on paved or unpaved roadways	⊗	⊘	⊘	⊙	⊙	⊙	⊙	○	○	○
4. No Action Alternative	⊗	○	○	○	○	○	○	○	○	○

Key:
- ○ No effect anticipated
- ⊙ Minor effect anticipated
- ⊘ Moderate effect anticipated
- ⊗ Significant effect anticipated
- \+ Beneficial impact

SECTION 6.0:
AGENCIES AND INDIVIDUALS CONTACTED, AND REVIEWERS

Anderson, Robert J (Jim). U.S. Forest Service on assignment with the Environmental Planning Support Branch, U.S. Army Environmental Command, Aberdeen Proving Ground, MD

Yakunich, Christina. Environmental Planning Support Branch, U.S. Army Environmental Command. Aberdeen Proving Ground, MD.

Kauffman, Emily. Environmental Planning Support Branch, U.S. Army Environmental Command. Aberdeen Proving Ground, MD.

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SECTION 7.0:
ACRONYMS AND ABBREVIATIONS

ADNL	A-weighted day-night average sound level
BDP	Battlefield Development Plan
BFV	Bradley Fighting Vehicle
BHP	brake horse power
BLM	Bureau of Land Management
BMP	Best management practices
CDNL	C-weighted day-night average sound level
CEQ	Council on Environmental Quality
CO	Carbon monoxide
CFR	Code of Federal Regulations
CRMP	Cultural Resources Management Plan
CS	Combat Support
DA	Department of the Army
dB	Decibel, a measure of noise energy
dBP	Impulse (or peak) noise
DNL	Day-Night Level
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESMC	Endangered Species Management Component - of the Integrated Natural Resource Management Plan (INRMP)
FWS	Fish and Wildlife Service
GMG	Grenade Machine Gun
HC	Hydrocarbons
HMMWV	High Mobility Multi-purpose Wheeled Vehicle
ICRMP	Integrated Cultural Resources Management Plan
ICUZ	Installation Compatible Use Zone
IED	Improvised Explosive Device
ITAM	Integrated Training Area Management
LUPZ	Land use planning zone
MNS	Mission Needs Statement
MOA	Military Occupation Areas (refers to military airspace)
MOS	military occupational specialty
NAAQS	National Ambient Air Quality Standards
NBC	nuclear, biological and chemical
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
O&O	Operational and Organizational (plan)
ORD	Operational Requirement Document
PM	particulate matter

RCRA	Resource Conservation Recovery Act
REC	Record of Environmental Consideration
ROC	Required Operational Capability
RONA	Record of non-applicability
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SRP	Sustainable Range Program
TES	Threatened and Endangered Species
TSCA	Toxic Substances Control Act
UAHMMWV	Up-Armored High Mobility, Multi-purpose Wheeled Vehicle
USFS	U.S. Forest Service
VEC	valued environmental component
VOC	volatile organic compound

SECTION 8:
REFERENCES

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APPENDIX A
RECORD OF ENVIRONMENTAL CONSIDERATION (REC) CHECKLIST AND PRELIMINARY EVALUATION

This checklist is intended to provide a framework for the identification of any NEPA requirements beyond this PEA for anticipated impacts associated with the use of the Mine Resistant Ambush Protected (MRAP) family of vehicles at an Army installation in the United States, and to certify that both the installation staff and proponent understand and support the requirements and discussions in this PEA, particularly the site conditions, the proposed action, and any required mitigations. If the conditions of the checklist in this Appendix are met, and if the procedures and mitigations are adopted at the installation level, a Record of Environmental Consideration (REC) may be prepared, referencing this PEA, and use of MRAP vehicles can proceed. If some checklist conditions are not met, the installation does not adopt the provisions of this PEA, or the installation environmental office finds this PEA inadequate, a separate EA will be required, and will culminate in either a separate Finding of No Significant Impact (FNSI) or a Notice of Intent (NOI) to prepare an EIS if significant affects are identified.

The considerations in this PEA, and the REC checklist are comprehensive, but may not be sufficiently exhaustive to address site-specific conditions at every installation. For this reason, the installation's environmental staff must review this PEA, evaluate the checklist conditions and requirements, and determine the appropriate course of action. If an EA is required it can supplement this PEA, addressing only those topics or issues that require further evaluation.

To use the attached checklist to evaluate the proposed action, the following format is recommended:

• "Yes" implies an issue may require further NEPA analysis.

• "No" on the REC checklist implies applicability of this PEA

• "N/A" implies the question does not apply

The "Response Documentation" column may be used for any comments pertaining to the Proposed Action, or identify existing programs or BMPs, regulations or policies that mitigate an issue identified in the questionnaire.

Any questions regarding completion of this checklist should be directed to the installation environmental staff. This checklist references portions of Title 32, CFR Part 651, "Environmental Analysis of Army Actions."

MEMORANDUM FOR RECORD DATE:

SUBJECT: Evaluation, under the National Environmental Policy Act (NEPA) of the using of the Mine Resistant Ambush Protected vehicles at (*installation name*).

1. Brief description: (Identify each unit receiving an MRAP, the number and types of vehicles, and the approximate dates when each unit will receive the vehicles. Include other relevant details about the vehicle's expected use.)

2. It has been determined that using Mine Resistant Ambush Protected vehicles (MRAP) as described above (choose a. b. or c.):

a. Is adequately addressed in an existing: EA____ EIS____

Title and date:

b. Qualifies for Categorical Exclusion under provisions of 32 CFR Part 651, Appendix B, Paragraph _____.

c. Qualifies for a Record of Environmental Consideration, based on the evaluation of the criteria in the checklist below because the issues requiring consideration under NEPA are addressed in the Programmatic Environmental Assessment entitled, "Final Programmatic Assessment for Fielding and Use of Mine Resistant Ambush Protected Vehicles at Army Installations in the United States," dated July 2009.

The following signatories certify their understanding of the Programmatic Environmental Assessment and the analyses therein, and certify compliance with the provisions and mitigations that are presented. This includes compliance of the procedures (Best Management Practices and Standard Operating Procedures) that are specified, and the funding necessary to insure that the required mitigations will be implemented.

_____	_____
proponent signature	Environmental Officer signature
_____	_____
proponent, printed name	Environmental Officer, printed name
_____	_____
e-mail and Phone number	e-mail and phone number

	CATEGORY	Yes,No,N/A	RESPONSE DOCUMENTATION (as needed)
	General NEPA		
1	The Operational Tempo for the Mine Resistant Ambush Protected (MRAP) is anticipated to be greater than the HMMWV it replaces.		If yes, a REC may not be sufficient; further analysis may be required. If no, continue to question #2
	Natural Resources & Soils		
2	Off-road operations of MRAP vehicles are likely to significantly increase the level of damage to vegetation on training ranges and maneuver areas above that caused by current level of activities by units equipped only with HMMWVs.		If yes, identify potential mitigation actions. If the action cannot be mitigated, further analysis may be required. If no, continue to question #3
3	Off-road operations of the MRAP equipped units are likely to significantly increase soil compaction, rutting, or conditions above that caused by current level of activities on training ranges and maneuver areas.		If yes, identify potential mitigation actions. If the action cannot be mitigated, further analysis may be required. If no, continue to question #4
	Air Quality		
4	Using MRAP vehicles at this installation will contribute to a change in the air quality compliance status (e.g., from attainment to nonattainment) in the region.		If yes, further analysis, and coordination with air quality permitting authority may be required. If no, continue to question #5
	Hazardous Materials & Used Oil		
5	The installation will need to build, or significantly modify, facilities necessary to store waste POL products in accordance with local/state/federal regulations.		If yes, ensure storage complies with provisions of Resource Conservation and Recovery Act (RCRA) regulations. Continue to question #6
6	The proposed action will require modification of the installation's Spill Prevention, Control and Countermeasures Plan (SPCCP).		If yes, make the necessary modifications. Continue to question #7

	CATEGORY	Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
	Noise		
7	Noise generated by normal operations of MRAP vehicles will likely affect sensitive wildlife populations, to include threatened and endangered species.		If yes, further analysis may be required. Consult with appropriate installation staff. If no, continue to question #8
8	Noise generated by the normal operations of MRAP vehicles will change existing noise contours on the installation.		If yes, further analysis may be required. If no, continue to question #9
	Facilities		
9	The Proposed action will require expansion of existing facilities for maintaining or parking MRAP vehicles involving more than 5.0 cumulative acres of land.		If yes, the installation may be required to prepare a supplemental EA. If no, continue to question #10
10	The installation has facilities (e.g., bridges) with weight ratings less than 20 tons that affect travel routes of MRAP vehicles on the installation.		If yes, revise standing operating procedures (SOP) to preclude MRAP vehicles operating on facilities with weight ratings less than 20 tons. If no, continue to question #11
	Water Resources		
11	The Proposed Action will require modification to the installation's Stormwater Discharge Prevention Plan.		If yes, make the necessary changes; coordinate with regulating agency (ies) as required. If no, continue to question #12
12	The Proposed Action will require MRAP vehicles to operate in areas not previously traveled by tactical vehicles, and require additional surveys to identify and delineate jurisdictional wetlands.		If yes, initiate survey. If no, continue to question # 13

	CATEGORY	Yes,No, N/A	RESPONSE DOCUMENTATION (as needed)
	Cultural Resources		
13	The Proposed Action will require MRAP vehicles to operate in areas not previously traveled by tactical vehicles, and thus require additional cultural resource surveys.		If yes, initiate preliminary survey. Further analysis may be required. If no, continue to question #14
	Threatened and Endangered Species		
14	Normal operational or training use of MRAP vehicles will significantly impact a federally listed, threatened or endangered species or their designated critical habitat.		If yes, consult with installation staff and INRMP. Further analysis may be required. If no, continue to question #15.
	Energy		
15	More frequent delivery of fuel will require revision of existing emergency response or spill response plans.		If yes, make necessary revisions. If no, continue to question #16.
	Cumulative Effects		
16	Other actions are underway, or proposed, that when combined with the potential affects of using MRAP vehicles on the installation, could have a significant effect on human health or the environment.		If yes, initiate further analysis, coordinate with the proponents of the other action(s); conduct further analysis as needed. If no, and all 16 questions have been answered as NO or N/A, continue to completion of a Record of Environmental Consideration.

Appendix B:
MRAP Vehicle Characteristics

CAT II - RG33L (6x6)

Configuration Type: 6x6
Personnel Capacity: 10
Operational Length: 333 in
Operational Width : 113 in
Operational Height: 134 in
Min Ground Clearance: 14.7 in
Max Speed: 67.9 mph
Time to 50m: 8.7 sec
Min Turning Dia (curb to curb): R 78.9/L 75.6 ft
GVWR: 52,000 lbs
GVW: 50,500 lbs
Payload (GVWR-GVW): 1,500 lbs
Kit Weight: NA
Max Slope: 60%
Center of Gravity (GVW Vertical): 57.7 in
Consumption Rate (Mi/GAL): 6.9
HP: 400
HP/Ton @GVWR: 15.4
EFP: NA

CAT I - RG31

Configuration Type: 4x4
Personnel Capacity: 6-8
Operational Length: 277 inches
Operational Width: 96 inches
Operational Height (w/ OGPK): 137 inches
Min Ground Clearance: 13.6 inches
Max Speed: 55 mph
Time to 50m: 8 seconds
Min Turning Dia (curb to curb): 62 ft
GVWR: 37,485 lbs
GVW: 33,033 lbs
Payload (GVWR-GVW): 4,452 lbs
Kit Weight: 1,386 lbs
Max Slope: 30% Side / 60% Grade
Center of Gravity (GVW Vertical): 59.2 inches
Consumption Rate (Mi/GAL): 8.6 Mi/GAL
HP: 275HP
HP/Ton @GVWR: 14.7 HP/TON
EFP: 3000 lbs MEAP Kit

CAT I – Caiman (6x6)

Configuration Type: 6x6
Personnel Capacity: 6/10
Operational Length: 309 in
Operational Height: 143
Min Ground Clearance: 14 in
Max Speed: 64.4 mph
Time to 50m: 9.0 sec
Min Turning Dia (curb to curb): 62 feet
GVWR: 50,620 lbs
GVW: 43,704 lbs
Payload (GVWR-GVW): 6,553 lbs
Kit Weight: MEAP 6500lbs
Max Slope: 60%
Center of Gravity (GVW Vertical): 55.8 in
Consumption Rate (Mi/GAL): 5.5
HP: 330
HP/Ton @GVWR: 10.6
EFP: None

CAT I - MaxxPro

Configuration Type: 4x4
Personnel Capacity: 6 + Gunner
Operational Length: 260 in
Operational Width (w/ EFP): 120 in
Operational Height: 159 in
Min Ground Clearance: 10.9 in
Max Speed: 69.2 mph
Time to 50m: 8.3 secs
Min Turning Dia (curb to curb): 62 ft
GVWR: 43,500 lbs
GVW: 39,850 lbs
Payload (GVWR-GVW): 3,650 lbs
Kit Weight: N/A
Max Slope: 30 % Side / 60 % Long Grade
Center of Gravity (GVW Vertical): 57.8 in
Consumption Rate (MPG): 5.8
HP: 300 @2,100 rpm
Torque: 950 ft-lbs @1,300 rpm
HP/Ton @GVWR: 15.2

Comparative MRAP Vehicle Characteristics

Variant	Gross Vehicle Weight (Pounds)	Curb Vehicle Weight (Pounds)	Payload Weight (Pounds)	Height (Inches)	Width (Inches)	Length (Inches)
Caiman	29,296	34,500	6,600	112	98	274
RG33	36,000	33,000	5,000	112	99	263
RG31(Mk5E)	22,487	19,842	4,400	104.3	97.2	236.2
RG31(Mk5)	31,300	29,842	4,400	104.3	97.2	236.2
MaxxPro	43,500	34,480	3,520	108	108	255

Appendix C:
List of MRAP Variant Noise Levels

RG 33 Noise Levels

Table G-2.1. INSTRUMENTATION

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATION DATE, 2008	PERIOD, yr
Sound Level Meter	Quest	1900	CC0020022	8 May	1
Micro Calibrator	Quest	QC20	QO9120010	8 May	1
Microphone	B&K	4936	2128674	8 May	1

TABLE G-2.2. 85 dB(A) CONTOUR DATA (LOW IDLE)

	LOW IDLE		HIGH IDLE	
	AC, NBC OFF	AC, NBC ON	AC, NBC OFF	AC, NBC ON
ANGLE, Deg	dB(A) AT 6 INCHES	dB(A) AT 6 INCHES	DISTANCE, Ft	DISTANCE, Ft
30	79.8	80.5	38.6	38.6
60	79.2	74.4	13.6	13.6
90	77.5	78.6	4.5	4.5
120	77.8	80.5	3.6	3.6
150	74.0	76.7	4.3	4.3
180	67.1	80.7	0.0	0.0
210	72.7	76.7	4.3	4.3
240	75.9	77.6	1.1	1.1
270	73.7	76.0	7.2	8.2
300	73.8	76.1	12.3	13.3
330	78.3	79.2	27.3	27.3
360	85.0 dB(A) at 15 ft	85.0 dB(A) at 15 ft	36	36

Single hearing protection should be worn within 61 feet of the vehicle when operated at the high idle 1800 rpm.

RG31 Noise Levels

Table G-3.1. INSTRUMENTATION

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATION DATE, 2008	PERIOD, yr
Sound Level Meter	Quest	1900	CC0020022	8 May	1
Micro Calibrator	Quest	QC20	QO9120010	8 May	1
Microphone	B&K	4936	2128674	8 May	1

TABLE G-3.2. 85 dB(A) CONTOUR DATA

	LOW IDLE		HIGH IDLE	
	AC, OFF	AC, ON	AC, OFF	AC, ON
ANGLE, Deg	dB(A) AT 6 INCHES	dB(A) AT 6 INCHES	DISTANCE, FT	DISTANCE, FT
30	80.3	85 at 2.6 ft.	81.8	81.8
60	80.0	82.3	83.7	83.7
90	81.5	82.4	85.0 at 3.2ft.	85.0 at 6.6 ft.
120	82.4	83.4	85.0 at 6.2 ft.	85.0 at 7.1 ft.
150	75.3	76.6	80.5	80.5
180	68.6	71.2	75.1	75.1
210	74.5	75.8	80.9	80.9
240	77.3	78.1	82.4	82.4
270	77.1	79.3	81.2	81.2
300	76.7	81.6	80.3	80.3
330	79.5	85 at 6 inches	80.2	80.2
360	85.0 at 6 inches	84.0	85.0 at 6 inches	85.0 at 6 inches

Single hearing protection should be worn within 7.1 feet of the vehicle when operated at the high idle 1500 rpm.

MaxxPro Noise Levels

Table G-4.1. INSTRUMENTATION

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATION DATE, 2008	PERIOD, yr
Sound Level Meter	Quest	1900	CC0020022	8 May	1
Micro Calibrator	Quest	QC20	QO9120010	8 May	1
Microphone	B&K	4936	2128674	8 May	1

TABLE G-4.2. 85 dB(A) CONTOUR DATA, A2F1

	LOW IDLE		HIGH IDLE	
	AC, OFF	AC, ON	AC, OFF	AC, ON
ANGLE, Deg	dB(A) AT 6 INCHES	dB(A) AT 6 INCHES	DISTANCE, FT	DISTANCE, FT
30	79.1	79.7	13.7	13.7
60	77.6	78.8	8.9	8.9
90	76.8	77.2	5.8	5.8
120	77.3	78.3	3.9	3.9
150	71.7	74.7	0	0
180	71.9	72.7	0	0
210	76.4	76.3	0	0
240	75.8	75.7	4.4	4.4
270	76.8	76.4	5.6	5.6
300	77.1	76.8	8.2	8.2
330	78.6	78.1	15.9	16.0
360	85.0 at 6 inches	85.0 at 6 inches	15.8	16.7

Single hearing protection should be worn within 16.7 feet of the vehicle when operated at the high idle 1500.

Caiman Noise Levels

Table G-5.1. INSTRUMENTATION

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATION DATE, 2008	PERIOD, yr
Sound Level Meter	Quest	1900	CC0020022	8 May	1
Micro Calibrator	Quest	QC20	QO9120010	8 May	1
Microphone	B&K	4936	2128674	8 May	1

TABLE G-5.2. 85 dB(A) CONTOUR DATA

	LOW IDLE		HIGH IDLE	
	AC, NBC OFF	AC, NBC ON	AC, NBC OFF	AC, NBC ON
ANGLE, deg	dB(A) AT 6 INCHES,	dB(A) AT 6 INCHES,	DISTANCE, Ft.	DISTANCE, Ft.
30	79.7	79.7	55.9	56.2
60	77.7	77.5	32.2	38.8
90	75.6	76.4	26.3	26.4
120	74.3	74.8	16.4	16.6
150	70.5	76.3	9.7	9.9
180	68.8	80.6	0.0	0.0
210	74.0	80.3	7.3	7.3
240	76.7	77.6	19.8	19.8
270	78.0	79.0	23.6	23.6
300	79.9	80.0	28.1	28.1
330	85.0	85.0	52.3	52.3
360	85.0 at 4 ft.	85.0 at 4 ft.	61	61

Single hearing protection should be worn within 61 feet of the vehicle when operated at the high idle 1800 rpm.

Appendix D: List of Hazardous Materials commonly used in MRAP Vehicles

List of Variant Vehicle Fluids

Variant	Engine Oil	Trans. Oil	Transfer case	Power Steering	Fuel	Gear Oil	Refrig Oil	Engine Coolant
RG31	18.5Q 15W40	15Q DexronIII	15W40	3.2Q ATF220 Type A	51G	2.8G 80W90	R-134a	28.5Q H20/EG
RG33	29.2Q 15W40	29Q 15W40	13.5Q 15W40	15W40	80G	14-18Q 80W90	R-134a	11.7Q H2O/EG
Caiman	24.5Q 15W40	49.3Q 15W40	49.3Q 15W40	5Q	74G	80W90	R-134a	H2O/EG
Cougar	22Q 15W40	29Q 15W40	17Q 80W90	6Q Dextron III	100 G	17Pt 85W120	R-134a	48Q H2O/EG
MaxxPro	30Q 15W40	19-29Q TransSynd	4.5Q SAE 50W	5.5Q 15W40	57G	50Q 85W140	R-134a	H2O/EG

Appendix E:
List of Fire Suppression Agents

Due to the fast pace of the program, the government purchased the MRAP vehicles with the fire suppression systems that were commercially available within the systems. As the program has progressed, various upgrades and retrofits have been made or are being made to the fire suppression systems. Therefore, different types of fire suppressants may be used within the fleet of each vendor's vehicles. The table below lists the possible fire suppressing agents that may be present in each of the vehicles.

List of Fire Suppression Agents

Variant	Zone 1 Engine Compartment	Zone 2 Crew Compartment	Zone 3 Tires	Zone 4 Fuel
RG33	FM-200	FM-200	None	None
RG31 Mk5	HFC-125	FM-200	None	None
MaxxPro	FM-200 or Sodium Bicarbonate	Water Mist or FM-200	Lehavot Petrotech or Firetrace Black Widow Powder	Lehavot Monoammonium Phosphate or Firetrace Black Widow Powder
Caiman	Ansul Foray (Monoammonium Phosphate) or FM-200	None or FM-200	None	None or Firetrace Black Widow Powder

Appendix F:
Initial Fielding by Installation

This table represents initial draft list of installations that should be receiving MRAP vehicles based on the Army's training requirements.

Army	Camp Atterbury, IN	**32**
Army	Camp Shelby, MS	**32**
Army	Fort Bragg, NC	**70**
Army	Fort Campbell, KY	**60**
Army	Fort Carson, CO	**60**
Army	Fort Dix, NJ	**32**
Army	Fort Drum, NY	**60**
Army	Fort Hood, TX	**70**
Army	Fort Irwin, CA	**100**
Army	Fort Lewis, WA	**70**
Army	Fort McCoy, WI	**32**
Army	Fort Polk, LA	**80**
Army	Fort Riley, KS	**60**
Army	Fort Sill, OK	**60**
Army	Fort Stewart, GA	**60**
Army	US Army Garrison Alaska	**30**
Army	RRAD, Texarkana, TX	**45**
Army	US Army Garrison Hawaii	**65**