Mine Resistant Ambush Protected (MRAP) Safety

DOD Safety Forum, 23 Sep 08

Mr. Alfred Rice
Deployment & Operations Task Force
The concern: Theater tactical vehicle mishaps

- CENTCOM vehicle accident data Jan 2003 – Aug 2008
  - 246 fatalities
  - 900 serious injuries
- MNC-I data for CY05
  - 384 rollovers
  - 71 fatalities
- Army Combat Readiness Center data for OIF/OEF
  - 538 HMMWV rollovers through Jan 07

The challenge: Apply lessons learned from Up Armored HMMWVs to get ahead of the “bow wave” when MRAP is fielded
**MRAP Mishaps – 1 Nov 07 – 20 Sep 08**

- 122 mishaps (recorded from multiple sources*)
- 63 (51%) rollovers/tip-overs
  - 39 - Fall initiated: ledge, slope, ground surface collapsed
  - 14 - Maneuver initiated: swerving maneuver on flat ground or terrain
  - 3 - Impact Initiated: hitting object
  - 7 - Unknown cause
- 7 fatalities from rollovers
- 66 injuries from rollovers
- 59 other mishap events include:

<table>
<thead>
<tr>
<th>Event</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Accident with other vehicles</td>
<td>12</td>
</tr>
<tr>
<td>Personal Injury – Falling off/tripping</td>
<td>6</td>
</tr>
<tr>
<td>Personal Injury – Crushing (doors, hatches, Rhino, turret)</td>
<td>16</td>
</tr>
<tr>
<td>Power Line Related</td>
<td>10</td>
</tr>
<tr>
<td>Fire</td>
<td>4</td>
</tr>
<tr>
<td>Other, i.e. hit objects, failed to set parking brake, etc.</td>
<td>11</td>
</tr>
</tbody>
</table>

* CENTCOM SIGACTS, Unit Safety Gram/Red-Hash, Safety Centers. Data includes both OIF and OEF.
MRAP Mishap Trend - 1 Nov 07 – 20 Sep 08

- Rollovers
- Other mishaps

<table>
<thead>
<tr>
<th>Month</th>
<th>Rollovers</th>
<th>Other mishaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov-07</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Dec-07</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Jan-08</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Feb-08</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Mar-08</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Apr-08</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>May-08</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Jun-08</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Jul-08</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Aug-08</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Sep-08</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Some of the Challenges – Vehicle Rollover
Some of the Challenges – Power line Entanglement
Some of the Challenges – Power line Entanglement

Blown Tire
TC Side

Power Line
Some of the Challenges – Crushed Hand Injury

SM Crushed his finger as Rhino was being lowered

Bolt and cotter pin release

Rhino system personal injuries
Some of the Challenges – Vehicle Recovery
MRAP Joint Project Office (JPO)

- **Concerns**
  - Field changes without hazard assessments
  - Safety of Use messages not reaching all users/operators
  - Difficult to implement recommended safety mitigations
  - High number of serious risks were accepted prior to fielding

- **Successes**
  - Expedited fielding of survivable vehicles to AOR
  - Completed safety hazard analysis and risk acceptance on all 5 variants for 12 unique missions within 1 year
  - Pushed for creative “safety” solutions in a non traditional rapid acquisition program
  - Used “Real Time” CENTCOM accident data/trends
MRAP JPO Closed Loop Hazard Tracking Process

1. Identify, Recommend, and Implement New Hazard Controls

2. Hazard Identified and Entered Into Hazard Tracking Database

3. Hazard Control Record Remains Open

4. Hazard Eliminated or Reduced to Acceptable Level?
   - NO
   - YES

5. Return to Database and Close Hazard Record

UNCLASS
**DOTF and MRAP JPO Collaboration**

**From DOTF tracking**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Nov 07</td>
<td>JERRV vehicle rolled over and sustained damage</td>
<td>ROU</td>
</tr>
<tr>
<td>10 Nov 07</td>
<td>MRAP (Cougar) traveling on an MSR and rolled over. One injury.</td>
<td>ROM</td>
</tr>
<tr>
<td>11 Nov 07</td>
<td>RG31 rolled over. Soldier driving the vehicle was trying to avoid pothole and made a sudden maneuver resulting in the rollover. Vehicle sustained $165K in damage. Four personnel were injured. Class C</td>
<td>ROM</td>
</tr>
<tr>
<td>21 Nov 07</td>
<td>JERRV While conducting drivers training, traveling 45mph, the driver lost control and rolled the vehicle over its roof.</td>
<td>ROM</td>
</tr>
<tr>
<td>27 Nov 07</td>
<td>Soldiers hand was crushed in electrical turret. Class C injury.</td>
<td>PI</td>
</tr>
<tr>
<td>30 Nov 07</td>
<td>RG-31 rolled over while trying to avoid a collision with another vehicle. No injuries (OEF)</td>
<td>ROM</td>
</tr>
</tbody>
</table>

**To MRAP JPO tracking**

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**Mishap Tracking Sheet**

Joint MRAP Vehicle Program

**Marine Corps Systems Command**

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**Mishap Metrics**

<table>
<thead>
<tr>
<th>No.</th>
<th>Date of Incident</th>
<th>Variant</th>
<th>System/Subsystem</th>
<th>Mishap</th>
<th>Effect</th>
<th>Cause</th>
<th>Resolution</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13-Nov-07</td>
<td>PPII</td>
<td>Cougar (JERRV)</td>
<td>Roll Over</td>
<td>Equipment Damage</td>
<td>Unknown</td>
<td>Training</td>
<td>See Note 1</td>
</tr>
<tr>
<td>2</td>
<td>10-Nov-07</td>
<td>PPII</td>
<td>Cougar</td>
<td>Roll Over</td>
<td>Injury</td>
<td>Unknown</td>
<td>Training</td>
<td>See Note 1</td>
</tr>
<tr>
<td>3</td>
<td>21-Nov-07</td>
<td>GDSL</td>
<td>RG31</td>
<td>Roll Over</td>
<td>Equipment Damage / 4 Injuries</td>
<td>Soldier made sudden maneuver to avoid a pothole, resulting in a rollover. Vehicle sustained $165K in damage.</td>
<td>Training</td>
<td>See Note 1</td>
</tr>
<tr>
<td>4</td>
<td>21-Nov-07</td>
<td>PPII</td>
<td>Cougar Cat II</td>
<td>Roll Over (Inverted)</td>
<td>Equipment Damage</td>
<td>White conducting drivers training, the driver lost control and rolled the vehicle over on its roof.</td>
<td>Training</td>
<td>See Note 1</td>
</tr>
<tr>
<td>5</td>
<td>27-Nov-07</td>
<td>Unknown</td>
<td>Electrical Turret</td>
<td>Hand Crushed by Turret</td>
<td>Class C Injury</td>
<td>Soldiers hand was crushed in electrical turret</td>
<td>Training</td>
<td>See Note 1</td>
</tr>
</tbody>
</table>
MRAP Safety Improvements

- Mishap trend information sharing
- Safety TTPs and Lessons Learned
  - Protection procedures for working in damaged vehicle (CHPPM, NMCPHC, CALL, USMCCLL)
  - Rollover Lessons Learned (TRADOC, USACRC)
  - Power line entanglements (CALL, USAIC)
- Safety Articles
  - USMCCCLL “Safety Corner” June 08
  - USACRC/SC “Knowledge” Sep 08
- Rollover Egress Procedures Graphic Training Aid (TRADOC)
- Disseminate MRAP Smart Book (CALL, USAIC)
- Safety of Use Message (SOUM) Master tracking (JPO, TACOM)
- Posts to CENTCOM MRAP Homepage – SIPR (CENTCOM)
- Proposed potential for Rollover Alert Device (JSSWG, JUWG)

MRAP Safety – A Collaborative Effort
MRAP Rollover/Tip-over 1 Nov 07 – 20 Sep 08

Rollover safety media campaign: Article, Rollover egress card, Lessons Learned
Questions/Discussion