THE PKK AND CAR BOMB ATTACKS

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ABSTRACT

This study proposes an analytical view to better understand the dynamics of car bomb attacks carried out by the terrorist organization of the Kurdistan Workers’ Party (PKK). The report examines the PKK’s car bombs (hereafter referred to as Vehicle Borne Improvised Explosive Device - VBIED) from the point of view of tactical needs, target analysis, and types of explosives and methods used in the attacks, and also discusses the interrelationships of these attacks. To this end, a total of 35 vehicle bomb attacks that PKK committed between August 2, 2015 and August 25, 2016 have been studied. The report analyzes the types of targets and frequency of attacks, the cities under PKK attack, and the timeframes of the attacks.

When and how the PKK commits VBIED attacks is explained in the first section. The thirty-five attacks carried out among other PKK attacks in the interval of August 2, 2015 – August 25, 2016 are highlighted and background information is given in the second section. The PKK assaults are examined under several headings in the third section. The fourth section analyzes the explosives used in the PKK attacks, while the dynamics of the attacks are discussed in the fifth section. The final section offers recommendations for possible parameters to prevent future PKK attacks. The study also tries to draw attention to how society at large is affected by the diversity of PKK attacks and the recurrence of certain types of attacks.
rubed as non-standard explosives prepared by mixing various amounts of destructive, incendiary, lethal and hazardous chemicals which are loaded on a vehicle and, therefore, mobilized.

The use of vehicle bombs in terror activities has grown to be an effective method of attack due to the availability of explosive materials readily in the market and the variety of options to deliver explosives to a selected target at a certain distance within the effective blast radius. In addition to the aforementioned factors, non-state armed actors often prefer to conduct car bomb attacks due to their impact. Actors using illegal power in irregular wars - terror organizations in particular - favor vehicle bomb attacks as they are the deadliest type of attacks.

What is a “car bomb attack” by which a terror group hopes to psychologically impact society and suppress the operational capabilities of security forces? The expression literally means “man-made explosive laden on a vehicle,” and is conceptualized as Vehicle Borne Improvised Explosive Device (VBIED). The two main elements of the concept of a bomb-la- den device are the explosive material itself and the mechanism to deliver the explosive to the target. The type, the shape, the amount, the method of detonation, and the impact of the explosive used in bomb devices vary; the dynamic nature of an explosive stems from such variations. On the other side, variables, such as the type, the capacity and the environmental adaptability of a vehicle carrying an explosive, constitute the dynamic nature of the method of delivery. Then, vehicle bombs may be desc-

There are a series of differences that have played a critical role in the evolution of IEDs into VBIED attacks. The explosive used in VBIEDs hits the target in a way similar to when an anti-tank munition hits a target. In roadside IED attacks, however, the target hits the explosive. Another important difference is that the weight of IEDs is limited to 50-250 kg as a result of the concern to hide the device in the ground or road culverts and walls. On the other hand, tons of explosives, depending on the vehicle’s capacity and the distance to delivery point, are used in VBIED attacks. Furthermore, an IED attack targets a single moving vehicle, but a VBIED attack aims at both mobile targets such as crowds and convoys, and fixed targets such as buildings and check-points. Consequently, VBIED attacks result in serious casualties.

The history of VBIED attacks in Turkey is not old. The use of VBIEDs skyrocketed following the invasion in Iraq and with the civil war in Syria, Al Qaeda introduced vehicle bomb attacks in Turkey. Eventually, the PKK started to commit such attacks. The terror organization of the Islamic State of Iraq and the Levant (ISIL, or DAESH in Arabic) has launched vehicle bomb attacks following the PKK. The PKK used IEDs for the first time in the 1990s, and has carried out VBIED attacks after such attacks intensified with the civil war in Syria. However, vehicle bomb attacks by the PKK are nothing new: the group has organized vehicle bomb attacks in Turkey long before its active involvement in the Syrian civil war.

THE PKK’S USE OF VEHICLE BOMBS
The first VBIED attack by the PKK was executed on September 20, 2011 with the explosion of a car laden with explosives and parked on the curb of Kumrular Street, Kızılay, in Ankara. When the psychological impact, casualties, damages and the form of the blast are considered, the PKK succeeded in its desire to hit a strategic terror target. Although the PKK’s armed wing did not claim responsibility for the attack, this was done by a terrorist proxy of the PKK, the Kurdistan Freedom Falcons (TAK). Formed by Duran Kalkan and Fehman Hüseyin, the group is responsible for attacking civilians in city centers. The second attack by the PKK targeting civilians on May 25, 2012 used the same method as the first. This time, the PKK hit the police station in the town of Pınarbaşı, Kayseri. The last VBIED attack took place on the eve of the reconciliation process, killed nine people and left 69 wounded in the southeastern city of Gaziantep on August 20, 2012.

Apparently, 40-50 kg of TNT or C-4, condensed and reinforced by metal pieces (nails) were used in all of these precursor assaults. Two of the three vehicles (one minibus and two cars) used for the blast were stolen and the other was bought from a car dealership in Ankara by the bomber using a fake ID. The attacks at Kumrular Street in Ankara and Gaziantep were organized against less risky, more fragile and soft targets. Conversely, PKK terrorists chose Pınarbaşı Police Station because it was the first tactical target in sight following a police chase that left them panicked. In the attacks of Kumrular Street and Gaziantep, terrorists used remote controlled detonators, but in Pınarbaşı, a suicide bomber set off a car bomb outside the police station. All of the explosives in the aforementioned attacks were manufactured, and no IED was used.

Between August 2, 2015 and August 25, 2016, the PKK executed a total of 488 attacks on re-

As of 2011, the PKK organizes attacks against two basic groups of targets: fixed targets (facilities) and mobile targets. The PKK’s common objective in both cases is to cause mass casualties. But these two groups differ in significance, location and characteristics. The method and the timing of attacks are determining factors. The most critical step for security forces to develop countermeasures is to understand the PKK’s target analysis. Analyzing the style of approach of the PKK threats will also contribute to innovative studies in the defense industry.

The PKK terror organization committed a total of 35 vehicle bomb attacks in the period of August 2, 2015 to August 25, 2016. The attacks are analyzed under four headings: the targets, the location of the attacks, their timing, and the types of explosives used in the attacks.

**FIGURE 1. DISTRIBUTION OF ATTACKS BY TYPE**

![Distributing the attacks by type](image1.png)

**FIGURE 2. CHRONOLOGICAL ORDER OF DIFFERENT TYPES OF ATTACK**

![Chronological order of different types of attack](image2.png)

**ANALYSIS OF SELECTED TARGETS**

As of 2011, the PKK organizes attacks against two basic groups of targets: fixed targets (facilities) and mobile targets. The PKK’s common objective in both cases is to cause mass casualties. But these two groups differ in significance, location and characteristics. The method and the timing of attacks are determining factors. The most critical step for security forces to develop countermeasures is to understand the PKK’s target analysis. Analyzing the style of approach of the PKK threats will also contribute to innovative studies in the defense industry. In approximately the last 13 months, the PKK has organized 26 of a total of 35 VBIED attacks against fixed targets and nine against mobile targets. Map 1 depicts the geographical distribution of PKK attacks. The red dots depict scenes of attacks and the figures inside indicate the number of attacks in that specific location.

**Fixed Targets**

Terrorists count on two main factors when calculating the impact of a potential attack against a building: the first is the mass of the explosive material to be used in the attack and the second is the distance between the point of explosion and the target. Following a simple logic, the probability of success in a terror attack increases when the mass of explosive is larger and the distance between the explosion location and the target is smaller. However, terrorists act carefully not to waste their limited resources; therefore, they try to use a reasonable amount of specific explosives and develop methods of delivery in order to execute an attack at the closest proximity to the targeted location. As a matter of fact, methods of attacks and security measures compete with each other in these two particular areas. Countermeasure operations by security forces are intensified over the routes along which an explosive is manufactured, stored, hidden...
or delivered in order to keep the amount of explosive at minimum level. In such operations, security forces take a series of physical measures between a potential point of explosion and security facilities.

In approximately the last 13 months, the PKK has organized 35 VBIED attacks: 26 have been on fixed targets and nine on mobile targets. The main reason for vehicle bomb attacks committed against fixed targets is to reach the maximum casualties by a single act (74%) considering that security personnel are gathered in facilities. The facility-related features that result in high number of casualties are: easy access, weak perimeter security, insufficient early warning systems, and vulnerabilities in physical structures. A chronological order of attacks against fixed targets is depicted in Table 1.

Thirteen of the 26 PKK VBIED attacks on fixed targets were against gendarmerie guard posts; eight against provincial/district police facilities and regional traffic stations; two against police/military checkpoints; one against the district governorate; and one against a courthouse housing facility. The primary reason for PKK’s picking gendarmerie guard posts for VBIED attacks is that the group considers this a tactical necessity to ensure elbow room in rural areas. The PKK carried out VBIED attacks targeting security facilities in an attempt to recuperate from its drastic defeat in city fights in May 2016, and to maintain presence at tactical level in cities. As far as fixed targets are concerned, the PKK organized most of its VBIED attacks against gendarmerie guard posts. Obviously, in threat assessments, the possibility of a VBIED attack was not considered at all when gendarmerie post premises on roadsides were chosen in the 1980s and 1990s. Building guard posts on roadsides enables aggressor vehicles to approach military sites. Weak construction elements, ordinary wires and no vehicle barriers are used for the physical security of a facility. All these make it impossible to take perimeter security measures. As a result of weak environmental security, buildings constructed 35 meters from roadsides turn into open targets for vehicles laden with 1,000 kilograms of ammonium nitrate.

Vehicles approaching a facility zone are not warned in advance by electronic, sound and lighting systems at a reasonable distance; instead they are warned after they get within sight of guards in the outer zone. Since the early warning depends on human methods, perimeter security cannot be provided due to personnel’s lack of attention or distraction. The PKK takes advan-
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<th>SCENE OF ATTACK</th>
<th>TARGET OF ATTACK</th>
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<th>TOWN</th>
<th>SECURITY PERSONNEL</th>
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<th>INJURED</th>
<th>CIVILIAN</th>
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<td>Doğubayazıt</td>
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<td>İğdır</td>
<td>Merkez</td>
<td>Suveren Gendarmerie Guard Post</td>
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<td>Hakkari</td>
<td>Şemdinli</td>
<td>Şemdinli District Governorate</td>
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<td>0</td>
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<td>4</td>
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<td>Vehicle Bomb Attack</td>
<td>Diyarbakır</td>
<td>Çınar</td>
<td>District Police Department</td>
<td>1</td>
<td>6</td>
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<td>Mardin</td>
<td>Nusaybin</td>
<td>Area Traffic Directorate and Police Housing</td>
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<td>33</td>
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<td>Diyarbakır</td>
<td>Lice</td>
<td>Mermer Gendarmerie Guard Post</td>
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<td>Kızıltepe</td>
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<td>Diyarbakır</td>
<td>Dicle</td>
<td>District Gendarmerie Command</td>
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<td>Mardin</td>
<td>Derik</td>
<td>Üçyol Gendarmerie Guard Post</td>
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<td>Mardin</td>
<td>Midyat</td>
<td>Anti İ Gendarmerie Guard Post</td>
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<td>Diyarbakır</td>
<td>Lice</td>
<td>Zeyrek Gendarmerie Check Point</td>
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<td>June 8, 2016</td>
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<td>Mardin</td>
<td>Midyat</td>
<td>Midyat Police Department</td>
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<td>June 10, 2016</td>
<td>Vehicle Suicide Attack</td>
<td>Şırnak</td>
<td>Merkez</td>
<td>Military Check Point</td>
<td>0</td>
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<td>0</td>
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</tr>
</tbody>
</table>
### The PKK and Car Bomb Attacks

In a 24-hour timeframe, 35% of vehicle bomb attacks against fixed targets, VBIED attacks, take place between 9 p.m. and 11.59 p.m. As they have the characteristics of frame buildings, all structural materials - except beams and columns - are damaged by the impact of a blast to the utmost degree. In particular, the sections between the beams and columns are built with bricks and briquettes, so they remain more vulnerable to explosions. Structural problems are not unique to guard posts. Add-ons to the buildings such as garages, restrooms, decks, pergolas, etc. are causes of increasing casualties. Structural damages can be seen in Photos 1 and 2.

### Table: Distribution of Attacks Against Fixed Targets

<table>
<thead>
<tr>
<th>Date</th>
<th>Type</th>
<th>Location</th>
<th>Attack Type</th>
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<tbody>
<tr>
<td>June 13, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Tunceli, Ovacik</td>
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<td>Vehicle Bomb Attack</td>
<td>Mardin, Ömerli</td>
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<td>June 28, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Van, Gürpinar</td>
<td>Güzelsu Gendarmerie Guard Post</td>
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<td>July 9, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Mardin, Cevizlik</td>
<td>Cevizlik Gendarmerie Guard Post</td>
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<td>July 10, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Van, Erciş</td>
<td>Pay Gendarmerie Guard Post</td>
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<td>July 15, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Tunceli, Nazimiye</td>
<td>Kilköy Gendarmerie Guard Post</td>
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<td>July 27, 2016</td>
<td>Vehicle Suicide Attack</td>
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<td>August 15, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Diyarbakir, Merkez</td>
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<td>Vehicle Bomb Attack</td>
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<td>Police Housing</td>
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<td>August 18, 2016</td>
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<td>Elazığ, Merkez</td>
<td>Provincial Police Department</td>
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<td>August 25, 2016</td>
<td>Vehicle Suicide Attack</td>
<td>Şırnak, Cizre</td>
<td>Riot Squad Directorate</td>
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</table>

*The numbers of fatal casualties and injuries are for the first 24 hours following the blast.*

### Figure 3: Distribution of Attacks Against Fixed Targets

- Courthouse Personnel Housing: 4%
- Gendarmerie Guard Posts: 50%
- Provincial / District Police Departments: 31%
- Recruiting / Induction Offices: 4%
- Check Points: 7%
- District Governorates: 4%
The PKK tries to increase the probability of success and decrease risks by committing vehicle bomb attacks within these hours: it is easy to send a bomb-laden vehicle to a targeted area in darkness, escape in the dark after parking the vehicle at the target location, and benefit from the scarcity of active personnel in guard posts or security/military facilities within this specific timeframe.

The method used in VBIED attacks is either to park the bomb-laden vehicle in targeted areas or to commit a suicide attack. Sixty-nine percent of the 26 VBIED attacks against fixed targets have been executed by parking the vehicle in the targeted areas and then detonating it with a remote control system. One third of the attacks against fixed targets are suicide attacks. In terms of the impact and the fatality rate, however, suicide bombings rank first.

In VBIED attacks against fixed targets as far as provinces are concerned, the southeastern and eastern Turkish provinces of Mardin, Diyarbakır and Van take the lead. Vehicle bombs are installed and used most often on the Derik-Ömerli-Midyat line. They are forwarded to nearby residential areas, such as the towns of Nusaybin, Kızıltepe, and Çınar. Rural areas on the aforementioned line allow terrorists to hide themselves, explosives and vehicles as the routes connecting residential zones and desolated roads beyond routine checks facilitate the delivery of vehicle bombs to selected targets. The frequency of attacks, along this line, increases with the support of PKK cohorts. Ammonium nitrate used for agricultural purposes in nearby cities is dispatched to the Derik-Ömerli-Midyat line by PKK’s partners in crime.

The second route that the PKK concentrates on is the Lice-Hani-Dicle line. Vehicle bombs are installed and used on this line and sent to nearby provinces, such as Diyarbakır and Elazığ. The Lice-Hani-Dicle and the Derik-Ömerli-Midyat li-
nes have several characteristics in common: both are PKK’s local strategic action routes on and around which the organization easily maintains its armed presence.

Mobile Targets
In case of failure to plant IEDs on roadsides or when they are easily noticed, terrorists park VBIEDs along curb lines in residential areas in the natural flow of daily traffic. This allows them to carry out attacks more effectively than IED attacks. IEDs are planted on roadsides and in sub-surfaces inside culverts; they are on average 200-250 kg in weight and usually target a single armored vehicle. A 1,500 kg explosive laden on a vehicle damages more than one vehicle and causes many casualties when it targets unarmored civilian and military/police service vehicles on surface. For this reason, the PKK chooses mobile targets. Terrorists carry out VBIED attacks against mobile targets for the following tactical reasons:

- To hide and camouflage IEDs in vehicles parked on roadsides in residential areas is easy.
- VBIED allows the use of more explosives to execute an IED attack.
- VBIED attacks against unarmored, non-tactical, official vehicles in residential areas increase the probability of a high number of casualties.
- Security forces do not use jammers in shuttle vehicles in residential areas.
- Shuttle vehicles routinely use certain routes.

After running out of tactics during the security operations in the southeastern Turkish towns of Sur, Nusaybin and Cizre, the PKK organized its first ever VBIED attack when an explosive-laden car was detonated by a suicide bomber in Ankara on February 17, 2016. The chronological order of similar attacks in Ankara, Istanbul and Diyarbakır is provided in Table 2.

![FIGURE 6. DISTRIBUTION OF PKK ATTACKS AGAINST FIXED TARGETS ACCORDING TO PROVINCES](image-url)
The PKK and the Kurdistan Freedom Falcons (TAK), a breakaway faction of the PKK, have executed a total of nine attacks on mobile targets. The PKK has mostly targeted police personnel shuttles, but has occasionally hit military personnel and private vehicles, and crowds, as well. The PKK for the most part has detonated bomb-laden vehicles parked on road sides by remote control; three of the nine aforementioned attacks were committed by suicide bombers. The number of casualties was the highest when VBIEDs were detonated by a suicide bomber.

Suicide attacks by VBIEDs can target more than one personnel shuttle en route at the same time and place and thus, result in a high number of casualties. Road curves, which cause vehicles to slow down or stop in traffic, uncontrolled cross-roads, and red lights or bus stops have facilitated the target-timing optimization of such attacks. Evidently, in terror activities organized by planting IEDs on roadsides against military personnel shuttles in rural areas, the PKK chooses points of attacks on road segments which force vehicles to slow down, pause or come to a full stop.
The timing analysis of VBIED attacks against mobile targets reveals that most of the attacks are committed during evening rush hour. Terrorists easily monitor the movements of targeted vehicles in heavy traffic, and take advantage of security forces’ distraction or lack of attention due to fatigue or tiredness; they thus seize the opportunity to occupy the headlines in prime-time news. As for the timing of the attacks, 78% of PKK attacks against mobile targets occur between 4.30 p.m. and 7.30 p.m.

Suicide bombings account for 33% of VBIED attacks against mobile targets. The PKK executes a potential suicide bombing based on three factors: the training of the assailant, the procurement of the vehicle and of explosives in bulk, and the preparation of the desired explosive to be used in a blast. Fulfilling these three requirements and putting them into action as an act of terror require sound and multifaceted efforts for a terror group that is secretive in nature. To hide the detailed operational processes of each of these factors is not easy. The PKK terror organization is known for collaborating with people - called auxiliaries - in the logistics and procurement phases of these activities. It is crucial, however, to examine the dates of the terror acts in order to understand why they cannot be prevented from turning into actions.

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<th>SCENE OF ATTACK</th>
<th>PROVINCE</th>
<th>TOWN</th>
<th>TARGET OF ATTACK</th>
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<td>March 13, 2016</td>
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<td>Ankara</td>
<td>Çankaya (Kızılay)</td>
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<td>Civilians</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>June 7, 2016</td>
<td>Vehicle Suicide Attack</td>
<td>İstanbul</td>
<td>Beyazıt/Vezneciler</td>
<td>Security Personnel Shuttle</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>August 10, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Mardin</td>
<td>Kızıltepe</td>
<td>Security Personnel Shuttle</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>August 10, 2016</td>
<td>Vehicle Bomb Attack</td>
<td>Diyarbakir</td>
<td>Sur</td>
<td>Security Personnel Shuttle</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Casualties | 43 | 118 | 41 | 204

*The numbers of fatal casualties and injuries are for the first 24 hours following the blast.*
All of the VBIED attacks in the form of suicide bombings were committed before the Fethullah Gülen Terror Organization’s (FETÖ) failed coup attempt on the evening of July 15, 2016. That may be considered an indication of FETÖ-PKK solidarity nested in the state’s intelligence units. Although the network of cohorts is monitored and constantly kept under technical surveillance, the type of vehicles to be used in terror acts and the failure to spot the transfer of explosives are a problem; it is also possible that on occasion they are overlooked. Nonetheless, from an intelligence perspective, there is no excuse for the failure to detect terrorists, who are trained for suicide attacks by the PKK. After July 15, 2016, no VBIED attack in the form of a suicide bombing has taken place; this may be related to the purge of FETÖ’s intelligence members within the state and the breakdown of the FETÖ-PKK solidarity.

As far as the location of attacks is considered, VBIED attacks against mobile targets are primarily executed in the southeastern province of Diyarbakır followed by the provinces of Ankara, Istanbul, and Mardin. Considering that the explosives used in the Ankara and Istanbul incidents were supplied from Diyarbakır, the PKK’s capacity in relation to this type of assaults in Diyarbakır may be better understood. All of the VBIED attacks against mobile targets have been carried out in cities and towns; no such attacks have been executed in rural areas.

**ANALYSIS OF EXPLOSIVES USED IN ATTACKS**

Two features play a key role in the classification of explosive materials: detonation (blast wave propagation) velocity and the relative effectiveness (R.E.) factor with respect to Tri-nitrotoluene (TNT). The breaching effect of a high explosive is correlated with the detonation velocity of that explosive. The R.E. factor is a numeric value developed relative to TNT’s breaching effect. Each explosive has an R.E. factor value; this numeric value is used for cal-
Calculating the amount of chosen explosive in weight. In short, it takes 0.74 units of C-4 and 2.38 units of ammonium nitrate to create the same impact of blast caused by one unit of TNT on a target. However, explosives vary according to types of target; for this reason, other specifications of explosives are taken into account. Performance and power determine the applicability of an explosive on a desired target; and these specifications determine the power and performance of an explosive. Comparative specifications of three explosives frequently used by terror groups are given in Table 3.

<table>
<thead>
<tr>
<th>EXPLOSIVE</th>
<th>RELATIVE EFFECTIVENESS FACTOR</th>
<th>DETONATION VELOCITY</th>
<th>POWER AND PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Nitrate</td>
<td>0.42</td>
<td>4.100</td>
<td>Propellant</td>
</tr>
<tr>
<td>TNT</td>
<td>1</td>
<td>6.800</td>
<td>Breaching</td>
</tr>
<tr>
<td>C-4</td>
<td>1.34</td>
<td>8.040</td>
<td>Breaching/cutting</td>
</tr>
</tbody>
</table>

**Ammonium Nitrate (AN) - NH₄NO₃**: AN (molecular mass 80.04 gr/mol) is the most common filling material used by the PKK for both planting IEDs on roadsides and in VBIEDs. Ammonium nitrate is a chemical compound (used as an oxidizer), not an explosive on its own, but is used as a component of explosive mixtures for vehicle bombs. The chemical is readily available in bulk; and because of its low cost, excellent cratering effect, and low detonation velocity, it is occasionally used in improvised and vehicle bombs.

**Trinitrotoluene (TNT) - C₇H₅N₃O₆**: TNT (molecular mass 227.13 gr/mol) is the most common filling material for military munitions. Since it is a standard/base explosive, TNT is used to rate other explosives. TNT has an R.E. factor of 1 per unit of explosive. TNT is manufactured in unique shapes and weights. It is difficult to obtain, store, transfer in bulk, and to give form. However, with its excellent shattering power, TNT is used as an initiator in detonating IEDs.
C-3/C-4: C-3/C-4 (members of the Composition C family of plastic explosives) is principally used for filling purposes. C-3/C-4 is a composite material with sheer destructive power, and consists of plastic compositions that are more effective than TNT. C-3/C-4 is suitable for cutting and breaching and has high detonation velocity. Since it is a manufactured explosive, C-3/C-4 is in unique forms and weights. Although difficult to obtain, transfer in bulk and store, C-3/C-4 can easily be molded into any desired shape and made suitable for delivery. C-3/C-4 is used as the initiator in detonating IEDs.

Cratering Effect and Ammonium Nitrate: The cratering power of high explosives depends on the total energy produced upon detonation that clears broken pieces out of the crater. The detonation velocity is not directly related to this effect. In fact, explosions with low breaching power have higher cratering power. For this reason, the amount of an explosive needed for cratering is not determined by R.E. factors. To create potholes and ditches in roads requires a large amount of explosives; therefore, as a standard cratering charge, ammonium nitrate-based explosives are used for cratering and ditching; their low velocity blast effect gives them a pushing or heaving effect which makes it suitable for cratering and ditching operations. Although ammonium nitrate is not as powerful as other military explosives, it is relatively less expensive than others. Ammonium nitrate is used in large quantities in farming. Its frequent use as a commercial and agricultural product makes ammonium nitrate readily available and deliverable and for this reason the PKK chooses ammonium nitrate explosives for vehicle bomb attacks.

TYPES OF ATTACK, VEHICLES, EXPLOSIVE MATERIALS, AND TARGET/DISTANCE RELATION

Bomb-laden vehicle attacks are carried out in five different ways: VBIEDs parked on roadsides; VBIEDs driven and then abandoned in a target area; VBIEDs driven by a suicide attacker onto a target; VBIEDs driven by individuals who have been forced to do so; and VBIEDs driven by utilizing deception techniques. So far, the PKK has carried out VBIED attacks in four of the above types.
Bomb vehicles parked on roadsides: This is the most widespread VBIED tactic that the PKK uses against mobile targets. It is quite difficult to identify a VBIED in irregular road traffic and road traffic that follows no specific patterns. A parked VBIED is detonated by remote control when it lines up with the selected target. The best example is the attack committed in Diyarbakır on March 31, 2016.

Bomb-laden vehicles driven to target area and abandoned: In this type of attack, the VBIED is hastily parked in a public parking lot in front of a guard post, or a police station, and is detonated by a remote control shortly afterwards. PKK terrorists have often used this method taking advantage of public parking lots in front of security buildings and the slow assessment of the situation by security personnel.

### TABLE 4. SAFETY DISTANCES FROM VEHICLE BOMBS

<table>
<thead>
<tr>
<th>VEHICLE TYPE, MAX</th>
<th>AMOUNT OF EXPLOSIVE</th>
<th>LETHAL BLAST RADIUS</th>
<th>SAFE DISTANCE TO POINT OF BLAST</th>
<th>SCATTERING PARTICLES DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatchback Automobile</td>
<td>200-250 kg explosive (avg 227 kg) if carried in trunk</td>
<td>30 m</td>
<td>98 m</td>
<td>457 m</td>
</tr>
<tr>
<td>Sedan Automobile</td>
<td>400-500 kg explosive (avg 454 kg) if carried in trunk</td>
<td>38 m</td>
<td>122 m</td>
<td>534 m</td>
</tr>
<tr>
<td>Minibus (Cargo or Passenger)</td>
<td>1.500-2.000 kg explosive (avg 1.818 kg)</td>
<td>61 m</td>
<td>195 m</td>
<td>838 m</td>
</tr>
<tr>
<td>Truck and Fuel Truck</td>
<td>10.000-16.000 kg explosive (avg 13.608 kg)</td>
<td>137 m</td>
<td>375 m</td>
<td>1.982 m</td>
</tr>
<tr>
<td>Truck</td>
<td>25.000-30.000 kg explosive (avg 27.273 kg)</td>
<td>183 m</td>
<td>475 m</td>
<td>2.134 m</td>
</tr>
</tbody>
</table>

Vehicle bombs driven by a suicide attacker to the target: A VBIED in a normal course of traffic approaches the targeted area, but suddenly maneuvers and hits the target or reaches the most suitable distance and is detonated by the suicide attacker. The absence of vehicle barriers between the target and access routes facilitates a vehicle’s approach to its target, and increases the attack’s probability of success.

Bomb-laden vehicles used by force: The driver of a loaded fuel truck is forced to drive to the target region, or an ordinary vehicle is stopped by terrorists, laden with explosives and then forced to hit the target region. Execution of this type of an attack is difficult. Such an attack against Suveren Gendarmerie Guard Post, in the eastern province of Iğdır, was attempted and failed by PKK terrorists on August 21, 2015.

CONCLUSION
This study has shown that VBIED attacks are generally carried out against police, who is in charge of law and order, and military facilities and official vehicles. Keeping this in mind, detailed analyses of vehicle bomb attacks with a focus on targets, locations, timing and methods, and a risk assessment on vehicle bomb attacks are necessary. Security, safety and facility/vehicle designs need to be developed urgently. Fixed facilities that are vulnerable to attacks and different types of mobile targets should be evaluated respectively. For fixed facilities, selection of compound location, structural needs, physical safety measures and effective security planning should be improved. The most limiting factor here is the operational needs of security forces in a facility.

Since they are illegal and criminal organizations by nature, terror groups when faced with effective measures are tactically dynamic, and rapidly change tactics. However, regardless of their tactics, terrorists always try to maintain sustainable dominance over their strategic terror targets in certain periods of time and geographical regions. For this reason, the PKK has tried to sustain its strategical dominion in rural areas when it has been weakened in urban fights; and has worked on IED, VBIED and armed attacks based on this strategy.

In order to measure the effectiveness of future preventive measures, the diversity of terror acts of the PKK should be analyzed. The PKK has recently started to commit softer acts of terror, such as assassinations, kidnaping and waylays. This is an indication that the organization did not have the desired tactical gains and the expected impact with vehicle bomb attacks. As the PKK diversifies its terror activities, it deepens its organized terror program as well. Similarly to the public criticism following the bomb attack in the town of Ovacık, social reactions are increasing in other cities as well after different kinds of attacks. Thus, the PKK has become a persona non grata, or a common enemy, for people living in Eastern and Southeastern Anatolia.

PKK’S CAR BOMBS ATTACKS AFTER AUGUST 25, 2016
The initial analysis covered PKK’s VBIED/SVBIED between August 2, 2015 and August 25, 2016 and was published in Turkish in October 2016. However, the increase in PKK’s VBIED/SVBIED attacks led to the update of the analysis so that it covered the period between August 26, 2016 and December 10, 2016. The following graphs have been added to the current analysis in an additional section and present the PKK car bomb attacks in a comparative manner for a better understanding of the nature of these events. Comparisons suggest a continuation of the PKK’s terror trends in Turkey.
The PKK has carried out a total of 42 bomb attacks since August 2, 2015 when the 7 attacks between August 26, 2016 and December 10, 2016 are added to the 35 attacks of the period between August 2, 2015 and August 25, 2016. The 7 new attacks were carried out against fixed targets; the new attacks had no impact on the nature of the attacks against mobile targets which were studied in the initial analysis. The comparisons of the attack dynamics based on the different parameters of the three different periods since August 2, 2015 can be found below.

**Comparison of the Attacks Based on Provinces**

**AUGUST 2, 2015 - AUGUST 25, 2016**

- Elazığ: 4%
- Ağrı: 4%
- Mardin: 31%
- Tunceli: 8%
- Şırnak: 8%
- Hakkari: 7%
- Van: 11%
- Diyarbakır: 23%

**AUGUST 26, 2016 - DECEMBER 10, 2016**

- Adana: 14%
- Istanbul: 29%
- Hakkari: 14%
- Van: 14%
- Diyarbakır: 29%

**AUGUST 2, 2015 - DECEMBER 10, 2016**

- Elazığ: 3%
- Ağrı: 3%
- Mardin: 25%
- Istanbul: 6%
- Tunceli: 6%
- Şırnak: 6%
- Hakkari: 9%
- Van: 12%
- Diyarbakır: 24%

**Comparison of the Attacks Based on Target Selection**

**AUGUST 2, 2015 - DECEMBER 10, 2016**

- District Gov't. Office: 4%
- Military Recruitment Facility: 4%
- Check Points: 7%
- Police HQs/ Stations: 31%
- Gendarmerie Posts: 50%
- Judicial: 4%
- Provinces/ Gov't. Office: 14%
- Political Party Buildings: 14%
- Police HQs/ Stations: 29%
- Checkpoints: 14%
- Gendarmerie Posts: 29%
Comparison of the Attacks Based on the Attack Timing

Comparison of the Attacks Based on the Attack Method:

AUGUST 2, 2015 - DECEMBER 10, 2016

AUGUST 2, 2015 - AUGUST 25, 2016

AUGUST 26, 2016 - DECEMBER 10, 2016

AUGUST 2, 2015 - DECEMBER 10, 2016
### VBIED/SVBIED Attacks Carried by PKK Between August 26th and December 10th, 2016

<table>
<thead>
<tr>
<th>Attack Order #</th>
<th>Attack Date</th>
<th>Attack Method</th>
<th>Attack Location</th>
<th>Attack Target</th>
<th>CASUALTIES Security Personnel</th>
<th>Civilians</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>September 12, 2016</td>
<td>VBIED</td>
<td>Van</td>
<td>Downtown AK Parti Provincial Office Building</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>October 6, 2016</td>
<td>VBIED</td>
<td>Istanbul</td>
<td>Yenibosna 75th Polis Station</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>October 9, 2016</td>
<td>SVBIED</td>
<td>Hakkari</td>
<td>Şemdinli Durak Gendarmerie Post</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>4 Kasım 2016</td>
<td>VBIED</td>
<td>Diyarbakır</td>
<td>Bağlar Provincial Police HQs Annexed Building</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>November 26, 2016</td>
<td>VBIED</td>
<td>Adana</td>
<td>Downtown Provinicial Governor Office Building</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>December 9, 2016</td>
<td>VBIED</td>
<td>Diyarbakır</td>
<td>Hazro Teknebaşı Gendarmerie Post</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>December 10, 2016</td>
<td>SVBIED</td>
<td>İstanbul</td>
<td>Beşiktaş Riot Police Standby/Control Location</td>
<td>37</td>
<td>45</td>
</tr>
</tbody>
</table>

**Total Casualties**
- Killed: 49
- Wounded: 60
- Civilians Killed: 24
- Civilians Wounded: 247
This study proposes an analytical view to better understand the dynamics of bomb-laden vehicle attacks carried out by the terrorist organization Kurdistan Workers’ Party (PKK). This report evaluates the tactical need, target analysis, types of explosives, and the methods of PKK’s vehicle bomb attacks, and the interrelationship of such attacks. To this end, a total of 35 vehicle bomb attacks committed by the PKK between August 2, 2015 and August 25, 2016 have been investigated, alongside the types of targets and frequency of attacks, the cities under attack, and the timeframes of the attacks.

The first section discusses when and how the PKK commits vehicle bomb attacks. The second section looks at 35 attacks carried out in the period of August 2, 2015 to August 25, 2016. The PKK attacks are examined in detail under several diverse headings in the third section, followed by an analysis of the explosives used in the attacks. Subsequently, the dynamics of the attacks are discussed and possible parameters to prevent future PKK attacks are recommended in the final section. The study also draws attention to how society at large is affected by the diversity of PKK attacks and the recurrence of certain types of attacks.