

TIRE DEFLATION DEVICES

RISK VERSUS REWARD

A Ten-Year Examination of
Law Enforcement Fatalities



**NATIONAL LAW ENFORCEMENT OFFICERS
MEMORIAL FUND**

MEMORIAL | MUSEUM | OFFICER SAFETY & WELLNESS

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Tire Deflation Devices

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INTRODUCTION

The National Law Enforcement Officer Memorial Fund (NLEOMF), through its partnership with the National Highway Traffic Safety Administration (NHTSA), has researched and analyzed law enforcement line-of-duty deaths associated with vehicles and traffic for over ten years. This effective collaboration has consistently endeavored to utilize actionable data to make law enforcement officer's jobs safer and provide leaders with solid recommendations to improve safety and reduce crashes.

The NLEOMF serves as a national clearinghouse for information and statistics on law enforcement line-of-duty deaths, as it tracks every manner of death that has occurred across the history of law enforcement in the United States. The NLEOMF remains the only institution in the nation with the ability to capture, analyze, and report on fatal law enforcement traffic incidents in this manner.

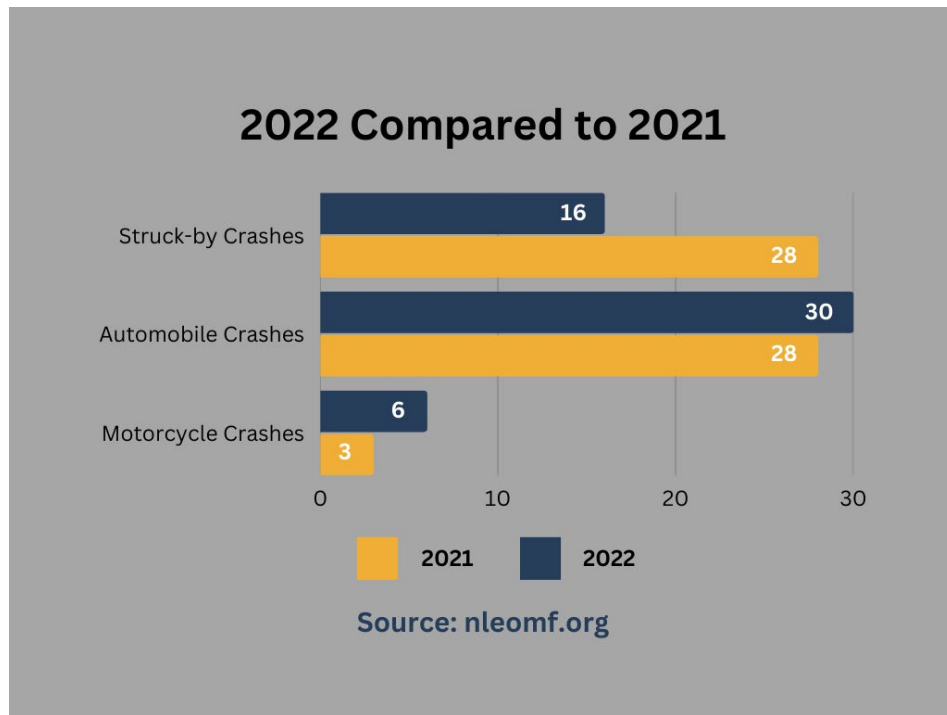
The NLEOMF conducts crucial research into how officers are being killed and regularly disseminates that information. The NLEOMF hosts a national database of programs that promote officer safety and wellness at no cost to agencies.

This involves continually reviewing "on the job" safety, officer tactics, and innovations in wellness to better support law enforcement officers nationally. Since 1990, the NLEOMF has captured proprietary data and regularly published its findings to raise awareness and make the job of policing safer. The NLEOMF breaks down the numbers and provides context to the figures as it helps stakeholders grasp the emerging trends.

DATA

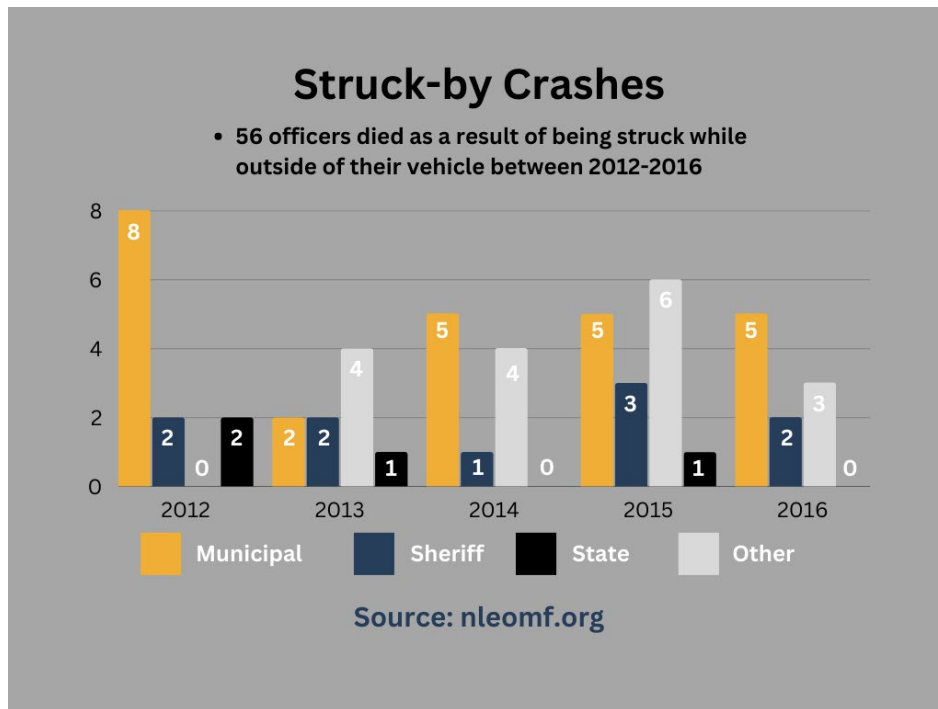
Through the NLEOMF's unique ability to obtain important law enforcement fatality data and analyze it, the NLEOMF has disseminated reports that identify trends and commonalities in line-of-duty deaths and provided recommendations to help enact change and save lives. The partnership with NHTSA allows the NLEOMF to constantly deliver important information to law enforcement on officer-involved crashes and to raise awareness about some of the preventable tragedies that involve law enforcement on our nation's roadways.

Using this data, the NLEOMF has identified specific trends leading to law enforcement traffic-related fatalities and shared those findings through presentations, messaging, videos, and infographics.



Research year to year comparison chart of fatal law enforcement crashes by type

In 2023, as the overall numbers of struck-by crashes (Officers hit by vehicles while on foot) began to decrease from a high in 2021, researchers in the NLEOMF's Officer Safety and Wellness Division turned their attention to the use of Tire Deflation Devices (TDD), often referred to generally as "Stop Sticks", or "Spike Strips," to get a better grasp on the danger they may pose.



Recent Research chart tracking Struck by crashes over five years by agency type.

PROBLEM

Despite reductions in some types of crashes, the researchers began to focus their awareness on the consistent series of struck-by crashes that involved the use of TDDs. These cases are a subcategory of the overall struck-by cases and present a persistent concern. The attention paid to the use of these devices is not new and has been written about in law enforcement publications and online law enforcement websites. According to a September 1, 2012, FBI Bulletin, the use of spike strips began in 1996. “Since that time, drivers have struck and killed 26 law enforcement officers, five in 2011-the most since 2003, which also featured five officer deaths.” (FBI, 2012)

The NLEOMF researchers conducted a review of their Line-of-Duty Death database and found **42** line-of-duty deaths directly linked to the “Placing of Stop Sticks”, between 1996 and 2022, which is nearly two deaths each year.

Between 2013 and 2022, there have been 17 officers struck and killed while deploying these devices and an untold number of injuries. As of the writing of this report, there have been three law enforcement officers struck and killed in 2023, while deploying TDDs. Two cases which involved state troopers from the same agency in separate incidents. (Vince, 2023; ODMP, n.d.).

The NLEOMF felt an examination of the continuing use of these devices important to better inform the law enforcement community of the circumstances that have led to tragedy and to raise awareness of the risk officers take when deploying tire deflation devices.

CASE STUDIES

The NLEOMF research team began looking more closely at TDD-related deaths in 2020 and continued to track them as it conducted its ongoing analysis of fatal law enforcement crashes. Following a National Law Enforcement Traffic Safety Summit, held in Washington, D.C. in 2022, a report was prepared (Partnerships Advancing Protection) in which TDDs were identified as a safety issue. Their use was discussed by several of the expert panelists and presenters at the summit. (NLEOMF, 2022., pp. 4, 10, 16).

The summit, and continuing reports of deaths and injury connected to these devices, prompted the NLEOMF to conduct an in-depth case review of ten years of line-of-duty deaths associated with the use of TDDs. This comes at a time when some agency leaders and risk managers are reconsidering their use. (McGee, 2021).

After that review of fatal law enforcement crash data, 17 cases were identified as directly involving the use of TDDs. The NLEOMF research team analyzed the submitted case information and examined each case to better understand the circumstances under which the TDDs were deployed, and what commonalities may exist among the 17 fatalities.

ANALYSIS

A thorough review of the circumstances of each death was conducted through an examination of the required documentation submitted by an agency needed to determine an officer's eligibility to be added to the National Law Enforcement Officers Memorial. That confidential documentation consists of a completed NLEOMF Data Form signed by the submitting agency head (Chief, Sheriff, Director), a death certificate, a crash report, investigative reports, Computer Aided Dispatch (CAD) reports, news clippings, and in many cases postmortem examination reports.

The officers and agencies involved are not identified in this report. This is an examination of the circumstances that may have contributed to the officer's death and the NLEOMF does not wish to disparage the memory of an officer, nor do we wish to impugn an agency or officer. These officers were selflessly acting in the public's interest to bring the pursuit to a swift and safe conclusion.

Once the researchers began to examine the individual cases maintained in the NLEOMF's restricted database, they evaluated what information was available in each case and worked to establish what they believed were the key pieces of information to be extracted from each case. These important pieces of information were also based upon a review of the guidelines and training instructions for three manufacturers of TDDs.

A list of important data points was created and as both researchers reviewed their respective cases, they worked to draw out those facts to fill in the specific data points on each case. Apart from capturing the basics, such as agency type, state of occurrence, and environmental conditions such as lighting, the researchers established that it would be important to grasp the following significant data points:

- What was the pursuit for?
- Was the officer who was struck, in the act of deploying the TDDs or retracting them?
- What speeds were involved?
- Who struck the officer?
- Were others injured?
- Did the deploying officer(s) have adequate protection?
- Did the TDD deployment work?

The researchers also noted what crimes the fleeing suspect(s) were charged with in relation to the fatal crash.

Some of the case information did not have the complete details the researchers were seeking, so in each case, additional open-source research was conducted in an attempt to glean more details. News reports, YouTube videos, and TV live shots from the scenes of many of these tragedies often provided greater context and helped answer specific areas of concern that were not clear from the available documentation.

One of the additional questions the researchers wanted to answer was whether a supervisor had been involved in the decision to deploy the TDD. This proved to be difficult to discern in many cases from the available materials. In a few cases, it was evident through submitted documentation that a supervisor approved the deployment or requested that the TDD be deployed.

In addition to the fatality case research, the team reviewed the training videos and training lesson plans for the products *Stop Stick* ©, *Stinger Spike System* by Federal Signal© and the *Nighthawk Remote Pursuit Prevention Technology*, by Matador © These reviews provided an understanding of these devices' intended use and their manufacturer specific safety warnings.

Furthermore, a review of readily available YouTube videos and videos used in training from programs like Below-100, depicting officers using TDDs, provided a better understanding of how these devices are commonly being used in the field. The researchers reviewed publicly posted videos, some of which contained multiple segments depicting the use of TDDs. These videos were in addition to the videos and news clips that were directly associated with the 17 cases being studied.

CASE ANALYSIS

The 17 cases reviewed occurred between 2013 and 2022 and involved police agencies in 14 different states. Seven of the cases were state police agencies, seven were municipal (city or town) agencies, and five were sheriff's offices. Sixteen of the slain officers were male and one was female.

Ten of the cases occurred at night in low light conditions and seven occurred during daylight hours. The weather may have been a factor in one of the cases as it had recently snowed.

The reasons for the pursuits ranged from failing to stop for a traffic violation to armed robbery. In four cases the pursuit began after a suspect fled a traffic stop. Three of the cases involved armed robbery, and six of the cases involved a stolen automobile. The remaining pursuits involved a hit and run, a suicidal person, and shots fired report.

In 13 of the cases, the officer(s) were struck by the fleeing suspect vehicle. In three of the cases, pursuing police officers struck and killed the officer, and in one case, a civilian truck driver struck and killed the officer. In 13 of the cases, the officer who was killed was in the process of deploying or had deployed the TDDs. In four of the cases the officer who was killed was attempting to retract the TDD from the roadway.

Beyond the 17 fatalities documented above, an additional eight other officers were injured as a direct result of crashes related to the 17 fatal TDD deployments.

Several suspects were also killed during these incidents. In one case, two of three suspects in a fleeing vehicle were killed when they crashed avoiding the TDDs. In separate cases, one suspect was fatally shot by officers after crashing and another suspect died by suicide when he was eventually stopped and surrounded.

A report of the estimated speeds of the chase could not be found in two of the cases, but the average (mean) estimated speed of the pursuits involved in 15 of the TDD deployments was 93 mph. Five of the cases recorded chase speeds at over 100 mph.

In 11 of the 17 cases, the TDD deployments were unsuccessful in deflating the suspect vehicle tires. In three of the cases, it is unclear if they worked and in three of the cases the TDDs did deflate at least one tire on the suspect's vehicle.

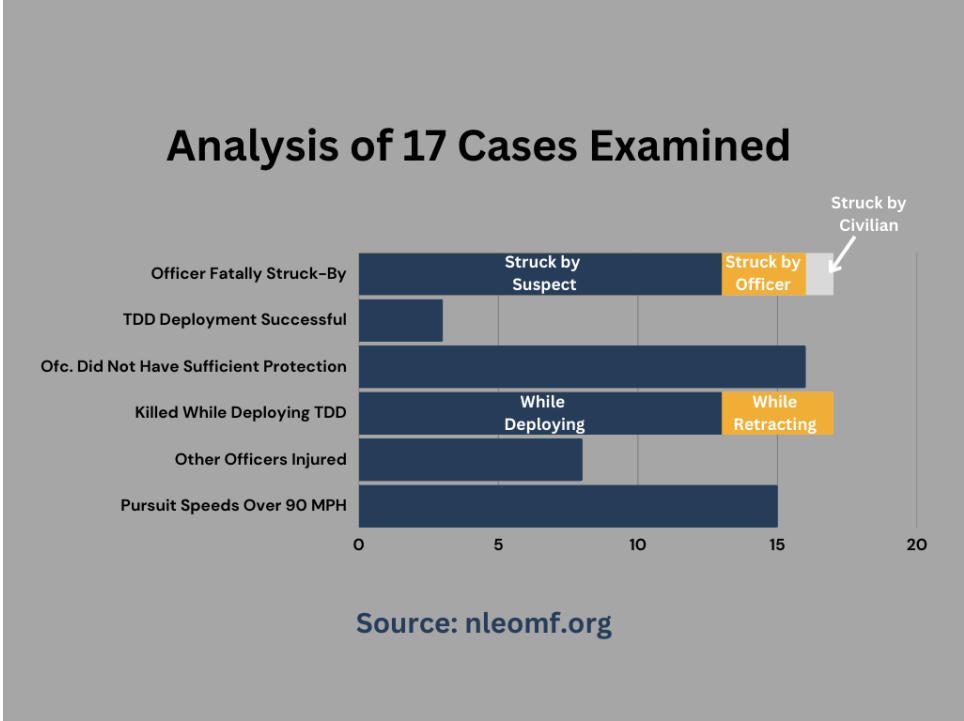
In 13 of the 17 cases, the suspects were captured and charged with murder. The murder charges stemming from the killing of the officer, ranged from 1st to 2nd and 3rd degree depending upon state laws and the mitigating factors in each case.

KEY FINDINGS

The review of these cases involving the use of TDDs was motivated by the inherent danger associated with their use and the consistent number of deaths associated with their usage. Based on the research there are nearly two deaths (1.7) each year connected to their use.

A total of 21 lives were lost in the 17 incidents studied (officers and suspects). Eight officers were injured, and multiple vehicles were damaged.

The most common element in all the examined cases was the fact that officers were not adequately protected when they prepared to deploy the TDD and, in some cases, they were completely exposed when attempting to deploy or withdraw the TDDs. Through the review of videos, crash reports, statements, and investigations, officers are putting themselves at tremendous risk when deploying these devices and not following the product guidelines and associated training.



In 10 of the cases, officers who positioned themselves ahead of the pursuit deployed the TDD using only their police vehicle as cover. Positioning their vehicle on the shoulder, the median, and in some cases in the roadway, officers did not provide themselves sufficient protection or adequate distance from the roadway should the suspect vehicle or a pursuing police vehicle swerve or lose control. This, according to the training guidelines and safety warnings provided by *Stop Stick*, is not adequate protection. Officers who were on the shoulder near their cruiser were often struck as the suspect swerved to avoid the TDDs. In some instances, officers were killed or injured as their parked police vehicles were forced into them by the fleeing suspect's vehicle.



Suspect vehicle avoids the TDDs but slams into the deputy's cruiser. (Below 100)

<https://www.youtube.com/watch?v=5ILlyMhcGoU>

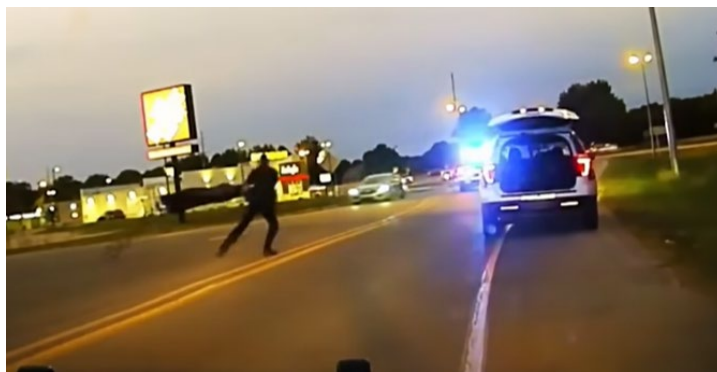
In seven of the cases, the officers were in the roadway when they were fatally struck. From the review of these cases, it appears that only one officer was away from the roadway at any significant distance, and it appears that other officers neglected to use the full length of cord that the products are equipped with. The minimum cord length of the three products reviewed was 40'. It also appears that in some cases officers hastily deployed the TDDs by throwing them out in front of the suspect vehicle as it sped towards them without using the tether at all. In none of these cases were the officers behind a suitable protective barrier.



Image from video compilation of TDD Deployments. <https://www.youtube.com/watch?v=FsX60zvAaLg>

This is the core of the concern, and it was reinforced in nearly every video that was reviewed as the researchers repeatedly watched officers hastily retrieve a set of TDDs and run out into the roadway to throw the TDD directly in front of the speeding suspect vehicle.

In other cases, officers waited without using the tether to pull the TDD across the roadway into the path of the fleeing suspect vehicle and instead threw the TDD in front of the suspect vehicle anticipating it to run over the spikes.



Police dash Camera image, <https://www.youtube.com/watch?v=sEbHsVCTOow>

According to the *Stop Stick* website they have recorded over 4000 successful uses of their product reported by law enforcement in the last two years. (Stop Stick, n.d.). There are several other product lines, and the use of these devices is quite common in today's pursuit termination strategies.

It is not the devices, but the way they are being used that presents the danger. The training guidelines from *Stop Stick* clearly and emphatically state, **“Under no circumstances should a deploying officer enter the roadway to deploy or retrieve *Stop Sticks*!”** (Stop Stick, 2023).

Further, only trained personnel should use *Stop Stick* and when preparing for a deployment:

“Officers should also be prepared to find substantial cover in the location, such as a large tree, guard rail, or other objects of sufficient structure capable of stopping an approaching vehicle. Patrol vehicles are not adequate cover.” (Stop Stick, 2016).

In most of the cases studied, and in many of the listed videos that were reviewed (Appendix A), officers were parked along the side of the road ahead of the pursuit, using their patrol vehicles as cover. Based on the review it seems as though several of the officers failed to recognize the inherent danger or felt compelled to run out and try and "spike" the suspect's car tires.



Officer runs out ahead of fleeing suspect vehicle to throw out a TDD.

https://www.youtube.com/watch?v=FvBpJNO_i60

This overtly dangerous action must be avoided, and supervisors must approve TDD deployments only when they are sure that the deploying officer is behind substantial cover and using the provided tether to draw the TDD along the pavement and then quickly remove it from the roadway.



Officer is protected by guard rail.

The proper procedure was also demonstrated in the training video for the *Stinger Spike System*, (2017) where officers are up on the curb and utilizing the full 40' of the tether cord from a safe distance.

The third system reviewed was the *Nighthawk Remote Pursuit Prevention Technology*. This system is designed to prevent what is precisely the core circumstance of fatal deployments. The officer places a box containing a coiled TDD and remotely deploys and then retracts the TDD without having to be near the roadway. (WOOD TV8. 2015)

Another crucial element in our findings, which was a factor in at least one of the cases reviewed, was communication. Communicating the location of the deployment of the TDD along the pursuit route is paramount and pursuing vehicles must slow down to allow for the deploying officer to remove the TDD from the roadway.

As previously mentioned in this report, in three of these cases the officer was struck and killed by a fellow officer. This is unimaginable, and potentially creates a circumstance where the striking officer would struggle to remain in service due to extreme exposure to the universal and predictable symptoms of post-traumatic stress.

RECOMMENDATIONS

From the cases reviewed, key recommendations from the NLEOMF include the following:

Train and Create a Policy

Law enforcement agencies that utilize every brand of TDD must review their policy and ensure that their officers don't engage in the unnecessarily risky action of hastily deploying TDDs to end a pursuit. Officers must not enter the roadway. This should be reflected in the training and written policy for each agency.

Deploying Officers Must Not Attempt to Throw the TDD into the Fleeing Vehicle's Path

The research clearly demonstrates that officers are taking an enhanced risk by stepping out into the roadway to deploy the TDD, and in three of the cases officers were struck while stepping out into the roadway to retrieve the TDD.

A Police Vehicle Parked Along the Shoulder, Ahead of A Pursuit, is Not Adequate Protection.

The research shows that in 10 of the 17 fatal cases, officers had pulled to the side of the road, and in a several cases, stopped in the oncoming lane to intercept the fleeing vehicle and deploy the TDD from behind their vehicle. Using only their patrol car as cover. This is insufficient cover and may cause the suspect to anticipate the deployment and cause them to swerve at high speed to avoid them. In turn, the suspect vehicle crashes into the stopped patrol vehicle which can be forced into the deploying officer injuring or killing them. The guidelines for deploying these devices strictly warn against using a patrol vehicle as protection.

The use of distance, and a hard barrier, such as an abutment or guard rail is much more sufficient protection for a deploying officer.

First Line Supervision

As earlier mentioned, the NLEOMF researchers were not able to determine if a supervisor or senior officer was involved in making the decision to utilize the TDD in most of the cases but believe them to be an important part of the decision to deploy a TDD. First-line supervisors must approve the use of these devices and ensure that the TDDs are deployed safely with adequate protection for the deploying officer.

Policies should be updated on the use of TDDs so that only trained and certified members may deploy these devices and training reviews must be held regularly.

Supervisors who are monitoring pursuits must ensure that the officers who are preparing to deploy a TDD are trained and doing so from a location that provides the officer solid protection.

Communication

Once a pursuit has begun, and a determination has been made to attempt to deploy a TDD, that precise location must be broadcast to all agencies in the pursuit. This is complicated when you have multi-jurisdictional involvement in a pursuit. A shared radio channel which agencies can utilize to coordinate pursuits is critical. This provides pursuing officers notice to be alerted to the impending deployment of a TDD ahead and to slow down. In one of the videos reviewed, several patrol cars were disabled by a lack of communication and the inability of the deploying officer to get the TDD out of the roadway in time as pursuing officers were too close.

Pick Your Location

Finally, all agencies that are using TDD devices, especially those with long stretches of highway, should select predetermined locations along their major roadways and routes where officers can go directly and reposition themselves to safely intercept the fleeing suspect's vehicle.

These preselected spots should provide cover and ideally provide concealment for the deploying officer, who should be well off the roadway as they drag the TDD into the path of the fleeing vehicle.

CONCLUSION

One could logically surmise that each of these fallen officers tangibly knew the inherent dangers associated with attempting to deflate the tires of a speeding vehicle driven by a person determined not to be stopped.

To some degree, these officers knew the risk, and perhaps in the heat of executing the mission, they put themselves in harm's way doing what they believed was right. Had they survived their respective encounters and had the ability to examine the circumstances of that incident, it is likely they would have a cautionary tale about the use of these devices.

Every officer currently using TDD's must use these tragic losses; as just that, a cautionary tale. No officer should be knowingly placing themselves in a position where the outcome is so predictably tragic.

Our nation's heroic law enforcement officers deserve sound policies and regular training in the use of TDD's. This should be done with an eye towards proper usage and risk management. The TDD manufacturers guidelines must be strictly adhered to and incorporated into these policies and training protocols.

No officer should lose their life in the termination of a vehicle pursuit. The reward is a fleeing law breaker in custody, but the risks come in many forms; destruction of department property, significant bodily injury to involved personnel, and the unthinkable loss of an officer's life.

These deaths were and are preventable. We urge every law enforcement administrator, commander, supervisor, and rank and file officer to not allow the ultimate sacrifices paid by the officers in this report to be in vain. Rather, honor their memories, learn from it, and prevent future occurrences.

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ATTACHMENT A (URLs of TDD Deployment Videos Reviewed)

The Official Stop Stick Training Video

www.youtube.com/watch?v=pWwOziWi9Mc

Law Enforcement Officers Practice Their 'Stop Stick' Skills

www.youtube.com/watch?v=yeHjsBm8-gw

Dodge Charger Going 150 mph Avoids Stop Stick

www.youtube.com/shorts/QhKL2D1eAGI

Spike Strips for The Win

www.youtube.com/shorts/Y9rCMj644CU

Police Chase Kidnapping Suspect (January 2023)

www.youtube.com/watch?v=cyuQis0HaMs

Police Use Spike Strips During Chase! Best Moments

www.youtube.com/watch?v=5ILlyMhcGoU

How Not To Deploy Spike Strips

www.youtube.com/watch?v=StAG3KphQxs

Stolen Colorado State Patrol Vehicle Ends in Fatal Crash

www.youtube.com/watch?v=orTIMAOgYEg

FCSO Stop Stick Deployment

www.youtube.com/watch?v=2I3_WLFGiho

Private Video

www.youtube.com/shorts/qOXXFnjPVtg

Police Pursuit – Spike Strip

www.youtube.com/shorts/U0_YOAxp4pE

Stolen Hellcat vs Police | Stop Sticks FTW

www.youtube.com/watch?v=6-mYPQLPE_A

Watch: Osceola Deputies Use Stop Sticks to Destroy SUV Tires Driven by Wanted Man

www.youtube.com/watch?v=BlcbbsG4JQk

Greenfield Police Use Stop Sticks in Pursuit of Stolen Vehicle

www.youtube.com/watch?v=YNCHzqmcAb8

Best Spike Deployment Ever! 100 mph Pursuit of Stolen Astro Van

www.youtube.com/watch?v=FvBpJNO_i60

NightHawk – Re-loadable and Reusable RoadSpike Strips!

www.youtube.com/watch?v=k4l_AudN6F4

Police Spike Trap Wins and Fails Compilation

www.youtube.com/watch?v=2tDcvvrJe8w

Police Use Spike Strips in Real Chase. Epic Moments

www.youtube.com/watch?v=FsX60zvAaLg

US Police Officer Stops Car Chase by Bursting Suspect's Tyres with Spike Strip

www.youtube.com/watch?v=0KRpfpkpwKg

Police Pursuits Ended in Accidents. Spike Strips and Activity

www.youtube.com/watch?v=NJgrI9VjrAA

Driver Crashes After Hitting Spike Strip in High-Speed Chase in Central Florida – August 16, 2020

www.youtube.com/watch?v=th1uKJ7Ztm0