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**Intelligence and Terrorism Information Center
at the Israel Intelligence Heritage
& Commemoration Center (IICC)**

Rocket threat from the Gaza Strip, 2000-2007



**Houses in Sderot damaged by rocket fire (Photos courtesy of the
Sderot Communications Center)**

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¹ Based on films shown of Al-Arabiya TV, Al-Aqsa TV, Al-Jazeera TV and the Hamas and Palestinian Islamic Jihad Websites.

Overview

1. The main objective of this study is to analyze the terrorist organizations' use of rocket and mortar shell fire between 2000 and 2007, the years of the terrorist campaign initiated by the Palestinians (called the Al-Aqsa intifada). The study examines the extent of the fire, the policies employed by the various organizations, the factors influencing those policies, trends of escalation or lulls in the attacks, the impact on the residents of the western Negev settlements.

2. Rocket fire began in 2001² and during the confrontation gradually became one of primary threats coming from the Palestinian terrorist organizations. **As of the end of November 2007, there has been a total of 2,383 identified rocket hits in and around the western Negev settlements, with the southern city of Sderot as a priority** and drawing 45% of the rockets which landed on inhabited areas.

3. **For the Palestinian terrorist organizations, rockets and mortars serve as an asymmetric response to Israel's military superiority. They are simple, available and cheap.** That response, from their point of view, even though there are problems and disadvantages, allows them to disrupt the life and rend the social fabric of the **civilian population** living with range, to **bypass the security fence** Israel constructed in the Gaza Strip and to create a kind of **balance of terror** to hamper the Israeli security forces' counterterrorist activities. **That strategic conception was primarily inspired by Hezbollah's Lebanese model**, which was regarded as successful before the Israeli withdrawal from the security zone and during the second Lebanon war. **Syria and Iran** support the terrorist

² The official Hamas announcement of the firing of a **Qassam 1 rocket** at Sderot was made on November 1, 2001. It had been fired a few days previously.

organizations' efforts to copy the Lebanese model in the Palestinian Authority with know-how, training and the purchase of standard rockets.

4. **Since 2001 rocket fire has been directly responsible for the deaths of ten Israeli civilians**, nine of them Sderot residents. In addition, **433 individuals** have been wounded,³ the overwhelming majority of them civilians, and during the past year and a half **more than 1,600 instances of stress** were reported. **Mortar fire has been responsible for the deaths of ten individuals, eight civilians and two IDF soldiers.** Of the 150 wounded, 80 were civilians and 70 soldiers.

5. The damage to the civilian populace **is not only measured statistically in terms of the number killed and wounded or the extent of property damage.** The continued attacks have an accumulated psychological impact on the population and destroy the sense of security previously had by more than **190,000 people, who now live under the potential threat of daily rocket and mortar shell attacks.** They also disrupt the routine of daily life in all the western Negev settlements, cause residents to move away (especially from Sderot), and expose the political echelons and the IDF to harsh criticism. The continuing fire **hampers efforts to advance a peace treaty between Israel and the Palestinians** by creating a situation of constant rocket fire and constant Israelis countermeasures.

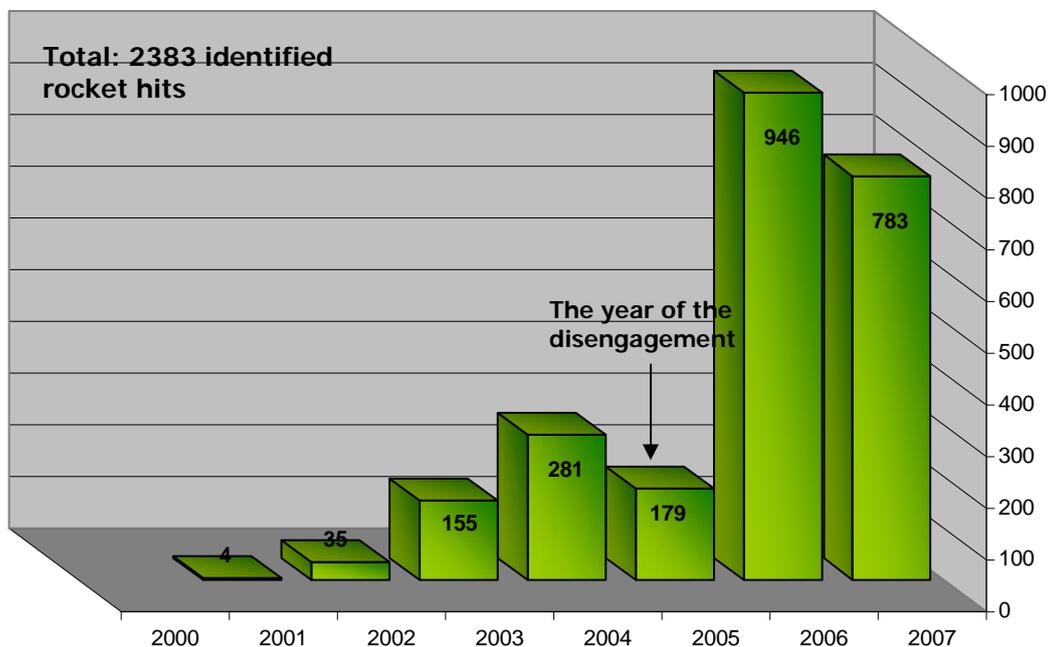
6. In addition, between 2001 and November 2007, **more than 2,500 mortar shells were fired.** Their **short range** made them effective before the disengagement, especially when they were aimed at the IDF forces which operated in the Gaza Strip and at the Israeli settlements there. In the absence of Israeli targets after the disengagement there was a **sharp decrease in the number of rockets fired.** However, since April 2007 the terrorist organizations have begun to make **greater use of mortar shells**, especially Hamas, which does not directly participate in rocket fire. In recent months

³ As of October 2007.

the fire has been aimed at **IDF forces** operating in the Gaza Strip and along the security fence, at the crossings (especially Kerem Shalom) and at the Israeli settlements close to the security fence, such as **Netiv Ha'asara, Kibbutz Kerem Shalom and Kibbutz Nahal Oz.**

7. This study concentrated all the data and examined the Palestinian terrorist organization policy of rocket and mortar fire, beginning when confrontation started in 2000 and going through October 2007. An examination of the following graph **shows the number of attacks gradually grew (2001-2004) until the disengagement (2005), when there was a temporary drop. However, in the two following years (2006-2007) there was a sharp increase and rockets became the main weapons** in the hands of the Palestinian terrorist organizations.

Annual distribution of rocket fire⁴



⁴ As of the end of November 2007.

8. The Palestinian rocket attacks, **both policies and scope**, are influenced by their technological capabilities, ideologies, internal considerations within the organizations and among the Palestinians, Israeli counterterrorist activities, developments in Israel and developments in the Israeli-Palestinian conflict in general. The main factors influencing the policy are:

1) **As an asymmetric weapon, rockets provide the Palestinian terrorist organizations with a response to Israel's military superiority.** They are easy to manufacture, their components are cheap and readily available, and it is simple to transport and operate them. Hamas and other terrorist organizations in the Gaza Strip easily use the technology for producing large quantities of rockets, which give them the ability to attack the Israel populace in the western Negev without the IDF's having an effective response. On the other hand, they face operational difficulties when they attempt to carry out other, more difficult types of attacks from the Gaza Strip, mainly attempts to infiltrate into Israel to carry out suicide bombing attacks, shootings and abductions.

2) **The strengthening of Hamas' grip on the Gaza Strip since the disengagement (August 2005):**

A) Following the disengagement, Hamas' grip on the security and politics of the Gaza Strip was strengthened at the expense of Fatah and the security services under Abu Mazen's control. Within the territorial space controlled by Hamas, the Palestinian terrorist organizations found it easy to expand their technological facilities for manufacturing rockets, smuggle in standard rockets from Egypt and make intensive use of rockets as weapons against Israel.

B) However, because of political considerations which will be discussed below, Hamas does not directly participate in rocket launches for extended periods of time, but rather grants the other organizations, especially the Palestinian Islamic Jihad, considerable freedom of action. **That enabled the terrorist organizations to increase the scope of their rocket**

attacks significantly in 2006 and 2007 and to train their sights on new Israeli settlements (primarily the large city of Ashqelon). When Hamas does decide to join directly in the shooting, **the range of settlements affected is liable to be much greater** because of the organization's potential and technical capabilities.

3) Internal Palestinian political developments and the relations between Israel and the Palestinian Authority:

A) Internal Palestinian developments among the terrorist organizations, between the terrorist organizations and the PA and between the PA and Israel **all greatly influence the rocket fire policies of the various terrorist organizations, especially Hamas**. As a result their rocket-launching policies sometimes had a moderating influence and sometimes led to escalation, sometimes **long-term**, sometimes **short-term**. Temporary cessations of rocket fire are exploited for rearming, training and smuggling standard rockets into the Gaza Strip for use in the future.

B) Many examples which illustrate the influence of internal Palestinian relations and Palestinian-Israeli relations on Hamas' rocket fire policies are contained in this study. For example:

i. After Arafat died in November 2004, there was a lull in the fighting resulting in a temporary decrease in the amount of rocket fire.

ii. In September 2006, Hamas stopped firing rockets after a lethal "work accident" resulted in hostile internal criticism.

iii. Since the Palestinian Legislative Council elections on January 25, 2006 and the establishment of the Hamas government in March 2006, for long periods of time Hamas has preferred not to participate directly in rocket fire.

iv. The cease fire agreed upon by the Israeli prime minister and the PA chairman on November 26, 2006, brought about a reduction in rocket fire, but did not end it.

v. The worsening of the battles between Fatah and Hamas in May 2007 made Hamas initiate a massive rocket attack unprecedented in scope.

vi. Since Hamas took over the Gaza Strip in June 2007, it has not directly participated in rocket fire because its priority is to strengthen its grip over the Strip.

C) Events and developments in Israel: Several times events and developments in Israel resulted in **a change in the scope of rocket fire** for short periods of time. For example:

i. In August 2005 during the disengagement there was a decrease so as not to hamper the Israelis from leaving.

ii. In September 2005, after the disengagement, there was a significant increase.

iii. On March 28, 2006, election day for the 17th Knesset, **the first 122 mm Grad rocket** was fired at Ashqelon, which has been the object of rocket attacks ever since.

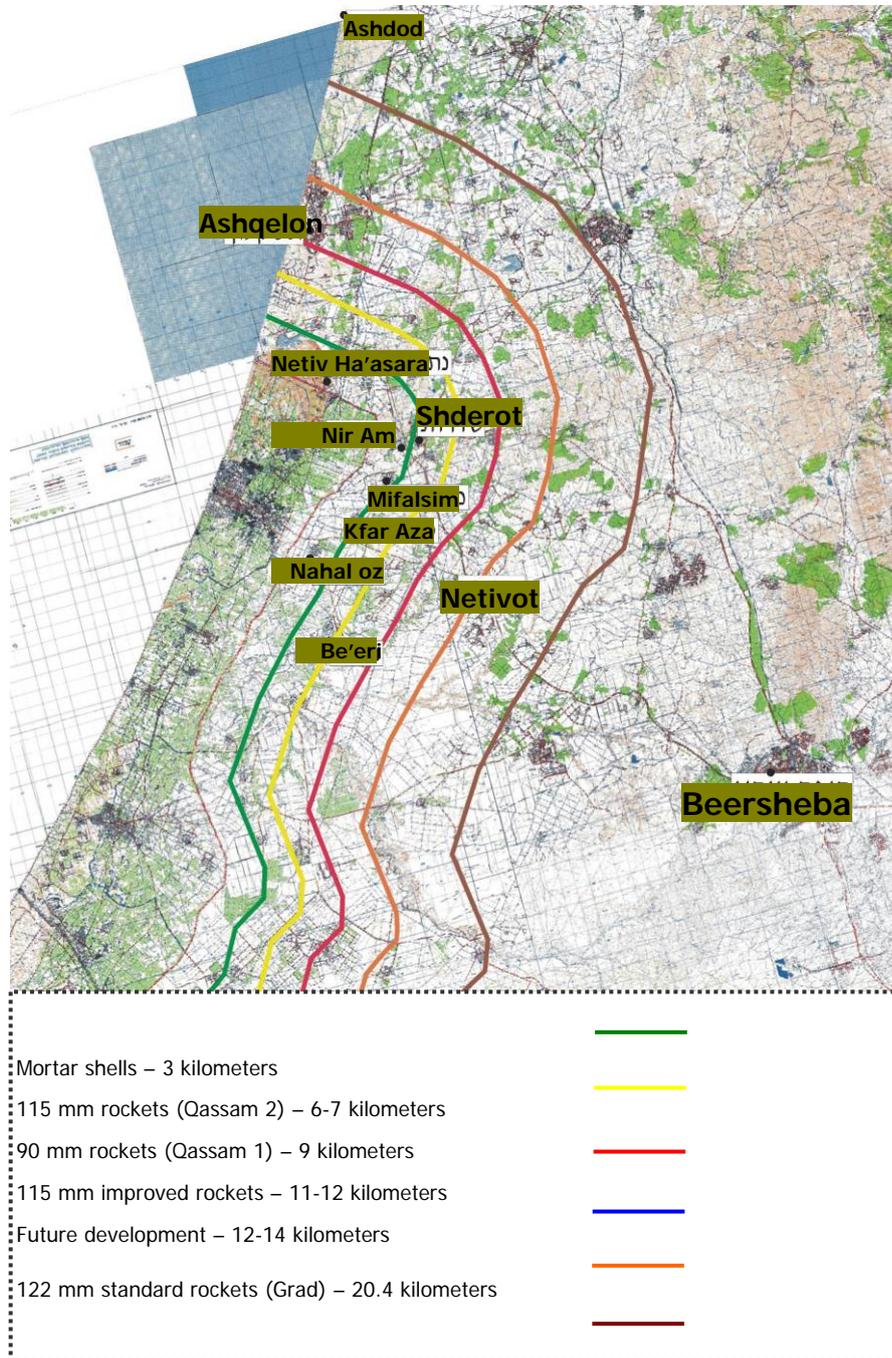
iv. In early September 2007, a barrage of rockets was fired at Sderot, coinciding with the beginning of the school year.

9. The operational and technological trends clearly showed that **the rockets have not begun to scratch the surface of the impact they can have on Israel**. In the coming years the terrorist organizations can be expected to continue their efforts to introduce technological improvements which are liable to **increase rocket ranges, the amount of explosives the warheads can carry and their degree of accuracy** (following the Hezbollah model in Lebanon). There may be much more rocket fire, both as technological developments **extend the rockets' shelf life** and because following political developments, Hamas may join the organizations

launching rockets. At the same time, **there may be an increase in the organizations' arsenals of standard rockets which have a range of more than 20 kilometers** (more than 12 miles), which would enable them to attack more settlements.

10. The variety of military and civilian actions taken by Israel during the years of the confrontation hampered the rocket fire, prevented several attempted launches and reduced the number of casualties. However, to date Israel has not found an appropriate response to the rocket threat which has grown alarmingly during the past two years, and which **today is the terrorist organizations' main threat against Israel.**

Israeli settlements within range of rocket fire⁵



⁵ The ranges were calculated from the launching areas in Gaza Strip and not from the security fence. 122 mm rockets with a range of 20.4 kilometers were used only a few time.

Methodological notes

11. This study collected and analyzed the information about rocket and mortar shell fire in the seven years of the current conflict (2000-2007). As it was being prepared it became clear that the Israeli defense establishment uses different statistical methods to define the data. As a result some of the statistics are different because of methodological differences in tracking rocket and mortar shell fire.

12. In this study we used rocket and mortar shell fire data based on the Operational Division of the IDF General Staff. Rocket or mortar shell fire is defined in the study as **an event, during which a launch is tracked and the hit is clearly identified as falling in Israeli territory (or close to an IDF force, or an Israeli settlement in the Gaza Strip before the disengagement).** It is also defined as an event during which a launch from the Gaza Strip is tracked and an explosion is heard, even if the location of the hit is not clearly identified. Regarding our statistics, it should be taken into account that the actual number of rockets launched may be at least 20% greater than the number of hits identified. Rocket fire and mortar shell fire data were **separated** because in our assessment the two are different in nature and each Palestinian terrorist organization has its own policies regarding them.

13. Monitoring information provided by the media about the Palestinian terrorist organizations' claims of responsibility for the rocket and/or mortar shell fire showed that **in certain instances the organizations claim many more fired than those located in Israeli territory.** In our assessment, there are two factors behind the disparity: one, many of the launchings were in fact carried out but did not reach Israel and the rockets/mortar shells fell either in the Gaza Strip itself or in the sea; two, often the reports issued by the terrorist organizations are unreliable. For example, often several organizations claim responsibility for the same event.

Therefore, although this study also used statements made by the terrorist organizations, they were not considered a reliable source.

14. The data in this study **update and replace** those which appeared in the past in Information Bulletins issued by the Intelligence and Terrorism Information Center.

15. **Sources:** This study is based on information received from the Operational Division of the IDF General Staff, military intelligence and other Israeli security sources. Use was also made of the Arab and terrorist organization media, and previous ITIC publications. It is accompanied by a digital appendix of videos broadcast on television, dealing with the manufacture and launching of rockets.

[Click here to watch the video](#)

The examination of the data and the analysis of the terrorist organizations' policies was carried out by the researchers of the ITIC. Therefore, the opinions and conclusions presented in this study represent only the ITIC.

Part I: The advantages and disadvantages of the use of rockets in the eyes of the Palestinian terrorist organizations

Overview

1. The rockets in the hands of the terrorist organizations are self-manufactured, relatively easy to produce and constructed out of cheap, available materials. They do not have guidance systems and are therefore fairly **inaccurate** and strike randomly. That means that they **cannot be pinpoint small military targets, but rather are launched toward large civilian populations**, which are the terrorist organizations' preferred targets. They therefore meet the criteria for **war crimes** are in gross violation of the international laws governing warfare, because the rockets are aimed at **civilian populations** which are in no way connected to military activity.

2. Behind the broad use of rockets lies the concept that **they provide an asymmetric response to Israel's military superiority** which is simple, available and cheap. As far as the terrorist organizations operating in the Gaza Strip are concerned, rockets **exhaust** Israel's civilian populace by bypassing the security fence Israel built in the Gaza Strip, and provide a response to the IDF's operational activity. The strategic concept of the rockets for the terrorist organizations is **inspired primarily by the Hezbollah model in Lebanon**, which, with **Iranian and Syrian support and aid**, stockpiled a large rocket arsenal in Lebanon and used them extensively to deter or punish, and used them to great effect during the second Lebanon war.

3. The experience accumulated by the Palestinian terrorist organizations in the Gaza Strip showed them that independently produced rockets did not cause "enough" casualties and property damage, certainly not when compared to suicide bombing terrorism. However, they still consider them effective in

disrupting the Israeli civilian populace's daily lives and deterring Israel from reacting in a way which would influence the morale (and the politics) of the State of Israel.

Advantages

4. As far as the terrorist organizations in the Gaza Strip are concerned, launching rockets into Israel has **several notably prominent advantages**:

1) **They are simple weapons**, easy to manufacture, cheap and available. They are manufactured independently by the organizations in large quantities and hidden within the civilian population in the Gaza Strip. That allows the rocket-launching networks to **survive Israeli attacks** and enables them to **have continuous rocket fire** over long periods of time.

2) **The independently produced rockets have relatively long ranges** (up to 10 kilometers – more than six miles), enabling them to threaten Israeli population centers and IDF posts and camps in the area abutting the Gaza Strip, and to overcome the obstacle of the security fence. The assumption of the terrorist organizations is that eventually they will be able **to increase the range** both by technological development⁶ and by smuggling standard weapons into the Gaza Strip.

3) Rocket fire enables the terrorist organizations **to avoid coming into direct contact with the IDF** and exposing themselves to IDF observation. They do that by launching rockets from a relatively great distance and sometimes by remote control (they also have the ability to use timing devices).

4) **Tactically, the terrorist organizations' modus operandi for firing rockets is simple** to carry out from the territory controlled by the terrorist organizations without the launching squads having to infiltrate Israel territory. It does not require complex planning or special training. It is difficult for the IDF to prevent beforehand and can be carried out in a continuous series.

⁶ During the confrontation the range of independently produced rockets has grown from three to ten kilometers (almost two to more than six miles).

5) In the eyes of the terrorist organizations, **firing rockets has a profound psychological impact**, it undermines the self confidence of the civilians within rocket range, disrupts their daily lives and has the potential to cause schisms in Israel society and politics.

6) The know-how for the manufacture of rockets is widely available and can be found all over the Internet. In addition, the terrorist organizations are supported by **Hezbollah and Iran** with know-how and training. Both spent many years constructing Hezbollah's arsenal in Lebanese territory, which was used to great effect during the second Lebanon war.

Disadvantages

5. The terrorist organizations are aware of the disadvantages and problems involved in rocket fire, but that does not prevent them from using them intensively. The main disadvantages are:

1) **Losses and damages sustained by the Palestinian population:** Israel's counterterrorist activities in response to the rocket attacks, both in the civilian and military spheres, disrupts the routines of daily life for the Palestinians in the Gaza Strip and causes casualties and suffering to Palestinian civilians. It is worthwhile to note that the **number of Palestinian casualties caused by terrorist organizations' rockets is far greater** than the number of suffered by Israel.⁷

2) **Rocket fire is not exact:** Not only do independently produced rockets lack guidance systems, but the IDF's counterterrorist activities cause operational difficulties for the rocket-firing squads. The result is that it is almost impossible to aim rockets at specific targets. **They are aimed in the general direction of a population center with the avowed intention of killing and maiming as many Israel civilians as possible.** However, hitting a population center is not a

Abu Mazen criticized the rocket fire several times and called it unnecessary and pointless. He said ⁷ that not only was it pointless, but that it badly harmed the Palestinian population and was a good excuse for an Israeli response. **Dr. Ghazi Hamad**, a senior Hamas activist who was prime minister Ismail Haniya's spokesman, also said that the rocket fire into Israel did more harm than good and that continuing it harmed the interests of the Palestinian populace. His comments were made in a letter sent to the Hamas leadership (Amad Website, October 21, 2007).

certainty. A substantial number of the rockets fired during the confrontation have fallen in open areas in Israel, in the sea or in the Gaza Strip itself.

3) The level of lethal damage they cause is low in comparison with other types of terrorist attacks (such as suicide bombing attacks): That is, in comparison with other terrorist attacks, such as suicide bombing attacks. During the seven years of the current confrontation, rocket fire caused the deaths of ten Israel civilians, a far lower number than the total of Palestinian civilians killed by terrorist organization rocket fire.

Future trends

6. Since the Palestinian terrorist organizations are aware of the difficulties and disadvantages, **it can be expected that they will continue trying to improve the rockets' effectiveness according to the model of Hezbollah in Lebanon.** The following can be expected to occur:

- 1) **More effective and heavier warheads will be produced** to increase the number of casualties and amount of damage done.
- 2) **Increase in range will be effected** through technological improvements in manufacture.
- 3) A continued effort will be made **to increase the number of available rockets** (including by technical means such as lengthening shelf life).
- 4) Smuggling more standard rockets into the Gaza Strip, with ranges of up to 20 kilometers.

7. **Iran and Syria** can be expected to continue supporting the terrorist organizations (especially Hamas and the PIJ), to improve the quality of the rockets with know-how, training and by providing standard rockets.

Part II: The terrorist organizations' rocket launching policies

Overview

1. During the recent years of the Israeli-Palestinian conflict, rockets have become the **leading weapons** of the terrorist organization operating in the Gaza Strip. So far efforts to export them to Judea and Samaria have **failed**, primarily thanks to the effective counterterrorist activities of the Israel security forces.

2. The organizations' policy of launching rockets is influenced by their technological capabilities (which will be discussed in Part IV), their ideology, general policies and a series of political factors and considerations, all of which contribute to restraining rocket fire or to escalation for specific periods of time.

3. There are two main policies governing rocket fire from the Gaza Strip :

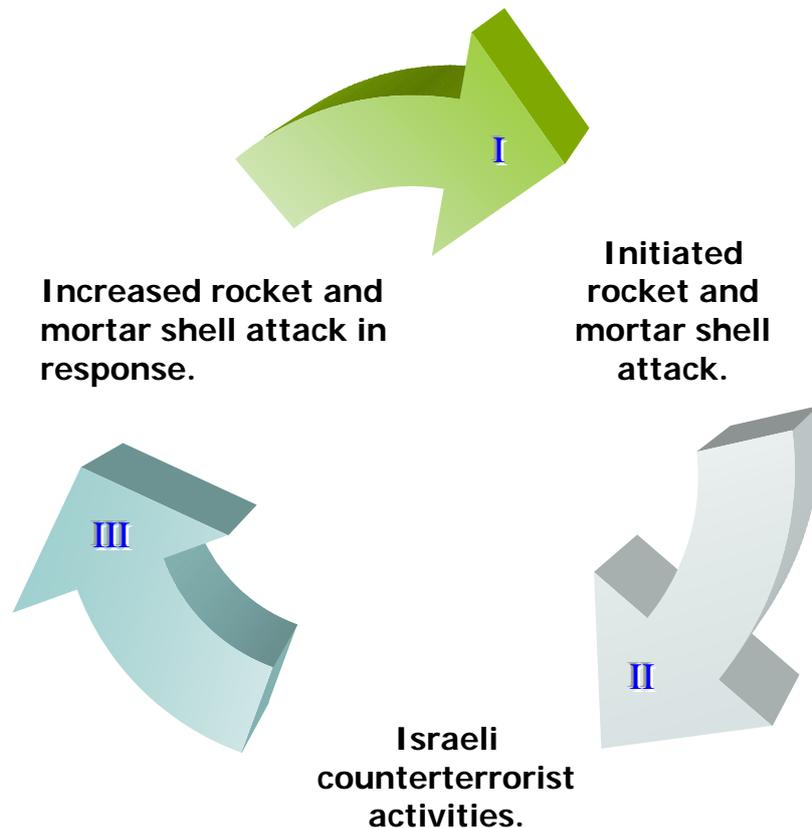
1) **The Hamas policy, more than those of the other terrorist organizations, is influenced by political considerations and its responsibilities as political ruler of the Gaza Strip.** Those considerations motivate them, despite the fact that they have the most well-developed capabilities for manufacturing rockets, to adopt a policy of **relative restraint**. However, their militant jihadist ideology prevents them from completely abandoning rocket fire or from restraining the other terrorist organizations. Thus rocket fire continues and even increases although at the time Hamas does not participate in it.

2) **The policies of the PIJ and the other, smaller terrorist organizations are not influenced by political considerations,** but by their basic mindset, which motivates them **to continue the terrorist attacks**, including rocket and mortar shell fire. Their main considerations are their technological and operational capabilities. However, sometimes events in Israel and the PA, and developments in

the Israeli-Palestinian conflict also influence them, and are usually directed at an effort to create a temporary escalation.

4. The IDF's counterterrorist activities in the Gaza Strip, and on occasion in Judea and Samaria, also influence the rocket fire policies of all the terrorist organizations. They regard rocket launching as **deterrence and punishment for Israel**, and on occasion they are carried out after an IDF action. Thus sometimes increased rocket fire coincides with a particular Israeli security force effort to prevent it.

The vicious cycle of escalation



5. The policies of the Palestinian terrorist organizations are as follows:⁸

The Hamas movement



6. Hamas was the first organization to fire rockets from the Gaza Strip, and has the most advanced technology and operational capability for manufacturing and launching rockets. While the movement was directly involved in rocket fire there was a **sharp increase** in the number launched



Hamas' Izzedine al-Qassam Brigades prepare rockets during an extended attack. The rockets are removed from their plastic coverings, apparently having been stored to lengthen their shelf life (The Izzedine al-Qassam Brigades Website, April 24, 2007)

7. Hamas' policies are generally determined by the leadership (although there are sometimes local initiatives not dictated by general policy). Many factors, sometimes contradictory, influence rocket fire policy: technical and operational capabilities, its militant jihadist ideology, Israeli security force counterterrorist activities, political developments in the PA and the gut feelings of the Gazan residents, who have suffered from rocket fire. A particularly salient example of that occurred after 19 Palestinian civilians were killed and more than 80 wounded in a "work accident" during a "victory rally"

⁸ Updated to the end of November, 2007.

at the Jabaliya refugee camp on the outskirts of Gaza City on September 23, 2005, at which point Hamas stopped its rocket fire.



An explosion during a demonstration at the Jabaliya refugee camp (Hamas Website, September 2005).

8. Hamas' participation in the Palestinian Legislative Council elections in January 2006 and the subsequent founding of its government in March 2006 reduced – in line with its decision – the extent of rocket fire carried out by the movement's terrorist operative wing. However, the worsening of its confrontations with Fatah and the Palestinian security services in the Gaza Strip in May 2007 led to an unprecedented rocket attack against Israel. The objective was to provoke the IDF to respond and create a “unity of weapons” among the terrorist organizations against Israel, which would deflect attention from the internal Palestinian confrontation.



Hamas preparing to launch a rocket at Kibbutz Zikim (Al-Jazeera TV, December 22, 2006).

9. After Hamas took over the Gaza Strip on June 15, 2007, it ended its direct involvement in rocket fire into Israeli territory and contented itself with launching mortar shells at military and civilian targets near the security fence. That was done because Hamas' main priority was to establish its grip on the Gaza Strip. **However, Hamas allows the PIJ and the smaller organizations to carry out rocket fire from within the Gaza Strip and sometimes even encourages them and uses them as sub-contractors.** Senior Hamas activists and the Hamas media support the continued terrorism ("resistance"), including rocket fire, even when Hamas itself is not directly involved.

The Palestinian Islamic Jihad



10. The policy of the PIJ is primarily influenced by its ideology, which involves **a continued, uncompromising campaign against Israel.** Other factors influencing it are the lack of governmental responsibility (such as that had by Hamas), intransigent opposition to the PA's agreements with Israel, and the massive support the organization receives from Iran.

11. To the above should be added the organization's rocket-manufacturing capabilities (**Quds rockets**) **which are inferior to those of Hamas, but nevertheless enable it to keep firing a small amount of rockets over a long period of time.** Thus the PIJ has become the organization launching the greatest number of rockets (especially during a time when Hamas does not restrain its rocket fire policy).



**Scenes from a PIJ movie documenting rocket launchings
(Al-Arabiya TV, March 3, 2006).**

12. Similar to its policies regarding suicide bombing attacks, **the PIJ does not regard itself as committed to the agreements between Israel and the PA.** For example, it did not obey the cease fire in the Gaza Strip of November 25, 2006, agreed upon between Israeli Prime Minister Ehud Olmert and PA chairman Abu Mazen, and continued launching rockets at the western Negev towns and villages. After Hamas took over the Gaza Strip, PIJ leader Ramadan Shalah made it clear that he regarded rocket fire as “a legitimate right” which the organization would never waive under any condition (Paltoday Website, June 24, 2007.) On September 2, 2007, the PIJ leaders announced that the organization would ramp up its rocket fire to disrupt the beginning of the school year in Israel. In point of fact, on the second day of school Sderot was hit by several rocket barrages.⁹



**PIJ operatives firing rockets at Ashqelon
(Al-Jazeera TV, March 1, 2007).**

⁹ For further information see our September 5, 2007 Bulletin entitled “Palestinian Islamic Jihad Website and a spokesman claimed the volleys of Qassam rocket fire at Sderot were launched to mark the beginning of the school year,” at http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/html/pij_e_spokesmen.htm and http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/pij_e_spokesmen.pdf.



Encouraging rocket fire into Israeli territory: a cartoon posted on Qudsway, a PIJ Website, August 12. The inscription reads “Saraiya” (battalion, i.e., the name of the organization’s terrorist operative wing), one of whose letters is an upraised fist from which rockets are launched (at Israel). The fist is a symbol of the violent “resistance” in many Palestinian terrorist organization insignia.

The Popular Resistance Committees



13. The policy of the Popular Resistance Committees is not influenced by political considerations because they are not subject to the same kinds of restraints as Hamas. It is influenced primarily by local operational considerations, by the organization’s limited technological capabilities and its relations with Hamas.

14. The PRC produces **Nasser rockets**. Their production line is relatively small and therefore they need support from the other organizations (especially Hamas). In most instances their launchings are carried out in collaboration with another organization.

Fatah cells operating in the Gaza Strip



15. Various local Fatah-Al-Aqsa Martyrs Brigade groups operate in the Gaza Strip, and their anti-Israeli rocket launching policy is not influenced the political considerations of Abu Mazen and the Fatah leadership in Judea and Samaria. They are motivated by local operational considerations and by their limited technological capabilities, which are inferior to those of Hamas and the PIJ. The groups have been deeply involved in firing their Al-Aqsa rockets at Israel since Hamas took over the Gaza Strip.



An Al-Aqsa rocket fired at Sderot; responsibility claimed by Fatah-Al-Aqsa Martyrs Brigade (Al-Jazeera TV, July 1, 2006).

The Popular Front for the Liberation of Palestine



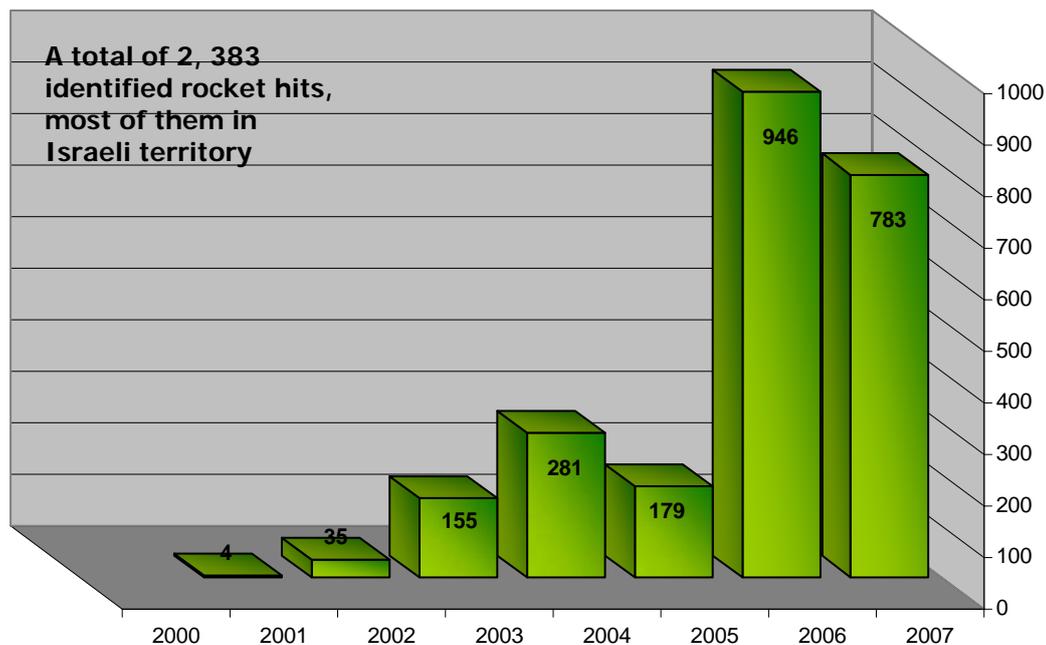
16. The rocket fire policy of the PFLP is not influenced by political considerations but dictated by its technological and operational capabilities, which are inferior to those of the other organizations. The organization has **Samud rockets**, which have a range of up to seven kilometers (about 4.4 miles). Because of their limited capabilities the organization frequently collaborates with other terrorist organizations.

The Popular Democratic Front for the Liberation of Palestine

17. The rocket fire policy of the PDFLP operating in the Gaza Strip is influenced primarily by its limited technological and operational capabilities. The number of rockets in its possession is unknown, as its ability to manufacture them. Since Hamas took over the Gaza Strip, the organization's terrorist operative wing (the National Resistance Brigades) has claimed responsibility for a number of rocket launchings.

Part III: Nature of the rocket threat, 2000 – 2007

Annual distribution of rocket fire¹⁰



The scope of the attacks during the confrontation

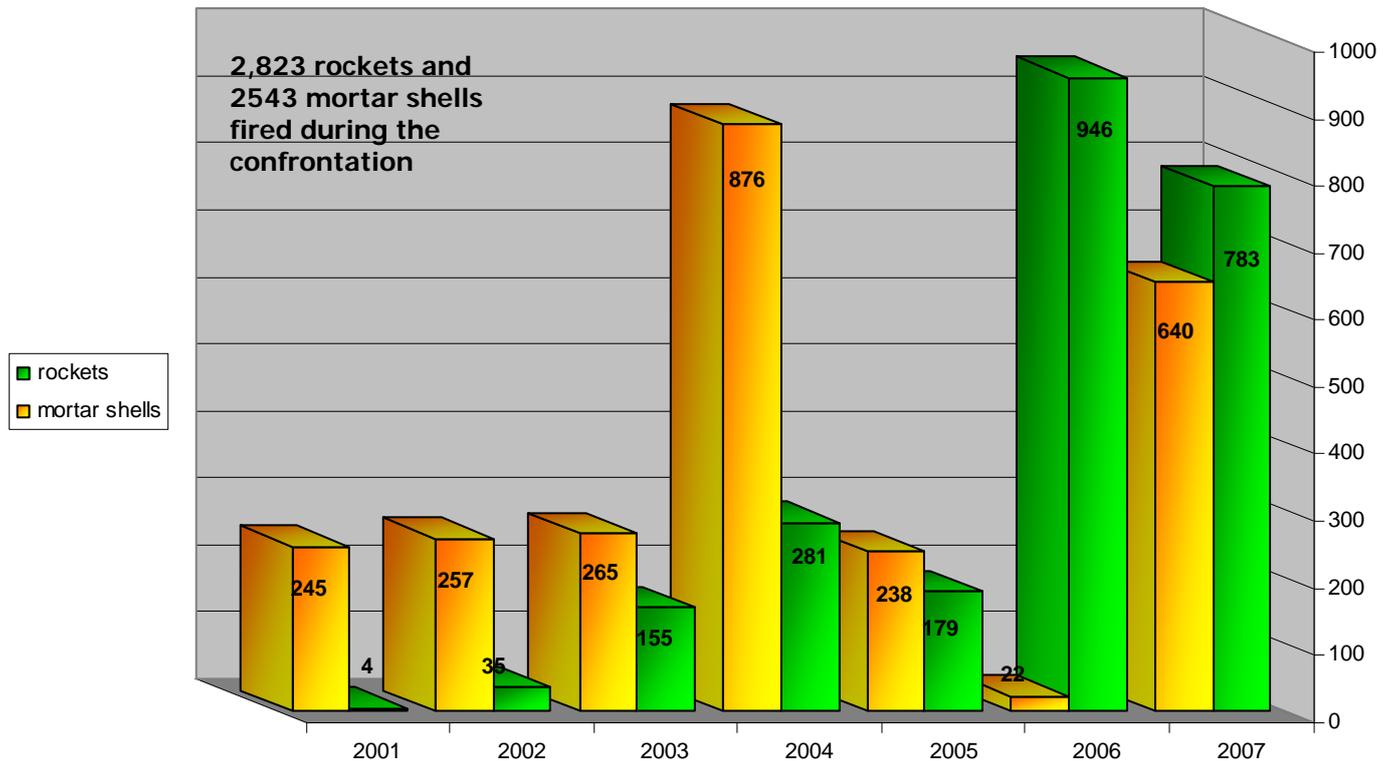
1. **The first rocket attack was apparently on April 16, 2001, when a rocket, identified at the time as a mortar shell, was fired at Sderot.** The following graph illustrates a sharp increase in rocket attacks in 2006 and 2007, after the Israeli disengagement from the Gaza Strip.

2. During the seven years of the current confrontation, there was a total of 2,383 identified rocket hits, the attacks aimed primarily at civilian targets. In 2001, when the terrorist organizations began firing rockets, they clearly

¹⁰ As of the end of November 2007.

preferred attacking the western Negev towns and villages and paid less attention to the Israeli towns and villages in the Gaza Strip (before the disengagement), which they usually attacked with mortar shells. Policies of rocket and mortar shell attacks were not always coordinated, as the graph shows.¹¹

A comparison of rocket and mortar shell fire during the confrontation



How and where rockets are launched

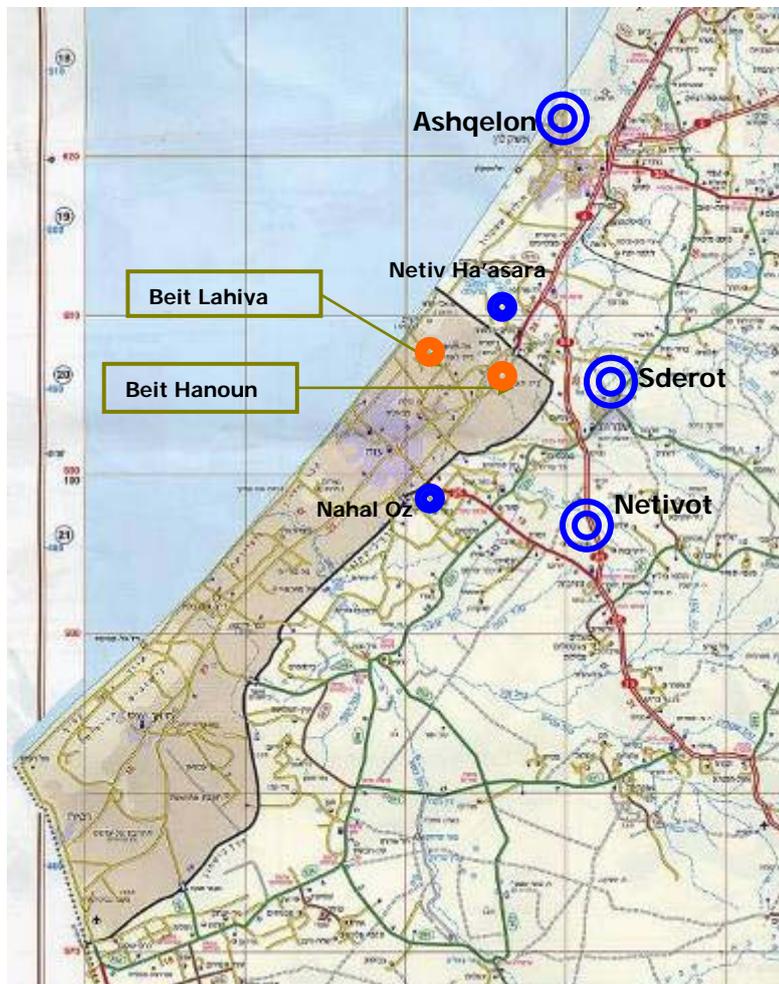
3. Rockets are launched from open spaces or from urban areas (such as yards, alleys, ruins of buildings, etc.). **That turns Palestinian civilians into human shields** with the intent of increasing the survival potential for the launchers themselves. In most cases the squads drive to the launch sites, i.e., most of the rockets are launched close to roads for easy access and escape.

¹¹ Mortar shell fire policies will be analyzed below.

4. **Preferred launch sites** are the northern Gaza Strip (the areas around Beit Lahia and Beit Hanoun), because they are close to important population centers in the western Negev, they are easily accessible and closest to Sderot (the preferred terrorist organization target) and Ashqelon (the target they seek to reach).

5. **The city of Sderot** is the central target for terrorist organization rocket fire because it is the most densely populated towns and village **within current rocket range**. Secondary targets are the towns and villages close to the Gaza Strip. Further afield are **Ashqelon and strategic facilities near it**, which are at the very end of the range of the terrorists' independently produced rockets. Ashqelon is **not yet** under permanent threat of rocket attacks as is Sderot but the terrorist organizations **seek to change the situation**. That is because the organizations have small stocks of rockets and they prefer to keep them for escalation, whether they initiate it themselves or whether it comes in response to an Israeli military action.

Rocket launching sites in the northern Gaza Strip and prominent targets



6. Rocket launching stages:



The target is chosen.



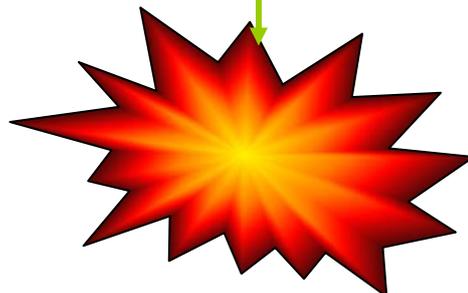
Rockets are manufactured or acquired and moved to the launching site.



The launchers are positioned.



The squad arrives at the launching site (sometimes remote controls are used).



The rocket is fired and the squad flees.

The scope of the attacks and factors influencing them¹²

7. Below are the details of rocket fire during the past seven years. It includes an examination of each individual year and an analysis of the factors which in our assessment influenced both the scope of the rocket fire and the terrorist organizations' policies.

2000

8. The Palestinian terrorist campaign (*intifada*) began in September 2000. During its first months attacks centered around shootings and the beginning of suicide bombings. **Rocket and mortar shell fire were still not used.**

2001

9. **On January 30 the first mortar shells were fired at the towns and village of Netzarim in the central Gaza Strip** (which was evacuated during the disengagement). **On April 16 the first rockets were apparently fired at Sderot** although at the time the Israeli media reported them as mortar shells.

10. At the **beginning of November** both Hamas and the Israeli daily newspaper Yediot Aharonot reported that the previous week Hamas had fired a Qassam 1¹³ rocket at Sderot. It was done to test the operational capability of a rocket manufactured locally. Hamas officially marks October 26 as the first rocket launch. The range of the Qassam 1 is three kilometers (a little under 2 miles). Since then there have been significant technological improvements in rocket manufacture. All rockets fired by the Palestinian terrorist organizations

¹² As of October 31, 2007.

¹³ The **Qassam 1** is manufactured by Hamas and named for sheikh Izzedine al-Qassam, a Syrian Muslim scholar and a standard bearer for Arab-Muslim-Palestinian radicalism who was active in the northern Samaria during the British Mandate and was killed in 1935. He became an important mythical figure and inspiration for Palestinians, especially the Hamas movement.

into Israeli territory are called Qassams by Israelis and sometimes by the foreign media.



Rocket launching in a movie broadcast to mark the third anniversary of the first launch (Al-Arabiya TV, October 26, 2004).

11. In 2001 there was **a total of four identified rocket hits**. The number fired may have been greater, since at that time no clear distinction was made between rockets and mortar shells.

Hammas announces the launching of the first rockets

تجاربها جيش الاحتلال ينظر بخطر باغة إلى إنتاج حماس لصواريخ ونجاح
 أجرت في نهاية قالت صحيفة يديعوت أحرونوت الصهيونية اليوم إن حركة حماس
 "قسام 1" - الأسبوع تجربة ميدانية هي الأولى من نوعها لصاروخ من إنتاجها
 وقذف الصاروخ باتجاه مستوطنة سدروت لكنه سقط في منطقة مفتوحة في إحدى
 -المستوطنات في المنطقة - كما زعمت الصحيفة
 لأول مرة أمام وسائل الإعلام ثلاث صواريخ من هذا هذا وكانت حماس قد عرضت
 . أمس أنه في يوم الجمعة جرت التجربة الأولى النوع. ولكن صحيفة يديعوت علمت
 مفتوحة في إحدى مستوطنات الجنوب واكتشفت شظايا الصواريخ في منطقة
 قذيفة هاون ولكن بعد الفحص اتضح واعتقدوا في الجيش بداية أن الحديث يدور عن
 ذلك أن الهدف كان سدروت أن الحديث يدور عن صواريخ. و أعلنت حماس بعد
 الخطورة. حسب تقديرات وفي الجيش الصهيوني ينظرون إلى هذا التطور بمنتهى
 يحتوي على مواد ناسفة أولية فإن مدى الصاروخ هو نحو أربعة كيلو مترات. وهو
 الفلسطينيون في زيادة مدى بقدر قذيفة هاون. ويخشى الجيش الصهيوني أن ينجح
 الكيان إلى خطر الصواريخ الجديدة الأمر الذي يعرض عدة مستوطنات داخل
 الهاون الإصابة - وخاصة إذا انتقلت الصواريخ إلى الضفة. ومدى قذائف
 الفلسطينية هو 1.5 كم تقريبا.

The announcement as it appeared on the Hamas Website following the first rocket fired at Sderot at the end of October 2001
www.palestine.info.net/arabic/palestoday/dailynews/2001/nov01/1_11/details1.html

Translation

"The occupation army regards the manufacture of rocket and the success of their trial runs as very serious.

Exclusive

The Zionist newspaper Yediot Aharonot reported today that at the end of last week Hamas carried out the first operational test of rocket [fire], manufactured by the movement and called **Qassam 1**. The rocket was launched at the towns and village of Sderot but fell in an open field in one of the neighboring towns and villages, as claimed by the newspaper.¹⁴

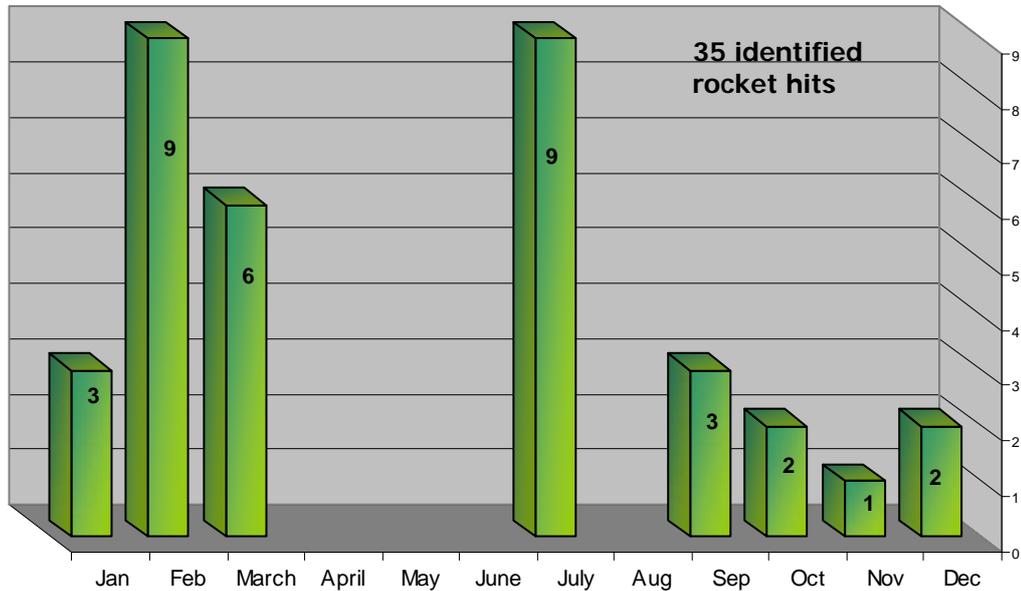
Hamas has already displayed three such rockets through the media, but Yediot Aharonot only found out yesterday that the first test was carried out last Friday. Fragments of the rocket were found in an open field of one of the towns and villages in the south. The army [i.e., the IDF] thought at first that they belonged to mortar shells, but examination showed they belonged to rockets. **Hamas later announced that Sderot had been the target.**

The Zionist army takes this development very seriously. According to first evaluations, the range of the rockets is four kilometers [just under 2.5 miles] and its warhead carries the same amount of explosives as a mortar shell's. The Zionist army is afraid that the Palestinians will increase the range of the new rockets, placing the towns and villages in the [Zionist] entity in danger, especially if rockets are transferred [from the Gaza Strip] to the [West] Bank. The range of Palestinian mortar shells is approximately 1.5 kilometers [a little less than a mile]."

¹⁴ Hamas calls all the Israeli population centers within the green line "towns and villages," regardless of age, size and official status.

2002

Rocket fire in 2002

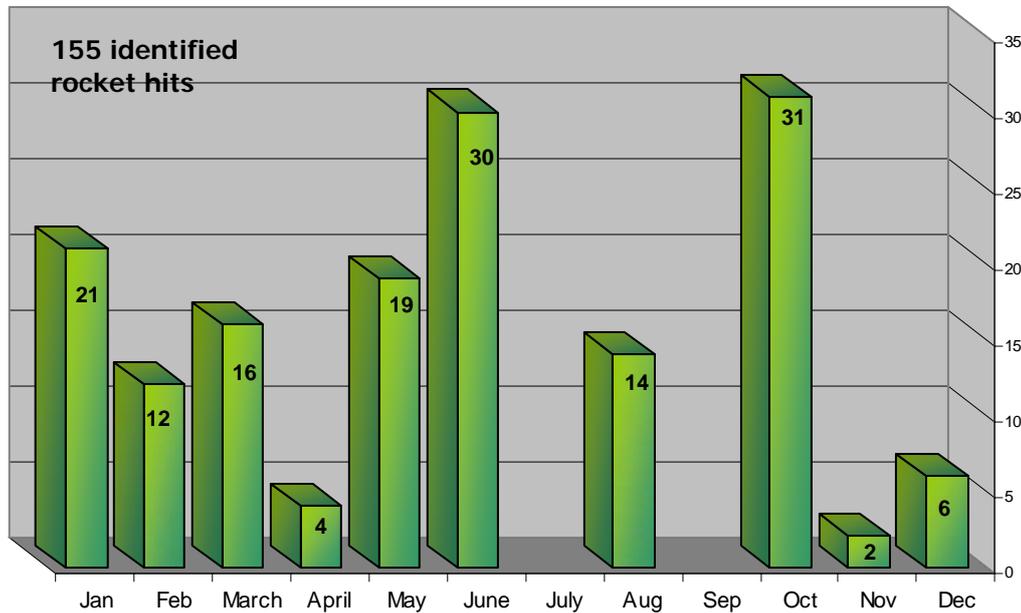


12. In 2002 the Palestinian terrorist organizations in the Gaza Strip began equipping themselves with large quantities of homemade rockets and mortar shells. Hamas developed the Qassam 2, which had a range of 6-7 kilometers (3.7-4.3 miles). The first identified Qassam 2 hit occurred on February 10.

13. During 2002, when suicide bombing terrorism peaked and Operation Defensive Shield was carried out in Judea and Samaria, there were 35 identified rocket hits, most of them close to towns and villages in the western Negev, some near towns and villages or IDF bases in the Gaza Strip. Nine rockets fell in both February and July, the highest numbers for 2002.

2003

Rocket fire in 2003

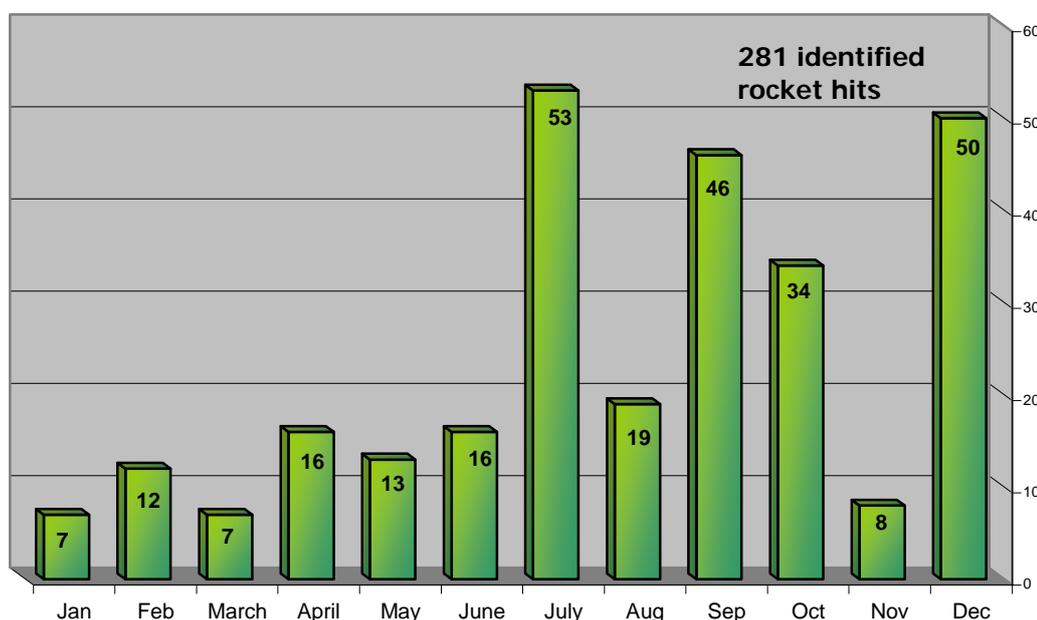


14. In 2003 the homemade rockets were technologically upgraded and the trend toward more rocket fire continued. There were 155 identified hits during the year, most of them (about 80%) aimed at Israeli towns and villages in the western Negev. **Only a small number of them were fired at Israeli towns and villages in the Gaza Strip**, which were targets for short-range mortar shells and lethal attacks along the roads leading to the towns and villages.

15. **Most of the rockets, 30-31 per month, fell during June and October. On June 26 a cease-fire was announced by Abu Mazen in the wake of the Aqaba summit meeting on June 4.** As a result, no rockets were fired in July. It began again in August when the cease-fire collapsed, and peaked in October.

2004

Rocket fire in 2004



16. In 2004, the year before the disengagement, there was a sharp rise in rocket fire from the Gaza Strip. During the year there were 281 identified rocket hits, most of them falling near Israeli towns and villages in the western Negev. During March and April, Hamas leader Ahmed Yassin and his successor, Abdel Al-Aziz al-Rantisi were killed in targeted attacks. After their deaths the relative calm continued until July, during which rocket fire reached the highest level of the three years of attacks.

17. The rise in the amount of rocket fire led to casualties and drew the IDF into intensive counterterrorist activities in the Gaza Strip. On September 30, after two children in Sderot were killed by rocket fire, the IDF undertook a broad action in Beit Hanoun, Beit Lahia and the Jabaliya refugee camp in the northern Gaza Strip. During September and October there was a sharp increase in the amount of rocket fire (46 identified hits in September and 34 in October, the month which saw the authorization of the disengagement plan by the Israeli Knesset).

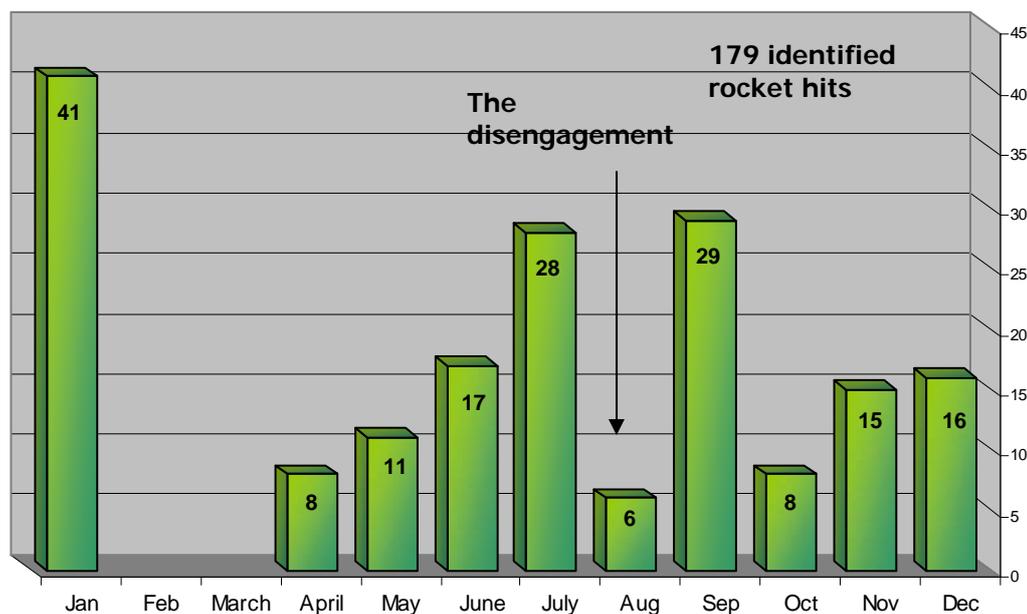
18. In November, the month in which Arafat died, there was a significant decline in the number of rockets fired (eight, as opposed to 34 in October). In December the number increased again and reached 50 identified hits.



Two terrorist operatives loading rockets onto a vehicle marked UN (Photo taken by an Israeli unmanned aircraft, October 1, 2004, released by the IDF spokesman). The terrorist organizations use emergency, press and UN vehicles to carry out terrorist operations (as documented by ITIC Information Bulletins). 2005

2005

Rocket fire in 2005



19. During 2005, the year of Israel's withdrawal from the Gaza Strip, there was a significant decline in the amount of rocket fire compared with the previous year. **The trend toward the increase which had begun in 2001 was temporarily halted.** The greatest amount was in January and it ceased in February and March, about half a year before the disengagement, following internal Palestinian developments.

20. After Arafat died there were internal Palestinian deliberations, at the end of which, on March 17, the Cairo Agreement proclaimed a lull in the fighting. Most of the terrorist organizations agreed to it, including Hamas and the PIJ. To enforce the ban on rocket fire, Palestinian security forces loyal to Abu Mazen were deployed at the traditional launching areas in the northern and southern Gaza strip. The terrorist organizations exploited the lull to rearm themselves by stepping up weapons production and smuggling, training, learning operational lessons and planning new attacks. In March no rockets were fired and in April the relatively small number of eight rockets was fired.

21. However, **the lull was short-lived.** During the months which directly preceded the disengagement **there was a gradual increase in the scope of rocket fire as the disengagement approached.** It peaked in July, **during which 28 rocket hits were identified.** That enabled the Palestinian terrorist organizations to claim that **Israel was withdrawing because of the pressure of their terrorist attacks ("resistance").** During the disengagement, which was carried out in August, the rocket fire declined to six identified hits, apparently not to disrupt the evacuation of the towns and villages and the withdrawal of the IDF from the Gaza Strip. However, in September, **after the disengagement, the number of rocket fire increased to 29 identified hits, accompanied by "victory celebrations" organized by Hamas.**

22. The increase in the number of rockets fired after the disengagement was accompanied by a **widening of the circle of Israeli towns and villages within range** as the terrorists moved into sites in the northern Gaza Strip in regions near evacuated towns and villages and improved their technology. The

rocket fire carried out during the last four months of the year included hits in **Ashqelon** (September and December) and the basic training camp at Zikim, south of Ashqelon (December).

23. In September, during which the incidence of rocket fire increased, an internal Palestinian event occurred which greatly influenced Hamas' rocket firing policies. On September 23 the movement held a "victory rally" at the Jabaliya refugee camp, located on the outskirts of Gaza City. It included a "military" show put on by terrorist operatives in which weapons were displayed, including rockets. During the show there was a terrific explosion which **killed 19 Palestinians and wounded more than 80, almost twice the number of Israelis killed during all the years of rocket fire**. The explosion was caused by a technical accident occurring in the vehicle carrying the Qassam rockets.

24. As usual, Hamas was quick to falsely accuse Israel and immediately blame it for responsibility for the explosion. Several hours later there was a massive rocket attack aimed at the western Negev towns and villages, during which there was an exceptional barrage of 15 rockets fired simultaneously at Sderot. A hit was also identified near the power station in Ashqelon. On September 25 the attack stopped, having been carried out by various terrorist organizations, especially Hamas.¹⁵



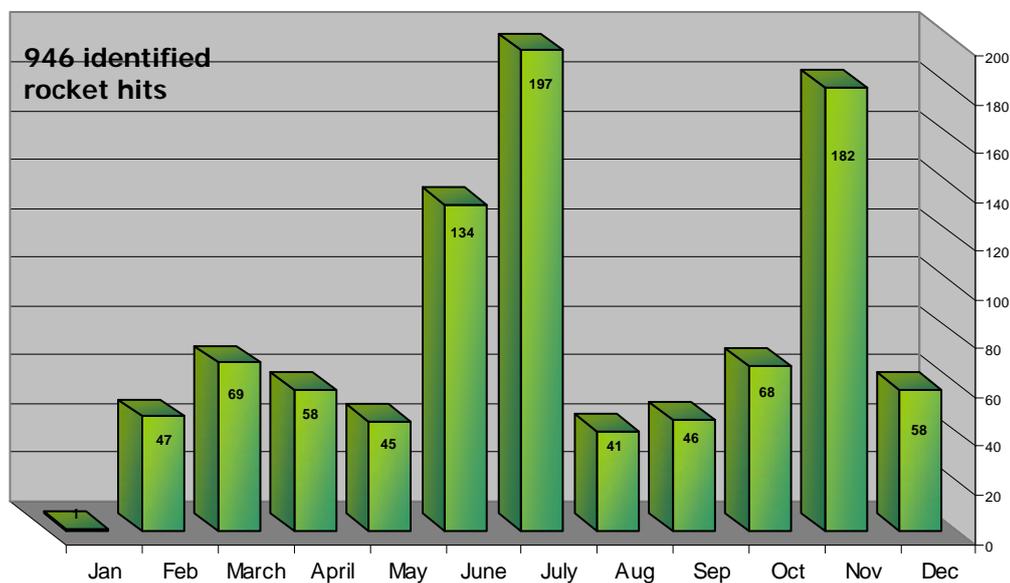
Hamas press conference where Israel is falsely accused of responsibility for the explosion in Jabaliya (Al-Jazeera TV, September 23, 2005).

¹⁵ For further information see our September 28, 2005 Bulletin entitled "Escalation of Palestinian terrorism after the disengagement," at http://www.terrorism-info.org.il/malam_multimedia/html/final/eng/eng_n/pa_esc_te.htm and http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/pa_esc_te.pdf.

25. **Hamas** was prominent among the organizations launching rockets in 2005 until the Jabaliya incident in September. **Afterwards, Fatah factions and the PIJ launched the greatest number of rockets.** Hamas stopped its direct involvement in rocket launching following the internal and external criticism it received for having harmed the civilian Palestinian populace, and later because of its governmental commitments.

2006

Rocket fire in 2006



26. In 2006 there was a **marked increase** in rocket fire into Israel. During the year there were **946 identified hits**, as opposed to 179 in 2005 and 281 in 2004, which until then was the highest number recorded. From February on there were between 45 and 70 identified hits per month, and in June, July and November the amounts of rockets fired were unprecedentedly high. At the same time there was a **significant decrease** in the amount of mortar shell fire, which had focused primarily on the Israel towns and villages in the Gaza Strip before the disengagement.

27. After the disengagement Hamas strengthened its grip on the Gaza Strip and **determined the policy of rocket fire from it.** It did so even when

because of internal Palestinian considerations, the organization preferred to have the rockets fired by **other terrorist organizations**. In our assessment, the increase in rocket fire in 2006 was primarily the result of the **operational and political ease** with which rockets could be manufactured in and fired from the Gaza Strip after the disengagement, when Hamas became the dominant force.

28. **During 2006** a new level of several dozen hits per month was established, although there were certain months which showed a drastic increase of up to 200 identified hits. Some of the more conspicuous events were the following:

1) On **February 3** a rocket hit a home in Kibbutz Karmia (northwest of the Gaza Strip) and injured a baby girl. In response the IDF increased artillery fire at the regions in the northern Gaza Strip from where the rocket had been fired. At the same time, the Israeli Air Force attacked several targets killing several senior PIJ and Fatah-Al-Aqsa Martyrs Brigade terrorist operatives. The counterterrorist activities of the Israeli security forces led to an increase in rocket fire during February and March, with 69 identified hits in March.

2) On **March 28**, Election Day in Israel for the 17th Knesset, for the first time two Qassams and a standard Grad 122 mm rocket¹⁶ were fired at Ashqelon. **Since then from time to time homemade rockets have been fired at Ashqelon, a situation unknown in previous years.**¹⁷ On July 4 an improved Qassam rocket hit close to a high school in the middle of the city, on July 5 one fell in an open field near a residential neighborhood and August 14 a standard Grad hit the Ashqelon marina.

¹⁶ The rocket in question was a Grad with a maximum range of 20.4 kilometers (12.7 miles).

¹⁷ In general, they are homemade rockets with a double motor to increase range.



Ashqelon comes within rocket range: an extended-range Qassam hits the center of the city (Amir Cohen for Reuters, July 4).

3) On **June 9, PRC head Jemal Abu Samhadana** was killed, leading to **an unprecedented escalation in rocket fire** during June and July (134 identified hits in June and 197 in July). **During June, both rocket fire and intensive terrorist activity from the Gaza Strip increased, peaking with the June 25 attack on an IDF force and the abduction of Corporal Gilad Shalit.**¹⁸ The IDF's intensive activities both the northern and southern Gaza strip following the abduction (Operation Summer Rains) led to another escalation in rocket fire.

4) **During the second Lebanon war (July-August) there was massive rocket fire from the Gaza Strip, peaking in July with 197 identified hits.** There were somewhat fewer rockets as the war ended in August.

5) **A broad-scope IDF action in the Gaza Strip, November 1-7, led to increased rocket fire.** During the action, called Operation Autumn Clouds, the Palestinian terrorist organizations made a concentrated effort and 182 rockets were fired during November. A few hours after the end of the action Hamas launched a barrage of four rockets at Ashqelon. One of them fell near a school in the southern part

¹⁸ For further information see our June 27 and 28, 2006 Bulletins entitled "IDF force attacked and soldier abducted near Kibbutz Kerem Shalom" and Updates 1 and 2 at http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/kerem_shalom_e.pdf, http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/kerem_shalom_be.pdf, and http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/kerem_shalom_ce.pdf.

of the city and was identified by the IDF as an improved homemade rocket with a double motor.

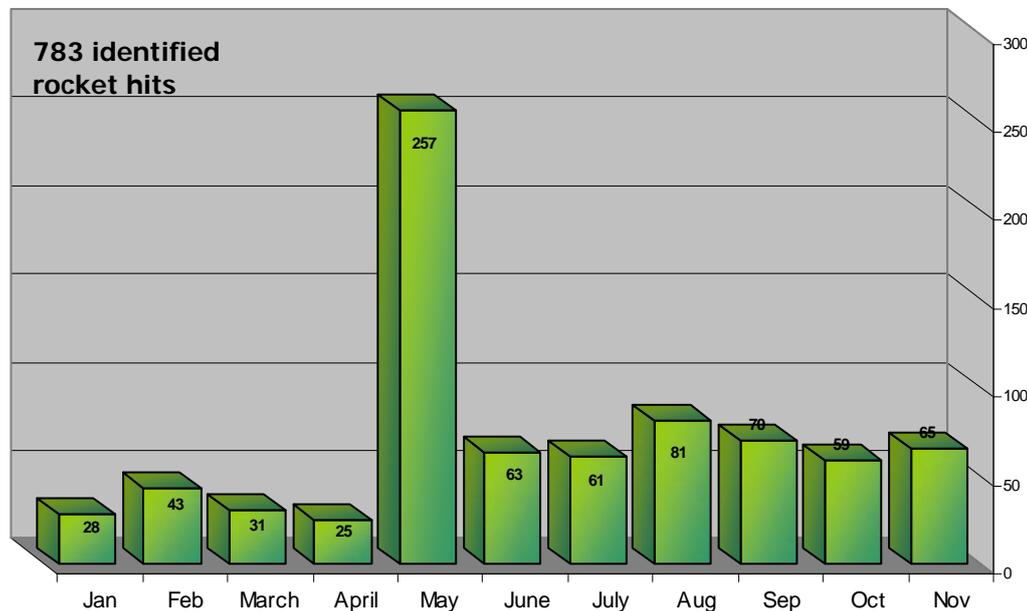
6) On **November 26** a cease fire went into effect following an understanding between Israeli Prime Minister Ehud Olmert and Palestinian Chairman Abu Mazen. Despite the official announcement, rocket fire continued, although the scope was relatively smaller. Responsibility for most of the incidents was claimed by Fatah groups in the Gaza Strip which had publicly rejected participation in the agreement. In December rocket fire returned to its “routine” level and there were 58 identified hits, but the routine was far higher than in previous years.



**Home in Kibbutz Karmia after a direct rocket hit
(Amir Cohen for Reuters, February 3, 2006).**

2007

Rocket fire in 2007



29. In **2007** (as of the beginning of December) **there has been widespread rocket fire** which, in our assessment, will reach the levels of 2006, even though so far the IDF has not carried out any particularly large action in Gaza Strip and there has not been a regional war like the second Lebanon war. As of the end of November a total of **783 rocket hits** had been identified. During the second half of the year there was an average of 60 to 80 hits a month.

30. There was a sharp increase in May when the internal confrontation between Hamas and Fatah in the Gaza Strip worsened. There were **257 identified hits, the highest number of any month during the seven years of rocket attacks**. The attacks claimed the lives of two Sderot residents, and were a clear example of how **internal Palestinian events** in which Israel has no involvement **influence terrorist organization rocket fire**. **Mussa Abu Marzuq**, deputy head of Hamas' "political bureau," **claimed that Hamas had fired rockets at Israel to end the violent clashes with Fatah** (Felesteen, June 9, 2007).

31. Since Hamas took over the Gaza Strip it has followed a policy of **restrained rocket fire** dictated by its objective **of strengthening its grip on the Gaza Strip**. The Izzedine al-Qassam Brigades, Hamas' terrorist

operative wing, **avoid direct involvement** in rocket fire and **focus on firing mortar shells** at Israeli towns and villages located close to the border and at military targets close to the security fence. However, political considerations have so far not motivated Hamas to put an end to rocket fire from the Gaza Strip, in fact, quite the opposite is true. Hamas permits and even **encourages** the other terrorist organizations (the PIJ, PRC, Fatah groups and smaller organizations) to continue their rocket fire. As a result, “routine” rocket fire means between 60 and 80 identified hits a month, including after the Hamas takeover.



A home in Sderot which suffered a direct hit during a Hamas rocket attack (Amir Cohen for Reuters, May 15, 2007).

32. Since the Hamas takeover, most of the rockets from the Gaza Strip are launched by **the PIJ**, which in the past carried out a significant number of suicide bombing attacks. Thus, for example, at the beginning of September PIJ terrorist operatives boasted that their rocket fire was aimed at disrupting the beginning of Israel’s school year.¹⁹ As a result, two rockets hit the city on the morning of September 2, and an exceptional barrage of nine rockets on September 3. On October 26 and 27 the organization launched rockets into Israel and announced that they were meant to commemorate the death of Fathi Shqaqi, the organization’s leader killed in a pinpoint attack in October 1995.

¹⁹ For further information see our September 5, 2007 Bulletin entitled “Palestinian Islamic Jihad Website and a spokesman claimed the volleys of Qassam rocket fire at Sderot were launched to mark the beginning of the school year,” at http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/html/pij_e_spokesmen.htm.

33. On the night of September 10 an **improved Qassam rocket** was launched from the Beit Lahia region by **the PIJ** and **hit the IDF's basic training camp at Zikim**. The explosion inflicted varying degrees of injuries on 50 soldiers (four were seriously wounded, seven suffered moderate wounds and 39 were slightly wounded).²⁰



Remains of the Quds 3 rocket which fell on the basic training camp at Zikim, injuring 50 soldiers.



Joy in the Gaza Strip following the attack on the soldiers at the Zikim base: handing out cake and candy to passersby (Ramattan News Agency, September 11, 2007).

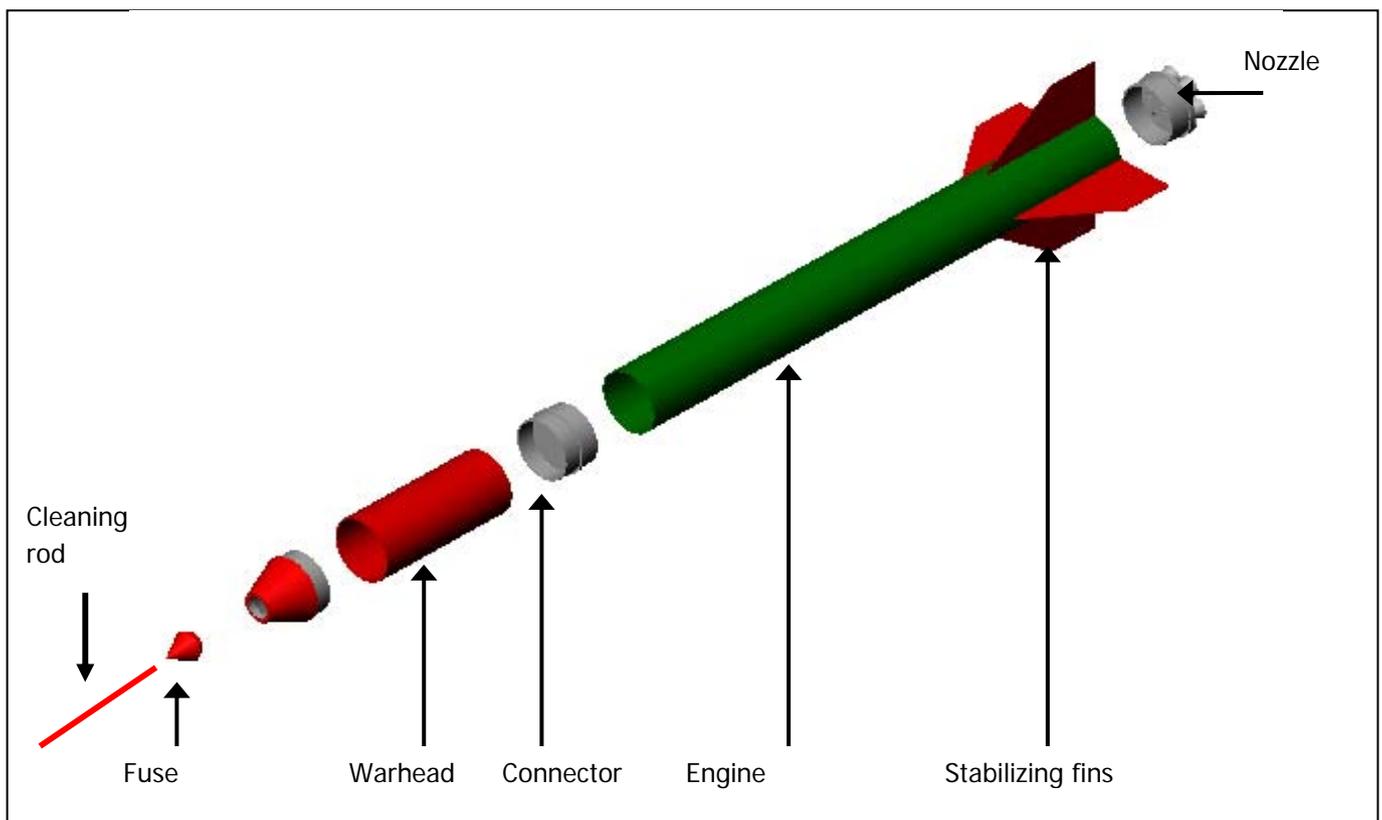
For further information see our September 11, 2007 Bulletin entitled "A rocket fired at the northern Negev on the night of September 10 hit the IDF base at Zikim, wounding 50 soldiers," at http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/html/zikim_e0907.htm.

Part IV: Technological aspects

General description

1. The rockets manufactured by the Palestinian terrorist organizations are simple arms without any guidance systems. They are made of easily obtained metal pipes (such as water pipes) filled with explosives and propellants, which, in most cases, are improvised and made of readily-available household supplies (such as sugar and agricultural fertilizers). The equipment used to manufacture the rockets is not technologically advanced, and it is widely used in civilian workshops and metalworking industries in the Gaza Strip.

Typical structure of a rocket



2. **The rocket hits are random.** It is extremely difficult to aim them at a specific target, and therefore they mostly target population centers. **The terrorist organizations' "successes" are incidental** (the more rockets fired, the greater the chances of hitting something). When a direct hit does occur, however, it may cause significant damage and claim human lives.

3. After the launch, the launchers are usually abandoned on the ground or loaded with more rockets.²¹ In most cases, the Palestinian terrorist organizations use improvised stationary single-rail launchers. They are made of several interconnected metal rods driven into the ground. Usually only single rockets are fired in each attack. About 25% of the time, several rockets are fired simultaneously. On rare occasions, the rockets are fired from vehicles.

4. Over the years, each major terrorist organization operating in the Gaza Strip has developed its own independent rocket manufacturing industry, each attempting to develop unique models of its own. The names given to those rockets are symbolic, and reflect the terminologies used by the organizations. There are, however, **slight technical differences** between the rocket models. **Hamas has the most advanced manufacturing systems**, so that when it directly participates in rocket attacks, a significant increase in scope can be expected.

5. The independent rocket-manufacturing project began in May 2001 (coinciding with the first launches), motivated by the desire to **imitate the balance of deterrence** created by Hezbollah which, the terrorist organizations felt was a leading cause of the IDF's unilateral withdrawal from the security zone in south Lebanon (May 2000).²² The independent manufacturing industry **improved** throughout the violent confrontation,

²¹ The launchers are left in place because if removed, their weight would make it difficult for the launching squad to evacuate the area quickly. In several incidents, squads in the northern Gaza Strip have been seen reloading used launchers. In some cases, children have been sent to the launch sites to reload them.

²² Hezbollah's rocket arsenal relies consists of rockets provided by Syria and Iran. The difficulty of smuggling rockets into the Gaza Strip forces the terrorist organizations to manufacture most of their arsenals themselves.

eventually becoming an extensive production system enabling the terrorist organizations to use rockets of their own manufacture over extended periods of time.

Technical information on independently manufactured rockets

Hamas's Qassam rockets



A Qassam rocket (Al-Aqsa TV, September 17, 2007)

6. Hamas has a rocket industry which includes workshops and lathes located inside densely populated civilian centers. The maximum range of the Qassam rockets it manufactures is about **10 km** (a little more than 6 miles). Hamas has also produced several improved rockets **with an engine split** into two parts, giving them a range of **over 12 km** (about 7 ½ miles). **Thus the Israeli cities of Ashqelon, Netivot and Sderot as well as most of the other population centers in the western Negev, are all within their range.**

7. The Qassams have a basic, “classical” structure, similar to other standard rockets worldwide. They are composed of two main segments: the engine and the warhead. The warhead of the rocket contains a fuse and explosives that are meant to detonate on impact.

8. Most of the raw materials used in producing the rockets come from **civilian industries**, and include steel pipes and plates, cast iron and

aluminum. Early in the development process, the propellants and warhead were made of readily-available materials, primarily nitrous fertilizers, **imported into the Gaza Strip for agricultural use.** Recently, in an effort to improve the rockets' technical capabilities, more extensive use has been made of standard materials, and attempts to manufacture them in the Gaza Strip have become more frequent.

9. Since the use of independently manufactured rockets began (2001), they have been considerably improved:

- 1) **Increasing the range:** The first Qassam 1 rockets had a range of about 3 km (a little less than 2 miles), while today their range is about 10 km.
- 2) **Structural materials:** There has been a significant improvement in the production and assembly of the rockets' metal parts.
- 3) **Composition and structure of propellants:** In recent months significant progress has been made in manufacturing propellants (the material causing the rocket to accelerate), and higher quality rocket engines are being manufactured.
- 4) **Composition and performance of warheads:** There have been no significant changes in the composition of the explosives. However, the warheads have recently been supplemented with metal pellets, increasing both damage and casualties.



Qassam 2 rockets

10. Hamas currently has four major rocket models at its disposal:

- 1) **Qassam 2:** Rockets with an improved propellant and ranges of about 8-10 km (almost 5 to a little more than 6 miles), threatening the southern neighborhoods of Ashqelon and the neighboring areas.

Technical specifications:

- ☑ **Weight:** 30-40 kg (66-88 lbs)
- ☑ **Diameter:** 115 mm (about 4 ½ inches)
- ☑ **Length:** 180 cm (almost 6 feet)
- ☑ **Maximum range:** 7-10 km (almost 4 ½ to over 6 miles)
- ☑ **Weight of explosives in warhead:** about 4 kg (8.8 lbs)



2) **Short Qassam 2:** Rockets usually launched at Sderot and population centers in the western Negev. They account for most of the rockets launched by Hamas.

Short Qassam 2

Technical specifications:

- ☑ **Weight:** 35 kg (77 lbs)
- ☑ **Diameter:** about 115 mm (about 4 ½ inches)
- ☑ **Length:** 180 cm (almost 6 feet)
- ☑ **Maximum range:** 6-7 km (3 ¾ to almost 4 ½ miles)
- ☑ **Warhead weight:** about 8 kg (17.6 lbs)

3) **Long Qassam 2:** Designed mainly to threaten the city of Ashqelon and nearby strategic facilities. It is a rocket with increased length or improved explosives.

Technical specifications:

- ☑ **Weight:** about 50 kg (110 lbs)
- ☑ **Length:** 250 cm (a little over 8 feet)
- ☑ **Diameter:** 115 mm (about 4 ½ inches)
- ☑ **Maximum range:** 10 km (a little over 6 miles)
- ☑ **Weight of warhead:** 8 kg (17.6 lbs)

4) **Rockets with a split engine:** A reproduction of standard Grad rocket types. The rockets were first used during Operation Summer

Rains (June 2006), following the abduction of Gilad Shalit. So far their use has been limited.

Technical specifications:

- ☑ **Weight:** 40-50 kg (88-110 lbs)
- ☑ **Length:** 260 cm (more than 8 ½ feet)
- ☑ **Diameter:** 115 mm (about 4 ½ inches)
- ☑ **Maximum range:** about 10 km (a little over 6 miles)
- ☑ **Warhead weight:** 10 kg (22 lbs)

11. Hamas invests considerable effort into the rockets' technical development, including:

- 1) **Improving the technical capabilities**, primarily **range and shelf life**. At present, the shelf life is relatively short (several months), making the rockets impossible to stockpile. Attempts are also being made to improve reliability and precision.
- 2) **Increasing the manufacture rate** by improving production lines and expanding manufacturing capabilities.
- 3) **Increasing stockpiles:** In our assessment Hamas' has an arsenal of several hundred rockets, mostly for ranges of up to 10 km.²³ Improving shelf life will also increase stockpiles.

12. Hamas also smuggles **standard rockets** from Egypt via tunnels under the border road (the Philadelphi route). Hamas has at its disposal standard 122 mm Grad rockets, with a range of up to 20 km (more than 12 miles). The advantages of standard rockets include improved range, reliability and shelf life. Hamas also confiscated several Grad rockets when it took over the Gaza Strip in June 2007.

²³ Based on information for the rockets fired at western Negev population centers during the last round of confrontations between Hamas and Fatah. A total of 223 rockets were fired between May 15 and June 2, 2007, about 40% by Hamas squads.

The PIJ's Quds rockets

13. The PIJ has **its own industry for manufacturing Quds rockets** but its production capability is inferior to that of Hamas.²⁴ The range of the PIJ's rockets is slightly shorter than Qassams. Most Quds rockets attain ranges of about 9 km (a little over 5 ½ miles) compared with Hamas' 10. Furthermore, the organization has **several standard rockets** which it smuggles from Egypt. On March 28, 2006, the organization made its first (unsuccessful) attempt to fire a standard 122 mm rocket with a range of about 20 km (over 12 miles) at the Ashqelon industrial zone.

14. The PIJ's **manufacturing rate is lower than that of Hamas**. That is usually felt during a period of escalation, when the organization wants more rockets. **In “normal” times**, however, when few rockets are fired, **the PIJ is capable of launching small numbers of rockets over extended periods of time**. The organization is engaged in technological development to increase the range and number of its rockets. In early 2007, a **multiple rocket launcher** mounted on a vehicle was introduced. While the organization has launched rockets from vehicles on several past occasions, the extent of its use of such means is unknown. So far, it is the only organization to use vehicles for launching rockets.

²⁴ A spokesman of the Jerusalem Battalions (the PIJ's terrorist-operative wing) said that the organization's engineering and technology unit was hard at work on the development and improvement of the “rockets weapon” to surmount the difficulties posed by the Israeli security forces (the security fence, fortifications, and considerable presence of troops on the ground). **The spokesman said that the rockets in the organization's possession were enough to fire “five rockets a day over two years”** (Al-Quds al-Arabi, November 5, 2007).



A demonstration launch from a multiple rocket launcher mounted on a vehicle, presented by the PIJ (Al-Jazeera TV, January 21, 2007).

15. The PIJ manufactures several models of Quds rockets, differing mostly in length and maximum range. The overall structure of the rocket is very similar to Qassams.



Muhammad Dahdoukh, a senior PIJ operative killed by Israel in a targeted killing (May 20, 2005). The inscription on the rockets reads: “Medium-range Quds [rocket]”. The organization frequently uses such rockets to attack population centers in the western Negev.



Class A Quds 2

16. Following are the rocket models of the PIJ:

1) Class A Quds 2:

- ☑ **Weight:** 23.5 kg (51.7 lb)
- ☑ **Length:** 150 cm (a little under 5 feet)
- ☑ **Diameter:** 90 mm (3 ½ inches)
- ☑ **Maximum range:** 6 km (3 ¾ miles)
- ☑ **Warhead weight:** 8 kg (17.6 lbs)



Quds 3 rocket (with Hebrew inscription for psychological effect)

2) Class B Quds 2:

- ☑ **Weight:** 33.5 kg (73.7 lbs)
- ☑ **Length:** 110 cm (3.6 feet)
- ☑ **Diameter:** 115 mm (4 ½ inches)
- ☑ **Maximum range:** 7 km (4 1/3 miles)
- ☑ **Warhead weight:** 8 kg (17.6 lbs)

3) Class A Quds 3:

- ☑ **Weight:** 35 kg (77 lbs)
- ☑ **Length:** 130 cm (4 ¼ feet)
- ☑ **Diameter:** 102 mm (4 inches)
- ☑ **Maximum range:** 8.5 km (5 ¼ miles)
- ☑ **Warhead weight:** 6-7 kg (13.2-15.4 lbs)

4) Class B Quds 3:

- ☑ **Weight:** 42 kg (92.4 lbs)
- ☑ **Length:** 200 cm (6 ½ feet)
- ☑ **Diameter:** 127.5 mm (5 inches)

- ☑ **Maximum range:** 9 km (more than 5 ½ miles)
- ☑ **Warhead weight:** 8 kg (17.6 lbs)

Popular Resistance Committees Nasser rockets

17. The PRC use rockets of their own manufacture named **Nasser**. The organization has three main models at its disposal:

1) Long Nasser 3:



- ☑ **Weight:** 30 kg (66 lbs)
- ☑ **Length:** 160 cm (5 ¼ feet)
- ☑ **Diameter:** 90 mm (3 ½ inches)
- ☑ **Maximum range:** 9 km (more than 5 ½ miles)
- ☑ **Warhead weight:** 9-10 kg (19.8-22 lbs)

Long Nasser 3 rocket

2) Short Nasser 3:

- ☑ **Weight:** 25 kg (55 lbs)
- ☑ **Length:** 125 cm (about 4 feet)
- ☑ **Diameter:** 90 mm (3 ½ inches)
- ☑ **Maximum range:** 6 km (3 ¾ miles)
- ☑ **Warhead weight:** 9-10 kg (19.8-22 lbs)



Short Nasser 3 rocket

3) Nasser 4:

- ☑ **Weight:** 40 kg (88 lbs)
- ☑ **Length:** 180 cm (almost 6 feet)
- ☑ **Diameter:** 115 mm (4 ½ inches)
- ☑ **Maximum range:** 9 km (more than 5 ½ miles)
- ☑ **Warhead weight:** 9-10 kg (19.8-22 lbs)



Nasser 4 rocket

Fatah's Al-Aqsa rockets

18. **Al-Aqsa** rockets are independently produced by Fatah groups based in the Gaza Strip. They closely resemble Qassams in form and capabilities.



An Al-Aqsa rocket

19. During a military parade held recently, the organization introduced a new rocket of their own manufacture named **Al-Yasser**, which, they claim, has a range of 15 km (more than 9 miles).



Al-Yasser rockets (Al-Jazeera, November 6, 2007)

PFLP Sumud rockets

20. The organization has rockets named Sumud, with a range of up to 7 km (4 1/3 miles).

Rocket models used by terrorist organizations in the Gaza Strip

Organization	Rocket models and ranges
 Hamas 	Qassam 1: up to 3 km Short Qassam 2: 7-10 km Long Qassam 2: 10 km Qassam-2 with a split engine: about 12 km
 PIJ 	Class A Quds 2: 6 km Class B Quds 2: 7 km Class A Quds 3: 8.5 km Class B Quds 3: 9 km
 PRC 	Long Nasser 3: 9 km Short Nasser 3: 6 km Nasser 4: 9 km
 Fatah 	Al- Aqsa: 6-7 km Al-Yasser: about 15 km (under development)
 PFLP 	Sumud: up to 7 km

Standard Grad rockets

21. In addition to independently-manufactured rockets, several organizations also possess **122-mm rockets (Grad)**, Russian rockets whose production began in the 1960s. They are equipped with standard warheads, with a maximum range of 20.4 km (almost 12 ³/₄ miles) and a payload of 18 kg (17.6 lbs). Their increased range, warhead size and fragmentation system **make them more destructive than independently-manufactured rockets.**

22. Such rockets are similar to those provided by **Iran** and **Syria** to **Hezbollah**, which put them to **widespread use** in the second Lebanon war.²⁵ The rockets in the hands of by the terrorist organizations were smuggled into the Gaza Strip from Egypt.²⁶ Israeli security has repeatedly warned that since the disengagement, **shipments of arms (including Russian-made standard Grad rockets) have arrived in the Gaza Strip, with an increase since the Hamas takeover.**



A Grad rocket of the PIJ taken out of a vehicle hit in an Israeli air strike (photograph courtesy of Israel's Channel 10 TV, June 13, 2006)

23. **The first attempt to fire a Grad rocket into Israel took place on March 28, 2006, the day of the 17th Knesset elections.** It attained a range of about 5 km and dropped in sandy terrain near Kibbutz Zikim (south of Ashqelon). Recently (October 7, 2007), a Grad rocket hit was identified in open territory west of Netivot (a range of about 12 km – almost 7 ½ miles). The terrorist organizations do not yet make extensive, systematic use of the Grad rockets, saving them, in our assessment, for special occasions. **Grad rockets will increase the number of Israeli population centers inside the rockets' range and threaten to civilians and military**

²⁵ Most of the rockets fired by Hezbollah on population centers in Israel during the second Lebanon war were various kinds of 122 mm rockets: high explosive 122 mm, 122 mm Grad with increased range, and 122 mm fragmentation rockets.

²⁶ An explosives expert from the Gaza Strip told the Firas Website that engineering squads in the Gaza Strip could not manufacture such rockets, since only improvised materials were available in the Gaza Strip for manufacturing the propellant (Firas website, January 4, 2007).

installations in the Negev (up to 20.4 km, almost 12 ¾ miles, which includes Nitzanim and Kiryat Gat).



The remains of a Grad rocket fired in May 2006



The first Grad rocket launched

24. Technical specifications of the Grad rockets:

- ☑ **Weight:** 62-66 kg (136.4-145 lbs)
- ☑ **Length:** 280 cm (a little over 9 feet)
- ☑ **Diameter:** 122 mm (almost 5 inches)
- ☑ **Maximum range:** 20.4 km (almost 12 ¾ miles)
- ☑ **Warhead weight:** 18 kg (39.6 lbs)



Left: The remains of a standard 122 mm Grad rocket that landed in Zikim. Right: the crater left by the rocket (March 28, 2006)

Developing and improving technological capabilities

25. Since the first rocket fired in 2001, Hamas and several other terrorist organizations have invested effort to increase rocket manufacture and improve technical capabilities. The improvements focus mostly on **increasing range in order to put more Israeli population centers within reach**. Increasing range also allows rockets to be launched from **deep within the Gaza Strip**, minimizing exposure to IDF surveillance systems and reducing the risk of clashes with IDF forces operating along the border fence.

26. Since the beginning of the conflict, the terrorist organizations have developed **several rocket models** which differ mostly in size. Each new model is heavier than its predecessor, and they are numbered successively. Most of the rockets currently in use are No.2 models. **During the years of the confrontation, the Palestinian terrorist organizations have managed to increase the range of their independently produced rockets from 3 km to about 6-10 km (a little less than 2 miles to 3 $\frac{3}{4}$ - more than 6 miles)**. To improve technological capabilities, the terrorist organizations receive know-how from **Hezbollah and Iran**, which seek to copy the success they had in Lebanon to the Palestinian Authority-administered territories.



A lathe for manufacturing rockets in the Gaza Strip's Zeitun neighborhood after an attack by the Israeli Air Force (Al-Jazeera TV, August 18, 2006).



A shipment of pipes which a Palestinian iron-trader attempted to smuggle before being detained by Israeli security forces at the Erez crossing. Such pipes are used for manufacturing rockets (March 4, 2007).

Stocking and storing rockets

27. For the time being, the rockets' shelf life is **relatively short**, estimated at several months. That means it is not profitable to manufacture large quantities and stockpile them. Furthermore, large stocks stored in central warehouses may become an attractive target for Israeli strikes. Therefore, the terrorist organizations in the Gaza Strip prefer keeping **relatively small stocks of rockets**, which limits their ability to launch large quantities over extended periods of time.

28. The terrorist organizations have **three kinds of stocks**, located in various locations throughout the Gaza Strip:

- 1) **The "routine" stock:** several rockets deployed throughout the Gaza Strip, mostly in houses and warehouses belonging to the terrorist organizations' launching squads. They are ready to be **fired immediately** once orders are given.
- 2) **Additional stock:** rockets deployed in civilian houses and installations, and partly stored in tunnels beneath houses.
- 3) **Dismantled rockets:** in some instances the rocket bodies are stored separately from the propellant. Storing parts separately extends of the propellant's shelf life to a certain degree. When necessary, the parts can be quickly assembled.

29. The inability to maintain large stockpiles of rockets was manifested during the massive rocket attack in May 2007. After about ten days of massive fire (10-40 rockets per day), there was a significant drop in number. According to Yuval Diskin, the Head of the Israel Security Agency, it also resulted from manufacturing limitations and difficulties in transporting the rockets to their launching sites (Ynet, May 28, 2007).

30. The stockpiles are stored **densely populated civilian areas**. The terrorist organizations use the civilian population as human shields for manufacturing and storing rockets. Two examples follow.

Storing arms and ammunition within civilian population concentrations



A house in the Jabaliya refugee camp used by Hamas as a weapons storehouse. Explosive charges weighing dozens of kilograms were stored there. The house was attacked by the IDF.



A one-storey industrial building in Khan Younis which served as a workshop for manufacturing windows and metalworking. The PIJ used it to manufacture and store weapons. The building, located 10 meters from a mosque, was attacked by the IDF.

Part V: Failure to export the rockets and mortars to Judea and Samaria

Overview

1. Since the confrontation began, and particularly since the disengagement, the terrorist organizations have sought to **export their rocket and mortar capabilities to Judea and Samaria**. Their aim is to attack the civilian population in central Israel, ²⁷ to provide a response to the operative difficulties created by the security fence and to create a more effective balance of terror against Israel.²⁸

2. So far, the terrorist organizations have been **unable** to significantly advance their efforts to smuggle or develop artillery weapons in Judea and Samaria, due mostly to the effective Israeli counterterrorist activities, whose presence on the ground limits the terrorist organizations' freedom of action.



The inscription reads "Qassam 2"

"The Qassam rockets in the occupied West Bank—the weapon of deterrence in the next phase" (The Izzedine al-Qassam Brigades Website)

²⁷ Large cities such as Jerusalem, Petah Tikva and Kfar Saba are within the range of the terrorist organizations' independently-manufactured rockets. Using standard long-range rockets such as the Grad may threaten other cities and strategic installations in the center of Israel.

²⁸ See our Information Bulletin: "An article published on the Hamas website reflects the movement's efforts to extend its Qassam rocket manufacturing capabilities to the West Bank. The writer of the article predicts that the Qassam rockets will create a balance of terror with Israel and serve as the weapon of deterrence in the next phase of the confrontation, providing an adequate response to the Israeli security fence" (June 28, 2005 at http://www.terrorism-info.org.il/malam_multimedia/ENGLISH/AUTHORITY-HAMAS/PDF/JULY5_05.PDF and http://www.terrorism-info.org.il/malam_multimedia/html/final/eng/sib/7_05/qassam_e.htm .

Attempts to export know-how to the West Bank

3. The activities of the Israeli security forces have so far exposed a small number of local squads, mostly in the Samaria region, which attempted to manufacture artillery weapons. For the time being, **few of those squads have achieved launching capabilities** and even the launch attempts which did take place were **insignificant**.

4. There have been several instances during the confrontation when terrorist operatives attempted to manufacture rockets based on technical know-how transferred from the Gaza Strip to arms laboratories in Samaria:

1) **In early 2002**, IDF forces seized a truck which contained a shipment of dozens of Qassam 2 rocket bodies and several separate rocket engines manufactured by operatives from **Nablus**. The shipment was en route to **Jenin**, where the rockets were to be fired at Israeli cities.

2) **In January 2004**, a Hamas operative was arrested in the Ramallah region, resulting in the discovery of a rocket laboratory and one rocket in advanced stages of production. During interrogation he related that he had learned how to manufacture Qassam rockets from terrorist operatives in the Gaza Strip.

3) **On December 30, 2004**, a PIJ operative was arrested in the **Jenin** region. During interrogation, he said the network to which he belonged planned terrorist attacks, including firing rockets at the city of **Afula**.

4) **On January 25, 2005**, 14 squad members were arrested in villages in the vicinity of **Jenin**. Their activity included building a laboratory for manufacturing explosives to be used in rockets.

5) **On March 2, 2005**, a laboratory for manufacturing explosives was uncovered **in the village of Al-Yamoun (west of Jenin)**. One of the things discovered was an improvised rocket body.



The laboratory for manufacturing explosives for Qassam rockets, in the village of Al-Yamoun (Photograph courtesy of the IDF Spokesman, March 2, 2005).

6) **On October 5, 2005**, a squad of three senior PRC terrorist operatives was arrested near **Mitzpe Ramon**. Moving through Sinai, the squad was on its way from the Gaza Strip to **Jenin** to join the terrorist network in that city. The squad's aim was to establish an operative infrastructure in the West Bank with arms manufacturing capabilities, mostly artillery (rockets and mortars).²⁹

Attempted mortar and rocket attacks from the West Bank

5. The terrorist organizations' efforts to establish a network for manufacturing rockets and mortars in Judea and Samaria have **so far** resulted in **a few failiures**. Such attempts were carried out from Samaria by members of terrorist squads most of whom were exposed and arrested:

- 1) **March 8, 2002** remains were found of a Qassam 2 rocket launched by Hamas which fell near **Tenuvot** (a village in the Sharon, situated between Netanya and Tulkarm).
- 2) **On March 8, 2006**, a squad belonging to the **PIJ** made an **unsuccessful** attempt to launch a rocket at an **IDF outpost in Jalame** (in the vicinity of Jenin).

²⁹ For further information see our October 31, 2005 Bulletin entitled "Attempt foiled to export technology from the Gaza Strip to the West Bank to manufacture rockets and explosive charges" at http://www.terrorism-info.org.il/malam_multimedia/html/final/eng/eng_n/ct_isse.htm and http://www.terrorism-info.org.il/malam_multimedia/English/eng_n/pdf/ct_isse.pdf

3) A **Fatah terrorist squad in Tulkarm** was engaged in the manufacturing of artillery weapons under the guidance of **Hezbollah**, using know-how received from **operatives in Jenin**. The squad made two **unsuccessful** launch attempts: one on **July 7, 2006**, and the other on **July 30, 2006**. The second launch was aimed at the village of **Bat Hefer** (a rural community in the eastern part of the Sharon region).

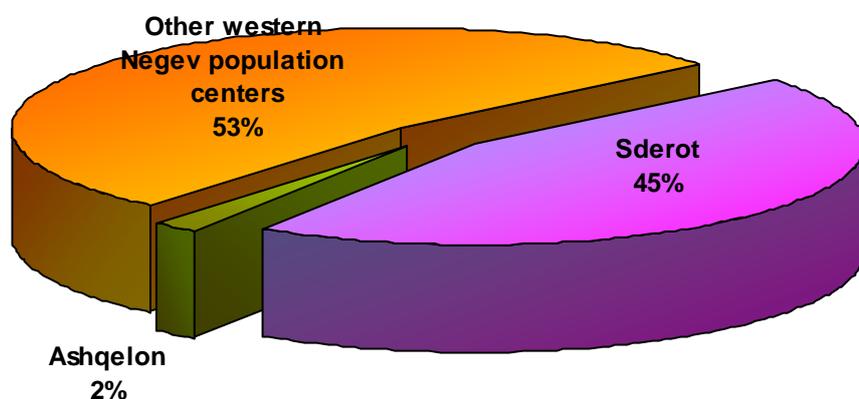


A rocket and a tripod belonging to a Fatah squad in Tulkarm

4) **July 10, 2006: a PIJ squad operating in Al-Yamoun (north Samaria)** made an **unsuccessful** attempt to launch a rocket at the village of **Ram-On**, east of Afula.

Part VI: The impact of rocket fire on the western Negev towns and villages

The Israeli towns and villages drawing the most fire³⁰



1. At this point, the western Negev population living under **potential threat** of rockets is **estimated at 190,000 civilians**. About 20,000 of them reside in the city of **Sderot**, 106,000 in **Ashqelon**,³¹ and 24,300 in **Netivot**. Tens of thousands of civilians in small towns (kibbutzim and villages) are also within rocket range.

2. Approximately 50% of all rockets fired in the course of the confrontation have been identified as hitting inhabited areas. The rest landed in open territories. **The level of the threat level** differs from one place to another. Of the Israeli population centers located within rocket range, **the city of Sderot was hit by the greatest number of rockets, 803 rockets** so far, accounting for **45%** of the total number of rockets hitting inhabited areas **and**

³⁰ The launch ranges were calculated from the launch sites in the Gaza Strip rather than from the border fence. Standard 122-mm rockets with a range of 20.4 kilometers were only used on a few occasions.

³¹ **At this point**, only part of Ashqelon's residents are living under the threat of rockets.

for about 35% of the total number of rockets fired during the confrontation. Thus it can be affirmed that Sderot is clearly the **main target** in the terrorist organizations' sights.



Remains of rockets fired at the city of Sderot, stored in Israeli police force warehouses (Sderotnews Website, November 12, 2007)

3. In the city of **Ashqelon**, perceived as a “strategic target” by the terrorist organizations, there were identified 35 hits, **only 2%** of the total rockets landing in inhabited areas. That is because Ashqelon is relatively far from the launch sites and **at this point** the terrorist organizations do not have a sufficient stockpile of improved, long-range rockets which can be fired at Ashqelon routinely and extensively. Therefore, rockets are usually fired at Ashqelon in response to intensive activities carried out by the Israeli security forces. In **Netivot** (also relatively beyond rocket range and not perceived as attractive a target as Ashqelon) only seven rocket hits were identified during the confrontation. Prominent among western Negev population centers targeted by rockets are Kibbutz Nir Am and Kibbutz Zikim, and the town of **Netiv Ha’asara**. **Due to its proximity to the security fence, Netiv Ha’asara is also a preferred target for mortar shells and infiltration attempts.**



The remains of a rocket fired at Sderot (Sderot Media Center)

Casualties caused by rocket fire



A 7 month-old baby injured as a result of a Qassam rocket in Kibbutz Karmia (Shai Shmuel for Reuters, February 2006).

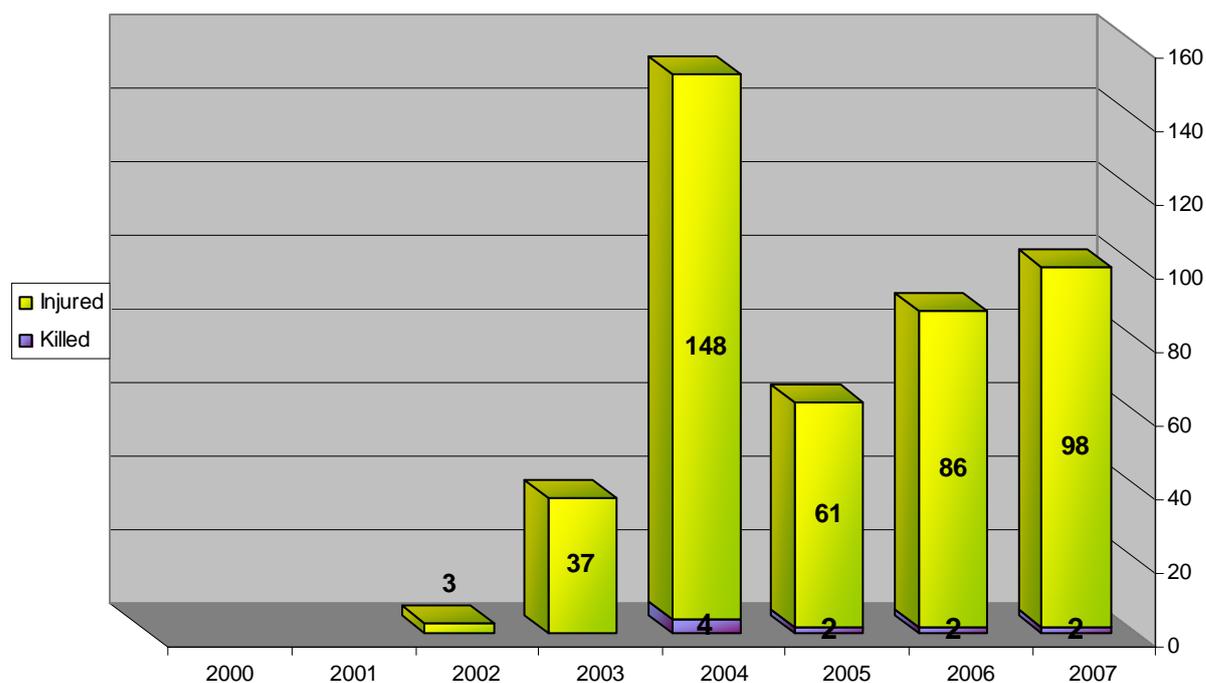
4. Since they first came into use in 2001, **the rockets have led to the deaths of 10 civilians and have injured 433**, most of them civilians.³² In the past year and a half, **over 1600 people were reported as suffering from post-traumatic stress disorder.**³³ There were no fatalities during the first two years of rocket attacks (2001-2002). **The record year** in terms of casualties was 2004, in which four civilians were killed and 148 injured. In 2005 (when there was a decrease in the number of rockets fired) and in 2006-

³² Not including those who suffered from post-traumatic stress disorder. Their number is difficult to estimate because not all of them seek medical aid. In addition, the symptoms may appear well after a rocket lands.

³³ Dr. Orit Nuttman-Schwartz from Sapir College and Dr. Rachel Dekel, Bar Ilan University, at the Sderot Conference for Social and Economic Policy (November 6-7, 2007).

2007 (when rocket fire escalated) two civilians were killed each year. Most of those killed **were residents of the city of Sderot.**

Casualties from rocket fire during the confrontation



5. **Living in the shadow of rocket fire caused many residents to leave Sderot**, either for short periods of time or permanently. The number of residents who left peaked in the summer of 2007, when there was a significant increase in the extent of the rocket fire. According to the Sderot municipality, **some 3,000 residents** abandoned the city during those months. Most of them were upper middle class families who made significant contributions to the city's social and economic life.³⁴

6. Ten people, **all civilians**, were killed by the rocket fire. Eight of them were **residents of Sderot**, and another, a resident of Hod Hasharon, was killed

³⁴ *Ibid.* Some residents left Sderot for **short periods of time** for relaxation. In mid-May 2007, following the massive rocket attack on Sderot, businessman Arcadi Gaydamak evacuated families on weekends for recreation. The Ministry of Defense organized a similar evacuation.

while visiting **Sderot**. A woman was killed in **Netiv Ha'asara**, north of the Gaza Strip. **Among those killed were a two year-old baby and two four year-old children, all residents of Sderot.** A man and a child were killed when a rocket landed in the vicinity of a kindergarten.

7. Following are the names of the victims and information about their deaths:³⁵

- 1) May 27, 2007: **Oshri Oz, 36**, from Hod Hasharon. Killed in Sderot when a rocket hit his vehicle as he was driving in the city, where he worked as computer technician.
- 2) May 21, 2007: **Shirel Friedman, 32**, from Sderot. Killed while walking near a vehicle directly hit by a rocket.
- 3) November 21, 2006: **Yaakov Yaakobov, 43**, from Sderot. Severely injured and died from his wounds one day later.
- 4) November 15, 2006: **Fatima (Faina) Slutzker, 57**, from Sderot, killed as a result of a rocket hit.
- 5) July 14, 2005: **Dana Galkowicz, 22**, from Kibbutz Bror-Hayil, killed in Netiv Ha'asara while sitting on a porch.
- 6) January 15, 2005: **Ayala-Haya Abukasis, 17**, from Sderot, critically wounded as a result of a rocket hit; she died of her wounds six days later.
- 7) September 29, 2004: **Dorit Aniso, 2**, from Sderot, killed when a rocket hit her parents' house.
- 8) September 29, 2004: **Yuval Abebeh, 4**, from Sderot, killed when a rocket hit his parents' house.
- 9) June 28, 2004: **Afik Zehavi-Ohayon, 4**, from Sderot, killed when a rocket landed near a kindergarten.
- 10) June 28, 2004: **Mordechai Yosepov, 47**, from Sderot, killed when a rocket landed near a kindergarten.

³⁵ According to information provided by the IDF.



Evacuating a women injured byrocket fire in Sderot (Ronen Zvulun for Reuters, May 27, 2007)

Long-term influence of the rocket fire on Sderot residents

8. The city of Sderot is clearly a preferred target for terrorist organization continuous, systematic fire because it is the largest population center within the range of rockets launched from the Gaza Strip. As a result, it has been the city most affected by rocket fire in terms of casualties and property damages throughout the confrontation.

9. Studies carried out in recent years on the residents of Sderot and neighboring areas **clearly show that the damage caused to civilian population by rocket fire goes beyond statistics.** Two studies carried out in 2005-2006 examined the mental health, distress, and personal, social and community functioning of the residents of Sderot and neighboring kibbutzim exposed to rocket fire.

10. The first study (2005) was carried out by the Department of Social Work at the Sapir Academic College.³⁶ **Another study, carried out in 2006,** examined the effects of exposure and coping methods among students at the Sapir Academic College. The studies were carried out by Dr. Nuttman-Schwartz, Chair of the Department of Social Work at the Sapir Academic

³⁶ The findings of the study were presented during the Sderot Conference for Social and Economic Policy (November 2005). In 2008, they will be published in *Sderot*, edited by A. Sasson, Makom Publishing.

College, and Dr. Rachel Dekel, from the School of Social Work at Bar Ilan University.

11. The first study examined 180 residents of Sderot and 100 residents of nearby kibbutzim. The findings showed that 87% of the residents had been directly exposed to rocket fire. **About 12% of Sderot's residents showed symptoms of post-traumatic stress disorder** (a higher percentage than the kibbutzim residents examined in the study). In addition, many of them reported high levels of **intrusive symptoms** (reliving the traumatic event accompanied by the involuntary intrusion into one's consciousness of images, memories or thoughts about the event, whether in dreams or waking states); **hyper-arousal** (sleep difficulties, nervousness, inability to concentrate, hyper-alertness and anxiety); **avoidance symptoms** (avoiding stimuli associated with the traumatic event, such as thoughts, emotions, conversations, activities, places or people). **All of the above had a severe impact on the quality of life of Sderot's inhabitants.**

12. **The second study (2006)** included 500 students (70 of which were residents of Sderot and 75 residents of nearby kibbutzim). **The results showed a significant increase (26%) in symptoms of post-traumatic stress disorder among residents of Sderot.** As in the first study, the second study showed that the occurrence of post-traumatic stress disorder among students residing in the kibbutzim was much lower among residents of Sderot, approaching that of students living outside of the danger zone. **The level of symptoms showed great distress.** Forty-four percent of the participants in the study living in Sderot reported hyper-arousal symptoms, such as being affected by unexpected, startling noises or other stimuli. Thirty per cent reported intrusive symptoms, saying they were often or usually beset by images or thoughts about the rockets or felt emotional stress when encountering something which reminded them of the rockets. Many reported concentration and memory difficulties.

13. The two studies concluded that **all residents experienced emotional distress affecting their mental health and the quality of their lives.**

The studies recommended that in light of the considerable levels of distress among all residents, **individual treatments should be given to those severely affected**. The studies also called for the provision of **adequate responses at the community level**, focused on trauma and its consequences. According to the studies, it was essential to reinforce the need to resort to shelter to prevent residents from becoming habituated to a threat situation to the point at which they ignored it. Community bonding and growth activities should be emphasized following the incidents, the studies said, and no less important, **the government should adopt a policy aimed at strengthening the sense of belonging to the country, which was found helpful in dealing with trauma**.

14. **Another study, carried out in summer of 2007**, examined the effects of the continuous stress situation on residents of Sderot. It was a comparative study with a test group of Sderot residents and a control group from the city of Ofakim. The study, whose findings were also presented at the Sderot Conference for Social and Economic Policy, was written by Dr. Rony Berger and Dr. Marc Gelkopf in cooperation with Dr. Mina Tzemach and the Dahaf Institute, under the auspices of NATAL, the Israel Trauma Center for Victims of Terror and War.

15. The main findings of the study were:

- 1) 28.4% of adults in Sderot reported symptoms consistent with post-traumatic stress disorder, three times higher than the national average.
- 2) The frequency and severity of psychiatric symptoms, accompanied by functioning difficulties, was much higher among residents of Sderot than residents of Ofakim (the control group of the study).
- 3) The reported frequency of post-traumatic symptoms, which lead to behavior and learning problems, was higher among children in Sderot than children in Ofakim.
- 4) A high correlation was found in Sderot between the (alleged) existence of post-traumatic disorders among parents and behavior problems among their children.

- 5) Vulnerable populations (new immigrants and the poorly educated) and women have a higher risk of developing post-traumatic symptoms.
- 6) The use of medications and medical services in Sderot is almost 3 times higher than in Ofakim.
- 7) Residents of Sderot seek psychological or spiritual aid (such as rabbis and clerics) three times more than residents of Ofakim.



Sderot residents go into hiding after hearing the warning siren (Photo courtesy of the Sderot Media Center)



A sticker distributed to residents of population centers near the Gaza Strip with instructions issued by the Home Front Command

Property damage caused by rocket fire

Damage to agriculture



Cows killed by rocket fire in a cowshed in Kibbutz Zikim (Photo courtesy of Sderot Media Center, taken by Noam Badin, November 11, 2007)

Damage to educational institutions



A police sapper examining the remains of a Qassam rocket that landed inside a school in Sderot (Amir Cohen for Reuters, June 11, 2006)



Rockets disrupt the beginning of the school year. Right: The kindergarten in Sderot near which a rocket landed. Left: The smashed windows of the kindergarten (September 3, courtesy of Amir Cohen and Ynet)

Buildings damaged in the city of Sderot (courtesy of Sderot Media Center)



Vehicles damaged in the city of Sderot (courtesy of Sderot Media Center)



Part VII: Mortar shell fire from the Gaza Strip

Overview

1. The mortar is a short-range weapon whose precision is higher than that of the independently-manufactured rocket. It is a mobile, lightweight weapon, easily transported and concealed on the ground. The terrorist organizations have large quantities of mortars of various diameters. Most of the mortars are not standard and are manufactured by the various organizations themselves.

2. Since the violent confrontation began in 2001, the terrorist organizations have fired **more than 2500 mortar shells**. Due to their short range (up to 2 km – 1 ¼ miles), prior to the disengagement most mortars were used **against Israeli settlements in the Gaza Strip and the IDF forces operating there. Ten people were killed and 151 wounded as a result of mortar fire during the confrontation**, most of them civilians and some of them IDF soldiers.

3. **The use of mortars temporarily decreased after the disengagement**, mainly because there were no settlements and IDF forces to be found in the Gaza Strip. However, since April 2007, following the unprecedented rocket attack in May and when IDF activities in the Gaza Strip resumed, the use of mortar shells has again increased, mostly because Hamas has focused on that modus operandi. Mortar shells are fired at **military targets** (IDF forces within and on the outskirts of the Gaza Strip) and on **civilian targets** (Israeli population centers near the Gaza Strip and the border crossings).

4. **The mortars and mortar shell manufacturing process is relatively simple**. Over the years, it has become available to all the Palestinian terrorist organizations, whether they use the local civilian industry

or independent industries for arms manufacture. Furthermore, the terrorist organizations have attempted to **smuggle standard mortars into the Gaza Strip**. For example, in May 2001 the Santorini fishing boat was seized while carrying dozens of 60-mm Yugoslavian-made mortar shells; in January 2002 dozens of Iranian-made mortars and hundreds of mortar shells were found on board the Karin A.



Examples of arms and ammunition from Iranian military warehouses, seized on board the Karin A: an anti-tank Sagger missile (with the identifying marks of the Iranian army erased), a 122-mm Grad rocket, and a 81-mm mortar (from the display of seized materials at the Intelligence and Terrorism Information Center in Gellilot, near Tel Aviv).

5. Mortar shells are usually fired at **IDF forces** during operations deep inside the Gaza Strip, at concentrations of forces or patrols, and at headquarters located near the security fence. Sometimes mortar shells are fired as tactical assistance for the terrorist organizations' offensive activities, as was the case in the abduction of Gilad Shalit. There are also mortar attacks on **Israeli population centers near the security fence** such as **Kibbutz Kerem Shalom, Netiv Ha'asara, and Kibbutz Nahal Oz**. Mortar shells are usually fired from places located several hundred meters away from the target. Since the takeover of the Gaza Strip in June 2007, most of the mortar shells have been fired by **Hamas**.

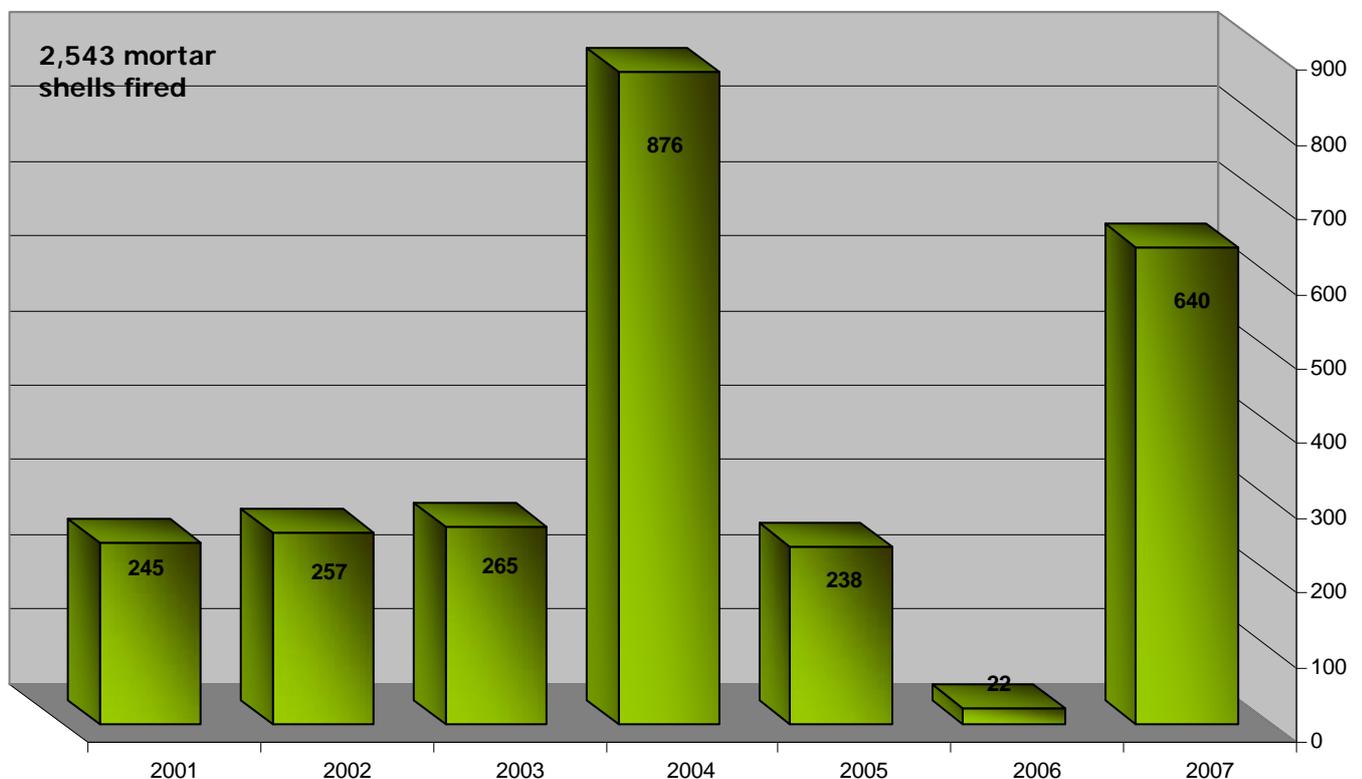
6. **The border crossings, mainly the Kerem Shalom Crossing, are also a target for mortar shell fire.** The Kerem Shalom crossing was created after the disengagement to replace the Rafah crossing. It is used to import goods into the Gaza Strip and allow foreigners to cross in from Egypt. Following the

Hamas takeover of the Gaza Strip, the operation of the crossing is perceived as an Israeli attempt to monitor the Gaza Strip’s entrances and exits because the Rafah Crossing cannot be used. Accordingly, the terrorist organizations attempt to disrupt movement through it and other crossings by firing mortar shells, **even though by doing so they harm the Gaza Strip’s civilian population.**

7. The terrorist organizations work constantly to improve their mortar and mortar shell manufacturing capabilities, **especially increasing the range to over 2 km and the damage** caused by the detonation of the warhead. Besides technical improvements, efforts are made to improve operational and launch capabilities, for instance by using launch sites prepared in advance.

Mortar shell fire during the confrontation (2001-2007)³⁷

Mortar shell fire by year



³⁷ As at late November 2007.

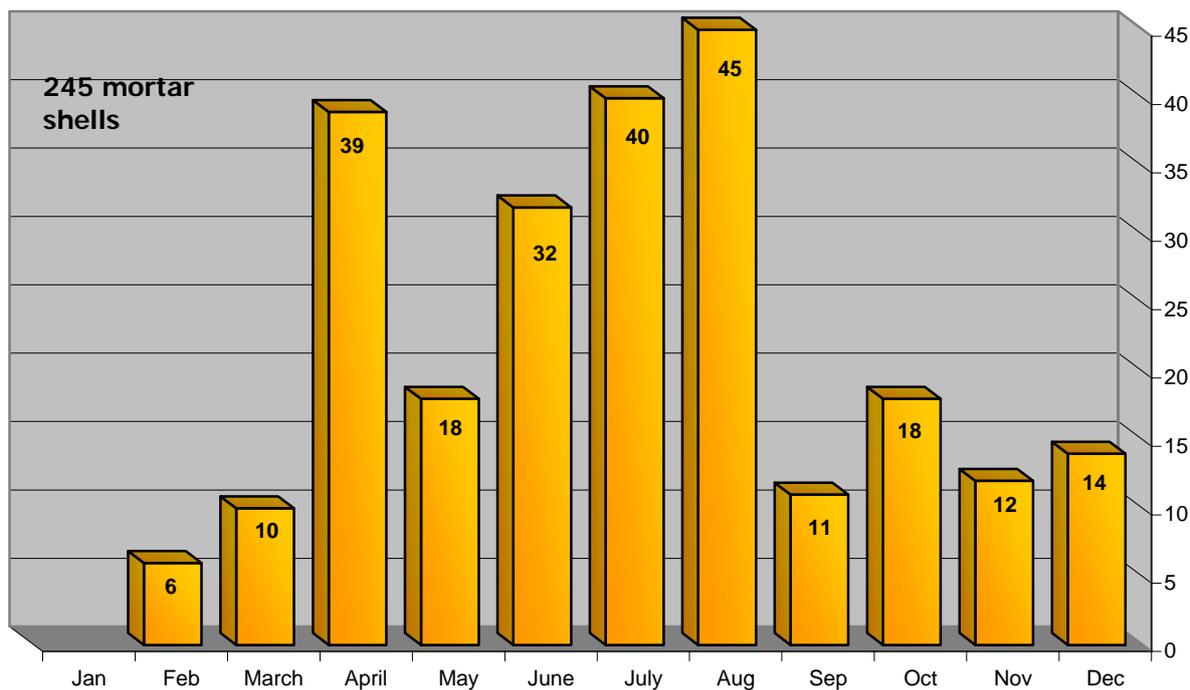
8. **Between 2001 and 2007 2,543 mortar shells have been fired.** The multi-annual graph of mortar shell fire shows that the **terrorist organizations' mortar shell policy is inconsistent with rocket fire, and in fact completely opposite in some cases.** Mortar shells were more **widely used** before the disengagement, since mortars were more available and Israeli targets (Israeli settlements and security forces in the Gaza Strip) were within their range. **Mortar shell fire peaked in 2004, the year before the disengagement,** which also saw an increase in rocket fire.

9. In 2006, when rocket fire broke a new record, there was **a significant drop in mortar shell fire.** The terrorist organizations focused their efforts on firing rockets into Israel and upgrading them, and on smuggling rockets and the materials used to manufacture them into the Gaza Strip. Mortar shell fire resumed (to a small extent) in June 2006, when Gilad Shalit was abducted. In November 2006 there was another increase in mortar shell fire at Ashqelon, triggered by the IDF's entry into the Gaza Strip during a broad operation (Operation Autumn Clouds). However, the extent of mortar shell fire this year remained low.

10. **The escalation began in May 2007,** during the severe confrontations between Hamas and Fatah, which coincided with the massive rocket assault. **Hamas has avoided firing rockets, while concentrating in mortar shell fire. As a result, it peaked at 132 hits in September and 90-100 in October-November 2007.**

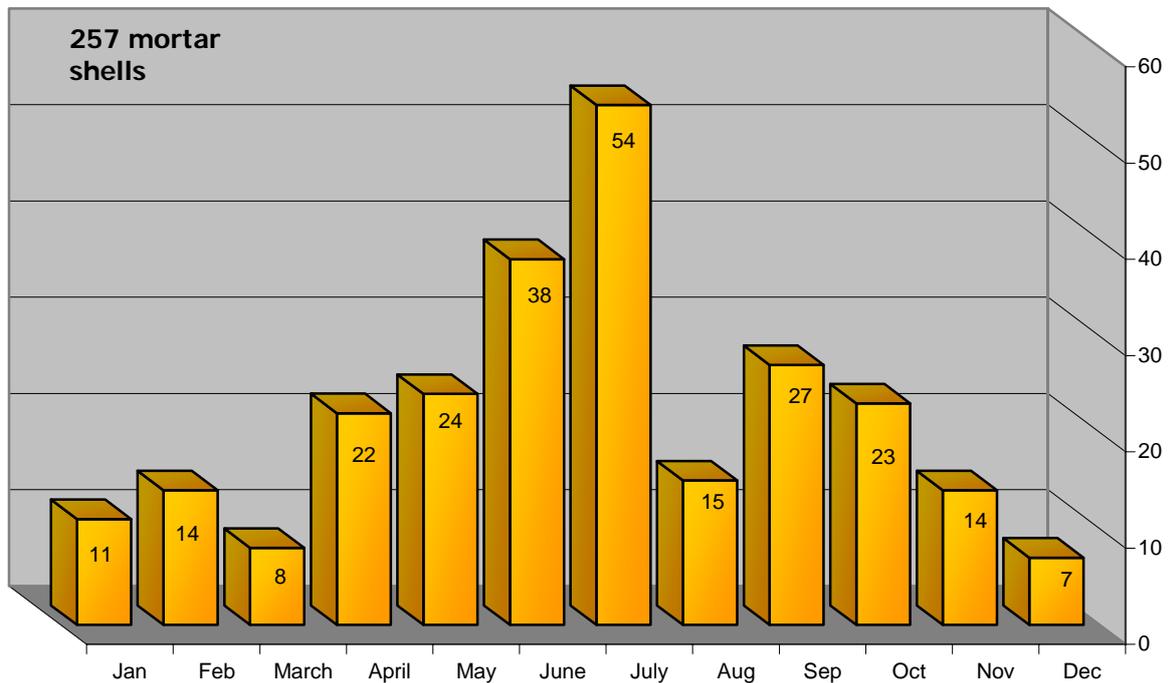
11. Following is the general description of mortar shell fire in 2001-2007 and the factors that influenced it.

2001



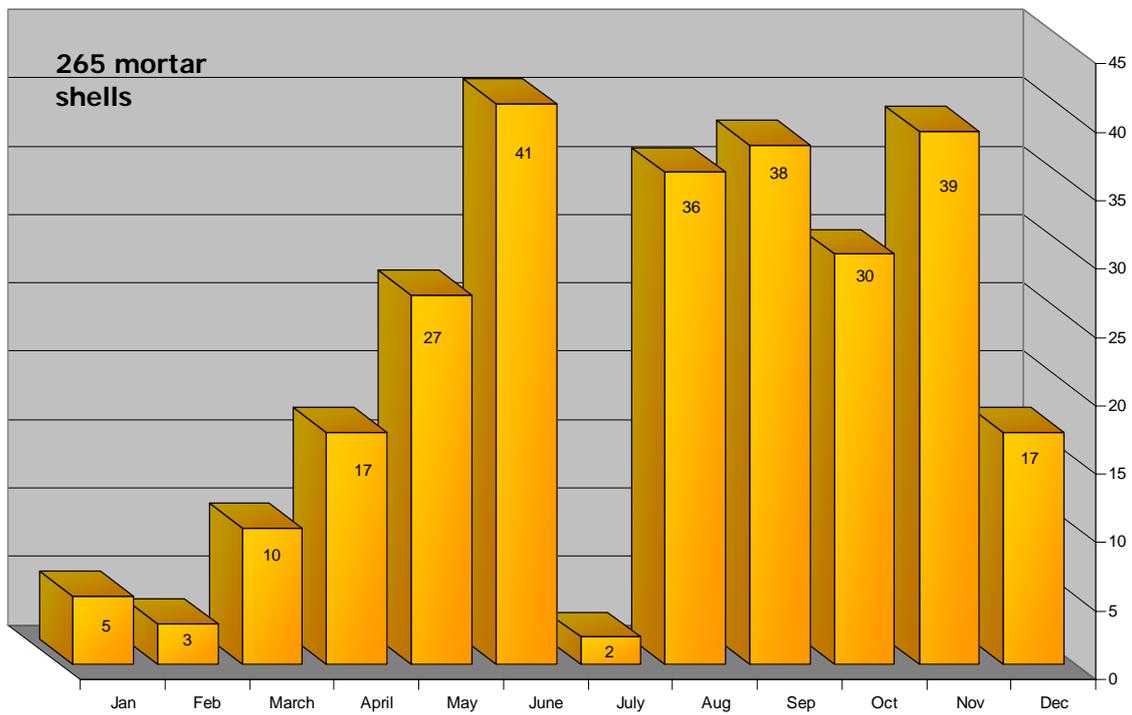
12. The first mortar shells were fired on January 30, 2001 at the settlement of Netzarim, in the middle of the Gaza Strip. A total of 245 shells were fired in 2001, most of them aimed at the Gaza and Gush Katif settlements. The IDF first entered the Gaza Strip in April and conducted activities in the town of Beit Hanoun. In response, there was an increase in mortar shell fire, which reached several dozens of shells in April-August. The four months of 2001 saw a decrease in the fire.

2002



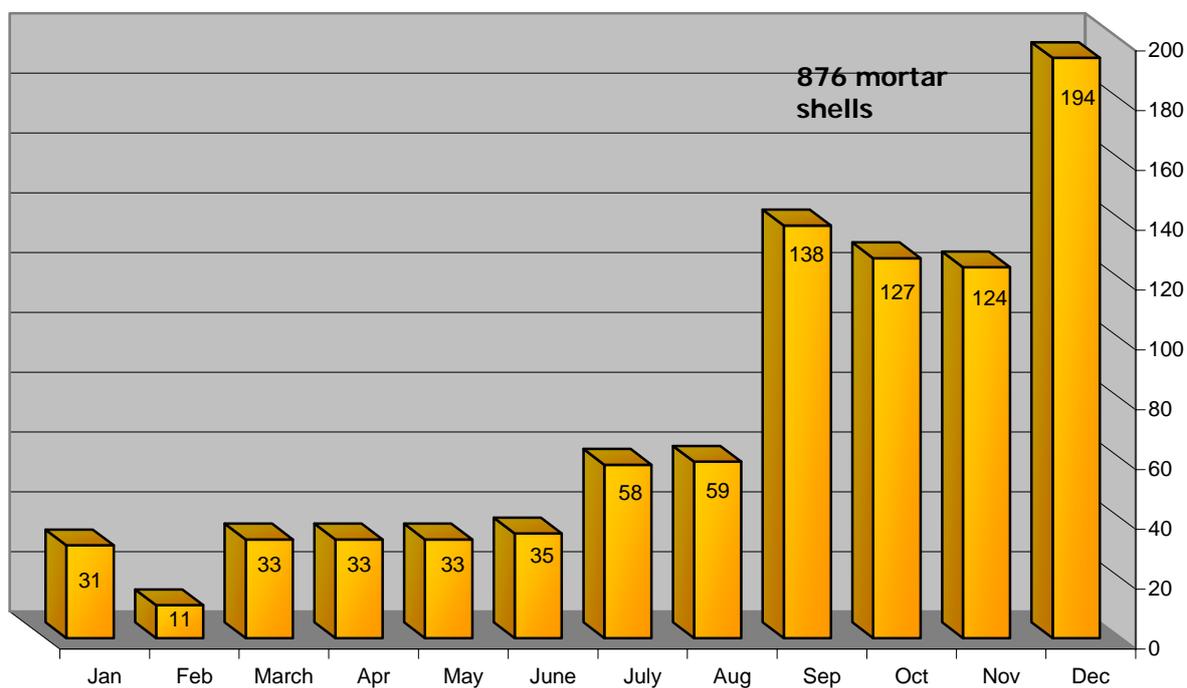
13. The number of mortar shells fired in 2002 (**257 shells**) was similar to 2001.. In April a gradual increase in the shell fire began, peaking at 54 shells fired in July. In our assessment, the increase came as a response to the extensive activities conducted by the Israeli security forces in Judea and Samaria during Operation Defensive Shield (late April and in the two months that followed).

2003



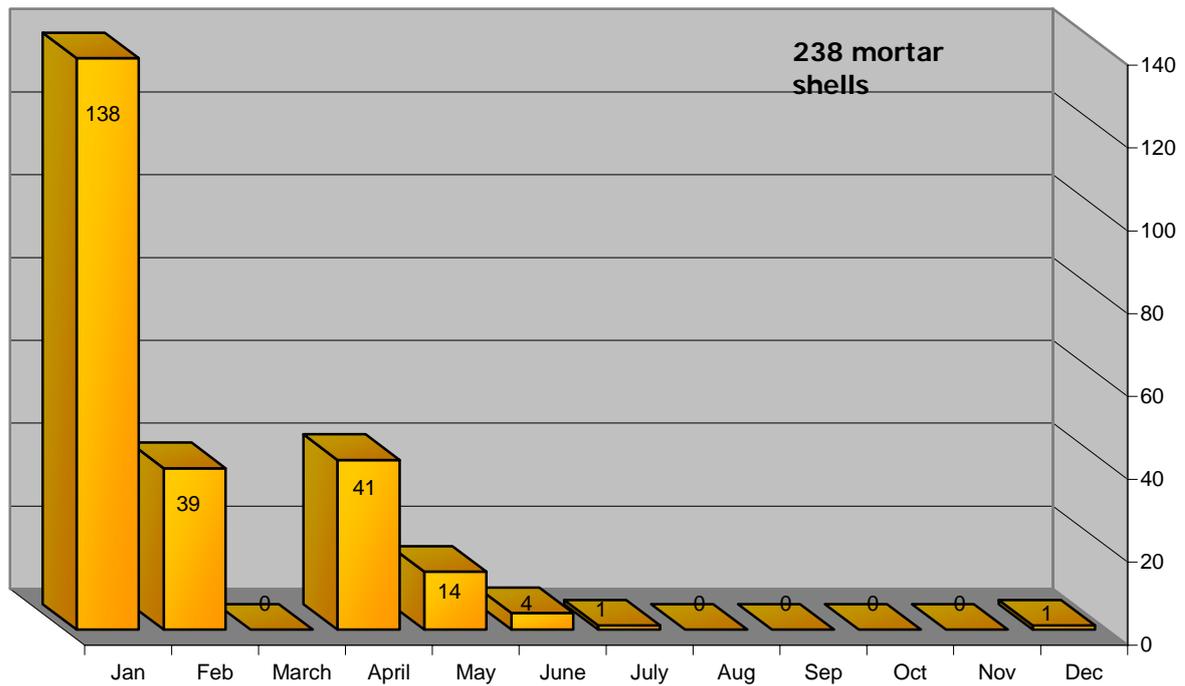
14. In 2003 **265 mortar shells**, similarly to 2002. The shell fire peaked in June (41 shells). There was a significant drop in the shell fire in July (only 2 shells) following the ceasefire (*hudna*) declared in late June. The ceasefire was not maintained, however, and the number of mortar shells fired between August and November increased to 30-40 per month.

2004



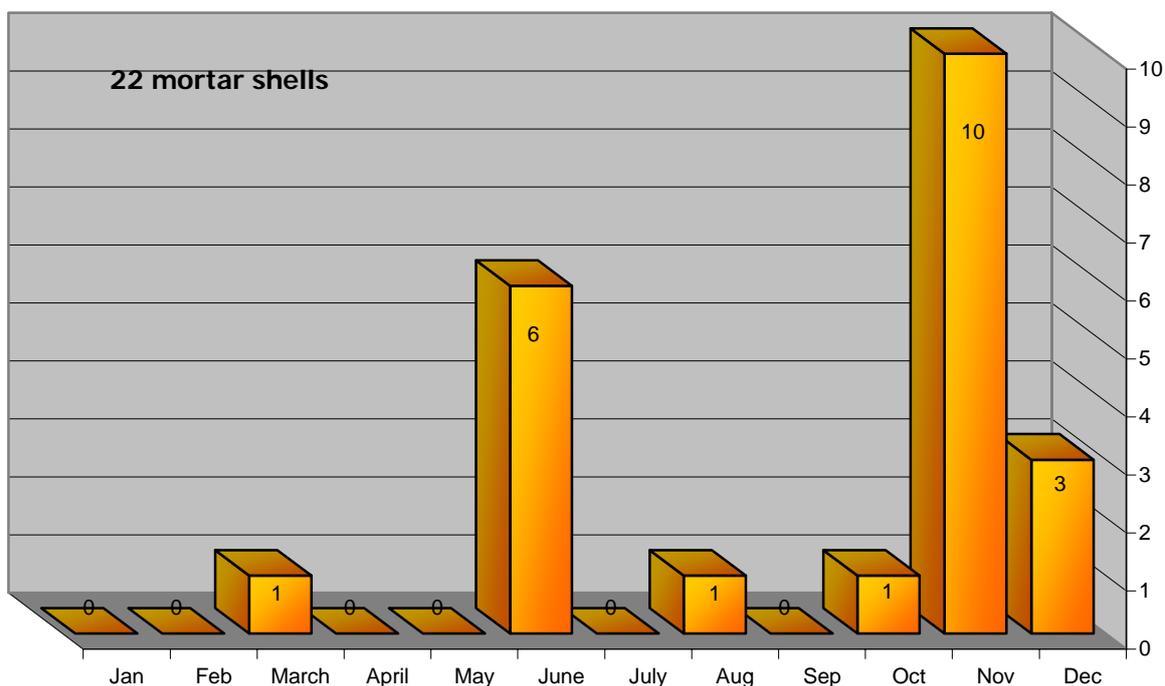
15. In 2004 **876 mortar shells were fired, more than three times the number in the two previous years.** In late September the IDF conducted intensive activities in the northern Gaza Strip, which contributed to the significant increase in mortar shell fire in the last four months of 2004. The mortar fire peaked in December, when the terrorist organizations attacked the Israeli settlements in the southern Gaza Strip (Gush Katif).

2005



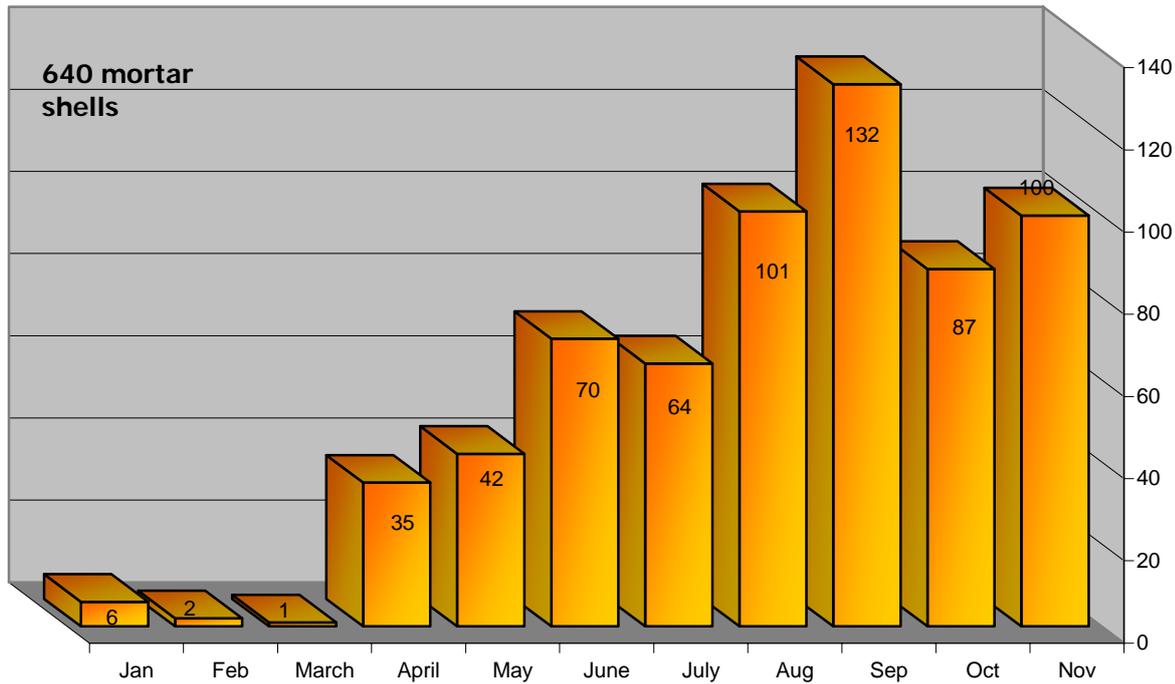
16. In 2005, **the year of the disengagement, there was a significant drop** in mortar shell fire. It decreased significantly in the two months preceding the disengagement, stopping almost completely in the months after it. In our assessment, it was both because the terrorist organizations did not want to interfere with the evacuation of the settlements, and because they no longer had targets inside the Gaza Strip within range.

2006



17. The year 2006 was also marked by a **significant drop** in mortar shell fire, which was **nearly or completely non-existent during most of the year. Twenty-two mortar shells** were fired, compared with 238 in 2005 and 876 in 2004. The IDF's massive activities in the Gaza Strip in June (Operation Summer Rains) and November (Operation Autumn Clouds) **did not result** in a massive increase in mortar shell fire. It was similarly not influenced by the second Lebanon war (July-August).

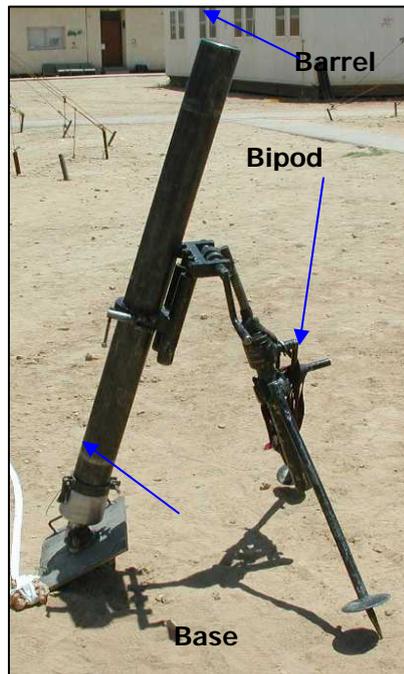
2007



18. Mortar shell fire has reached unprecedented levels in 2007. Mortar shells are often fired at military targets (IDF outposts along the Gaza Strip, IDF forces engaged in pinpoint operations in the Gaza Strip) and civilian targets (Israeli population centers near the Gaza Strip and the crossings). **There has been a significant increase in mortar shell fire since April 2007 which peaked in September.** Most mortar shells are fired by **Hamas**, perhaps as an alternative to firing rockets, which it avoids.

19. The sharp increase in mortar shell fire in May coincided with the escalation of internal conflicts between Fatah and Hamas in the Gaza Strip, which eventually led to the Hamas takeover of the Gaza Strip in June. The extensive shell fire from June to November coincided with the increase of Israeli security force counterterrorist activities in the Gaza Strip. Such activities prevent or disrupt most attempts at setting explosive charges and infiltrations, **leaving mortar shell fire and rocket fire as the preferred course of action.**

Technical-tactical aspects of using mortars



**independently-manufactured mortar seized in 2001
(photograph by the Israel Police Bomb Squad)**

20. The mortar is a relatively simple artillery weapon, made of a steel pipe connected to a base. The mortar shell is made of three main parts: a quick compact fuse, the shell body (made of cast metal which acts as a steel sheath for the explosives) and the tail, which composed of a pipe packed with a propellant, whether standard or improvised. Mortar shells are usually fired from a single barrel, and the rate of fire depends on how quickly the projectile can be replaced after each firing.

21. **Mortar shell fire has several advantages:** The mortar is considered a reliable, cheap and relatively easy to use weapon, requiring only one operator. It can be carried on foot and is easily deployed and removed without requiring special resources. It can be fired concealed or behind cover, **allowing it to be used in urban territory near residential buildings.** The expanding use of GPS devices and firing computers has turned mortars into weapons no less precise than cannons, while maintaining the fundamental characteristics of the mortar.



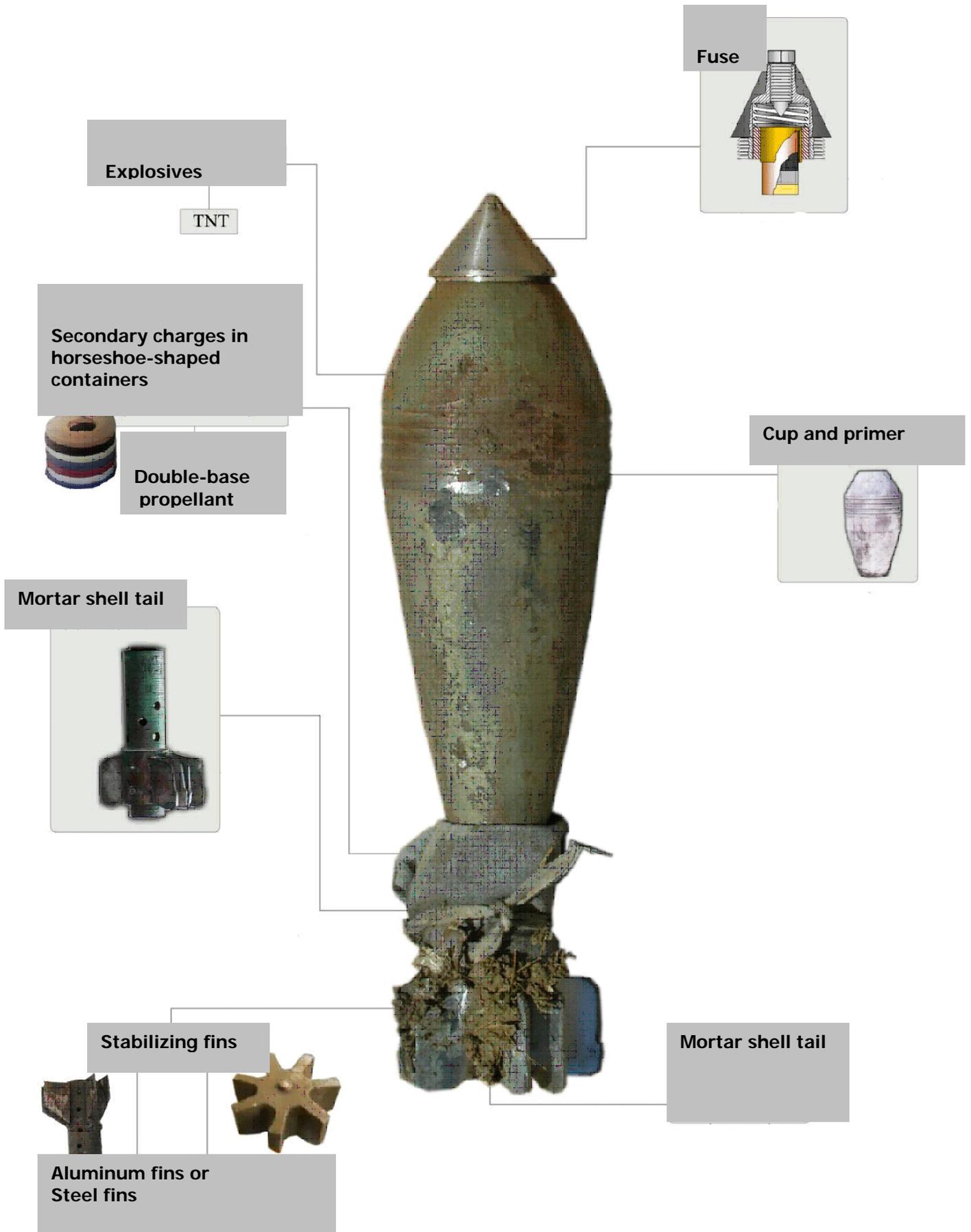
Left: Firing from open territory. Right: Firing from an urban environment (Al-Aqsa TV).



100 mm mortars manufactured by the PIJ (the PIJ Website)

22. The most common mortars used by the Palestinian terrorist organizations in the Gaza Strip are replicas of East European-made **80 mm and 100 mm** mortars. All the organizations have both the know-how and ability to independently manufacture mortar shells of various diameters (see below). The manufacturing know-how dates back to the Scientific Committee of the Fatah organization, which served as the research and development body in the early 1990s. In due course, Fatah's know-how spread to the other terrorist organizations.

Schematic diagram of an independently-manufactured mortar



23. The terrorist organizations currently have several models of **improvised mortar shells**. The three most common are 80-90 mm shells, 135-140 mm shells and 240-250 mm shells. Following is technical data:

1) **Improvised 80-90-mm mortar shell:**

- ☑ **Weight:** 3-5 kg (6.6-11 lbs)
- ☑ **Weight of explosives:** 400 g (14 oz)
- ☑ **Maximum range:** 1.8 km (a little over a mile)
- ☑ **Warhead:** several hundred grams



Improvised 80-90 mm rocket

2) **Improvised 135-140-mm mortar shell:**

- ☑ **Weight:** 20-25 kg (44-55 lbs)
- ☑ **Weight of explosives:** 3-6 kg (6.6-13.2 lbs)
- ☑ **Maximum range:** 4 km (2 ½ miles)
- ☑ **Warhead:** 1-1.5 kg (2.2-3.3 lbs)



Remains of a 135-140 mm shell tail

3) **Improvised 240-250 mm mortar shell:**

- ☑ **Weight:** 21 kg (46.2 lbs)
- ☑ **Weight of explosives:** 5-8 kg (11-17.6 lbs)
- ☑ **Maximum range:** 1-2 km (.6-1 ¼ miles)
- ☑ **Warhead:** 1-2 kg (2.2-4.4 lbs)



Loading a 240 mm mortar shell

24. **The Palestinian terrorist organizations seek to improve their mortar manufacturing capabilities.** Particular emphasis is placed on **increasing the range** to over two kilometers (the maximum range of mortar shells is about 5 km) and **increasing the damage** caused when the warhead

detonates. Alongside technological improvements, efforts are made to improve launching techniques, such as using launch sites prepared in advance and sophisticated aiming devices.

The phases of firing a mortar shell

25. Mortar shell fire takes place both in open territory and in urban environments. Sometimes mortars are fired from the vicinity of residential houses. A single barrel is usually used and the rate of fire is determined by how quickly the barrel can be reloaded. There have been some instances in which double-barreled mortars were used, or even several mortars used at the same time.

26. **Firing a mortar shell includes the following stages:**

- 1) **Positioning the mortar** on the ground and aiming it.
- 2) **Fixing the mortar** into the ground by laying rocks or sandbags on the legs of the bipod and on the mortar base.
- 3) **The firing itself**, which can be performed in three ways:
 - i. The operator inserts the mortar shell directly into the barrel. As it hits the base of the barrel the firing pin is activated.
 - ii. The mortar is laid on the ground with the mortar shell inside. The mortar shells is activated from afar using an electric fuse. That is relevant in cases where timing is important, for firing a volley from several barrels at the same time, and for prolonged, multi-barrel consecutive fire.
 - iii. Connecting the mortar shell to a mechanism at the tip of the barrel which prevents the shell from sliding into the barrel, and releasing the shell by **pulling a rope**. That allows the operator to stand at a distance and avoid getting hurt.

27. **The range of the mortar shell** is affected by two main factors: launch angle and engine power. Every standard mortar has a designated range table with information on the range attained for each angle and amount of

propellant. Independently-manufactured mortars are made with different diameters which do not conform to the range tables of standard mortars.

The stages of launching a mortar shell



1. Arriving at the launch site



2. Positioning the mortar on the ground



3. Fixing the mortar into the ground with a hammer



4. Setting the lift angle



5. Aiming the barrel



6. Taking the shells



7. Attaching the firing pin to the fuse

Launching mortar shells from the vicinity of residential buildings

28. Firing mortar shells from densely populated civilian areas **is a common modus operandi used by the Palestinian terrorist organizations** in the Gaza Strip. Footage filmed by the Israeli Air Force (morning of October 29 2007) **shows a squad of three terrorists launching mortar shells from the courtyard of a central building in a complex of educational institutions in the town of Beit Hanoun**, in the northern Gaza Strip (an area frequently used by terrorists for launching rockets and mortar shells at population centers in Israel). The footage shows the squad members preparing the launch site and firing the shells close to the building. After the launch, the squad members are seen **taking cover inside the building**.



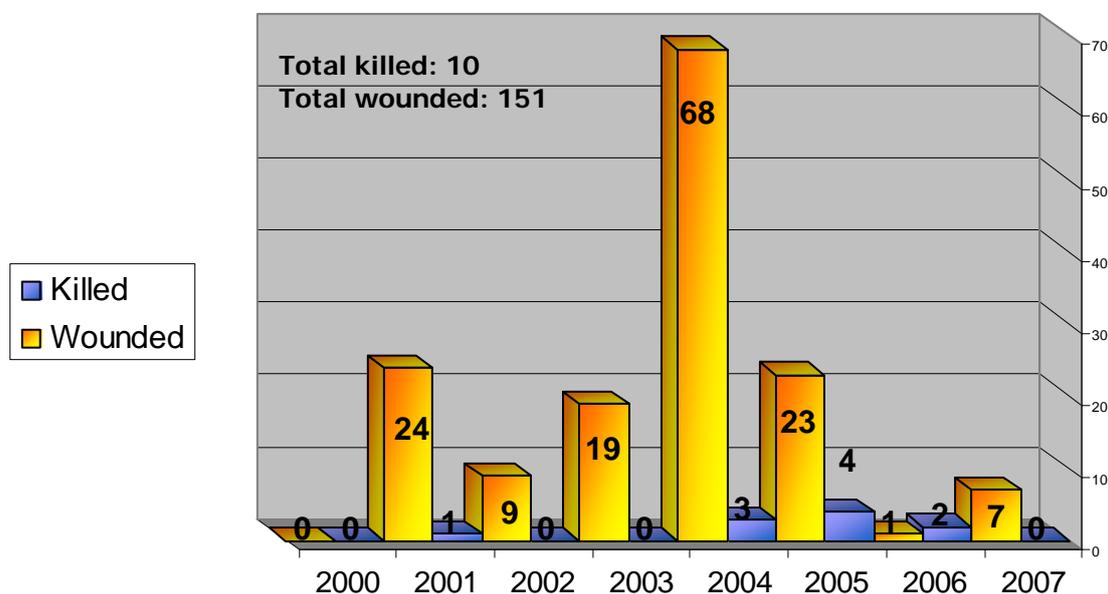
A mortar shell firing squad (red circle) positioned near a central building in a complex of UNRWA- run educational institutions in Beit Hanoun (from footage shot by the Israeli Air Force and distributed by the IDF Spokesman, October 31).



A squad launching mortar shells near a residential building (Al-Aqsa TV, October 26, 2007)

Casualties caused by mortar fire

Casualties caused by mortar fire, by year



29. In the seven years of the violent confrontation, **eight civilians and two IDF soldiers were killed by mortar shell fire**³⁸ (an identical number to those killed by rocket fire). In addition, **151 people were injured**, of whom 81 were civilians and 70 soldiers. The number of civilians killed includes two residents of towns in the Gaza region, two Bedouin shepherds, and four workers: two Palestinians, a Chinese national, and a Thai national.

30. Following are details on those killed as a result of mortar shell fire:

- 1) **March 28, 2006: Salam Ziadin**, a Bedouin shepherd, was killed when a dud mortar shell exploded near Kibbutz Nahal Oz.
- 2) **March 28, 2006: Khaled Ziadin**, a Bedouin shepherd, was killed when a dud mortar shell exploded near Nahal Oz.
- 3) **June 7, 2005: Muslah Umran**, a Palestinian worker, was killed while working in a greenhouse in the Gush Katif settlement of Ganei Tal.

³⁸ Four of the civilian victims were Palestinian and foreign workers working in greenhouses in the town of Ganei Tal.

- 4) **June 7, 2005: Bi Shude**, 46, a Chinese national, was killed while working in a greenhouse in the Gush Katif settlement of Ganei Tal.
- 5) **June 7, 2005: Muhammad Mahmoud Jaroum**, a Palestinian worker, was killed while working in a greenhouse in the Gush Katif settlement of Ganei Tal.
- 6) **January 2, 2005: Nissim Arbiv**, 26, of Nissanit, was severely injured by a mortar shell in the Erez industrial zone. He died from his injuries ten days later.
- 7) **December 14, 2005: Jitladda Tap-arsa**, 20, a female Thai national, was killed while working in a greenhouse in the Gush Katif settlement of Ganei Tal.
- 8) **October 28, 2004: Sgt. Michael Chizik**, 21, of Tiberias, was killed when a mortar shell landed in the Morag outpost in Gush Katif.
- 9) **September 24, 2004: Tiferet Tratner**, 24, of Neve Dekalim, was killed in her home by a mortar attack on the Gush Katif settlement bloc.
- 10) **November 24, 2001: St.-Sgt. Barak Madmon**, from Holon, 26, was killed by a mortar strike while on reserve duty in Kfar Darom.