Former deputy-head of the Israeli police bomb disposal division, chief superintendent (ret) Michael Cardash, talks to Andrew Johnston about the rise of TATP in Israel

# That Mother of Satan is highly unstable!

Triacetone triperoxide (TATP) has earned itself quite a reputation in recent years and is fast becoming the desperate terrorist's explosive of choice. 'Desperate' because, due to its instability, you certainly wouldn't dabble with it if you had any other choice. This instability is the reason why certain terrorist groups affectionately refer to it as Mother of Satan, a slightly grandiose name perhaps, which has now stuck. The compound is easy to produce from household chemicals, can serve as the detonator, booster or even main charge (contrary to popular belief) and can be easily initiated by a spark, friction or impact.

Actually, when it comes to power TATP is to explosives what drunken dancing is to seduction, easily done but not very effective. Pure TATP, which is rarely found in improvised explosive devices (IED), is about 80% as efficient as TNT and doesn't actually detonate in the literal sense. The explosive effect is due to a rapid expansion of gas with very little heat produced, known as an entropy burst. Not that this matters much to terrorists, victims or responders.

Unfortunately TATP has been rediscovered by terrorist organisations throughout the world but nowhere has it been more widely used than in Israel. Chief superintendent (ret) Michael Cardash of the Israeli police bomb disposal division (BDD) is a leading authority on the use of TATP by terrorist organisations and is in demand worldwide for his 27 years' experience in dealing with this 'new' threat.

TATP was first seen in Israel in the early 1980s, synthesised by Palestinian bomb makers for lack of a better option. Due to exceptionally tight security controls West Bank bomb makers found it almost impossible to acquire any other materials for making explosives, so the TATP based IED was developed. It is thought that the expertise in TATP synthesis in Israel came from an individual known as Adnan Ja'ber, who was trained in explosives and demolition in the former Soviet Union around 1974, returning to the Israel sometime before 1980.

The first documented incident of TATP use was by the Palestinian Liberation Organisation (PLO) in 1980 in Hebron. The PLO attacked a group of Israeli students with improvised grenades, killing six and wounding 17. A forensic investigation found residues of TATP on the grenade fragments. Ja'ber, imprisoned for his involvement in the attack, was released by Israeli authorities in 1983 in a prisoner exchange and promptly relocated to a neighbouring state where he became an explosives instructor. Shortly after this TATP based devices were seen in large numbers throughout Israel. It has now become the Palestinian terror organisations' most popular explosive.

As TATP production increased in Gaza and the West Bank post-1985, the number of 'work accidents' where bomb makers were either injured or killed dramatically increased. As a result, quantities of TATP rarely exceeded 40kg, still a sizable amount by any standard but not sufficient to make vehicle borne-IEDs (VBIEDs) which would require hundreds of kilos of TATP.

The innate instability of TATP led many explosive ordnance disposal (EOD) teams to assume that it would be impossible to produce a large scale TATP device. Perhaps predictably, these assumptions were eventually proven wrong and in 1994 Michael's team encountered an 800kg stash of TATP for the first time, in the city of Nablus on the West Bank. In Michael's words: "If they could make that much TATP they can make a VBIED, so we went back to the drawing board."

A common practice when dealing with VBIEDs is to use energetic materials to remove the intact IED from the vehicle. This of, course, is not an option with TATP due to its instability, as it is almost guaranteed to explode. It was therefore, decided that the best way to deal with large quantities of such an unstable explosive was to find a way to desensitise or even chemically neutralise it, although it was unclear how to achieve this. The academic world, always aware of real world operational challenges of course, advised Michael's team that diluting TATP with alcohol would desensitise it enough to burn it without an explosion. "Anyway, we were assured it would work with 10g of TATP in a lab," Michael commented.

Unfortunately some scientific principles are just not scalable, and this theory was literally blown apart in a test by the Israeli BDD. Sadly they could not get their hands on enough distilled alcohol, and suggested the next best thing - diesel oil. Not all experiments work the first time, and this was never more evident than when 500kg of seized TATP mixed with diesel fuel exploded - with the added charm of a diesel oil fuelled fire ball. Over the years alternatives such as chloroform and carbon tetrachloride (CTC) have been suggested but these compounds present other handling challenges being incapacitants and carcinogens in their own right.

The TATP threat in Israel is now so great that EOD teams respond to incidents on the assumption that TATP could be present. The quantities could range from a few hundred grams to hundreds of kilograms, something truly unique to the region and the world. The threat from this unstable peroxide has become so dominant in Israel that it affects BDD operational tactics.

Mr Cardash explained: "When approaching an IED threat the basic assumption now is that it could contain TATP and this has had an impact on the way we deal with the device. Energetic materials would be potentially dangerous for the device so we have developed techniques that use specialised robotic tools and cold disruption techniques. We would not previously have considered this as it can draw out the response timeline putting us under greater threat of attack."

This modified approach to TATP has come from lessons learnt at a cost. The BDD has seen a number of colleagues lose their lives whilst dealing with TATP. Mr Cardash recalled one particular incident from a time when the sensitivity and variability of TATP were less well understood. "We lost guys from dealing with TATP, for instance when a colleague was killed trying to remove TATP residue from an open pipe bomb which was thought to be safe. To this day it is uncertain what triggered the explosion."

Hard lessons are not exclusive to the Israeli police however. It is perhaps an unfortunate symptom of the threat level in Israel that its citizens' awareness and ability to react to an IED threat is far in advance of almost every other country in the world. One example of this involved a backpack IED found on a bus in downtown Tel Aviv, December 2013.

The backpack was identified by a passenger who quickly established it was not owned by anyone on the bus. The driver was alerted; the bus then immediately pulled over and was evacuated. Shortly after evacuation the IED, which was later identified as a pressure cooker filled with TATP, detonated before any emergency services could respond.

This response was initiated and managed entirely by civilian passengers without any intervention or even instruction from the emergency services. What may seem an impressive civilian response to many readers is ingrained in Israeli citizens from an early age with children as young as five being educated in the dangers of IEDs. This is certainly in contrast to an IED exercise Mr Cardash witnessed in South East Asia where the words 'IED' and 'selfie' were mentioned in the same sentence while describing the public response.

TATP is a notoriously difficult compound to detect. It breaks down very quickly in sunlight and the degradation products vary immensely depending on the pre-cursor chemicals used to create it. At least this is the case in the Western world. So much TATP is produced in Israel that it is quickly identified by means of simple wet chemistry. While smell (or bouquet) is subjective, Mr Cardash has been able to identify TATP in a post-blast environment. "TATP has a very distinct smell post-blast; if you arrive at an incident within 20 or 30 minutes it is very obvious," he said.

There is a geographical asymmetry to the TATP threat in Israel which is inversely related to levels of security. The West Bank has very tight security so smuggling any explosives or weapons into this region is very difficult. Hence the vast majority of TATP used in Israel is produced

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in the West Bank, as synthesising explosives from household materials is the bomb makers' only option.

The Gaza strip, on the other hand, has an intricate network of tunnels, the longest of which was discovered by the Israeli military in March this year and runs into Sinai for a distance of 2km. These tunnels are used to smuggle in more conventional weapons and explosives from Egypt, so Gaza's bomb makers very rarely try to produce TATP. There is no need when more stable and efficient compounds such as ammonium nitrate or urea nitrate are available.

Perhaps ironically, because of the levels of security in the West Bank Michael Cardash predicts that TATP will be around for a long time yet, terrorists having little other choice. The Israeli authorities have attempted to monitor and restrict large quantities of TATP precursors from entering the West Bank, but in truth not much can be done. "No matter what we do, committed individuals will always find a way," he stated.

There will no doubt be accidents in the production of large amounts of TATP, as the Israeli Police have already seen, and in their experience these incidents are often followed by an increase in production of more traditional explosives. Pipe bombs filled with smokeless powder or black powder are the most common, but eventually TATP will be back in production as people forget or techniques improve.

Looking to the future, Israel is following events in Syria closely. Fundamentalists currently operating in that region will, at some point, turn their attentions to Israel with whatever weapons they have acquired in the munitions free-for-all that is war-torn Syria. Given the seemingly limitless supply of explosives in the hands of rebels and groups affiliated to them, it is unlikely there will be an increase in the use of TATP in Israel during and in the aftermath of the Syrian conflict, though. Perhaps quite the opposite.

Whatever the outcome of the Syrian conflict TATP will remain a very real threat in Israel for the foreseeable future. And after almost 30 years' experience of responding to IED incidents Mr Cardash concluded with some sage advice: "No matter how you try and prepare for dealing with TATP incidents it is important to remember that laboratory synthesised TATP from government chemists is very different to TATP produced by terrorist groups. Lab based TATP is pure and usually desensitised. Illicit TATP is synthesised using different acids at different concentrations and of varying quality so sensitivity can vary considerably. To our cost we have discovered that the real problem occurs when you assume TATP found in the field will be like your own lab produced compound".

*The monster under the bed. How well would you sleep with this TATP under you? ©M. Cardash*