POLICE 1

EXPEDITING INVESTIGATIONS: ADVANCED TOOLS FOR THE CRIME SCENE

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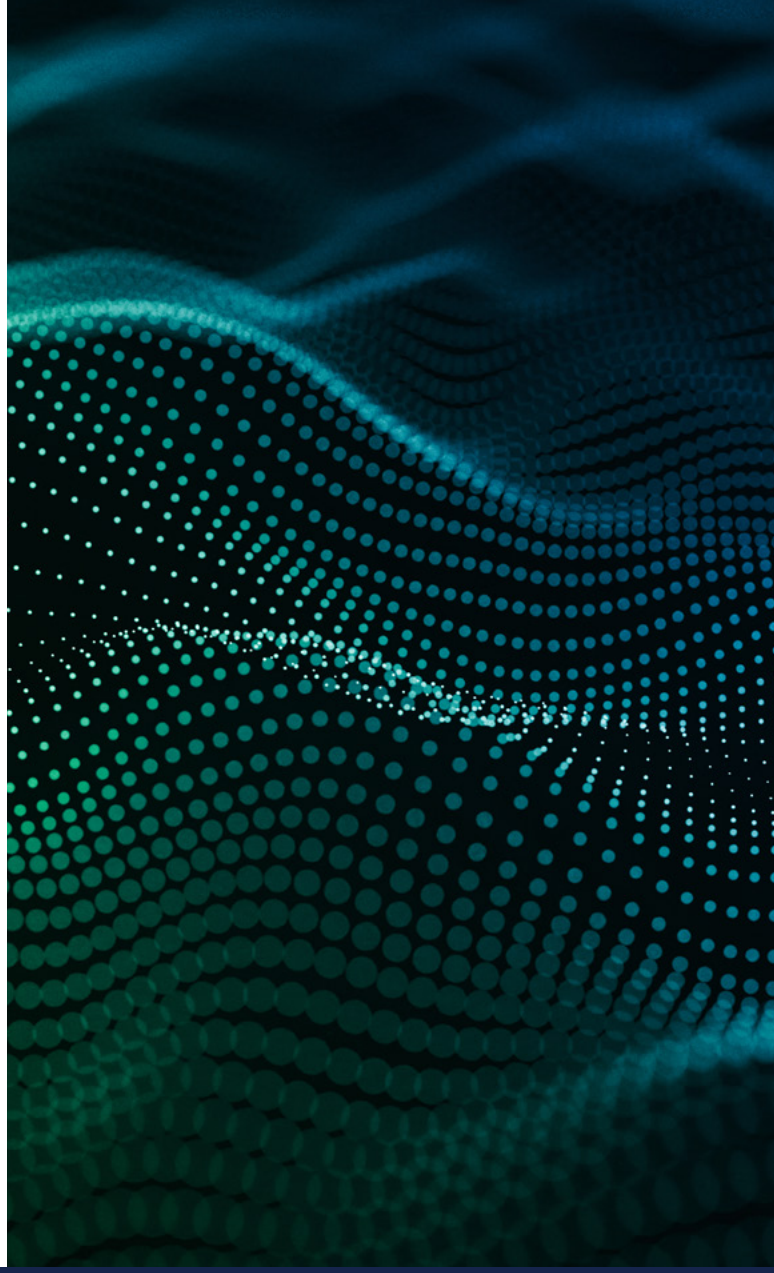
FROM THE EDITOR

In today's increasingly complex law enforcement world, having the right tools at a crime scene can make all the difference. This eBook highlights technology designed to support officers in the field by expediting investigations and enhancing safety.
From narcotics detection and rapid DNA processing to the identification of hazardous chemicals, these instruments equip agencies with the capability to act quickly while prioritizing safe outcomes. As criminal activity becomes more sophisticated, embracing these innovations is critical to ensuring that officers have the resources they need to protect and serve their communities effectively.

Nancy Perry, editor in chief, Police1



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SAFER STREETS, FASTER RESULTS:

HOW THIS DEPARTMENT IMPROVED THEIR NARCOTICS IDENTIFICATION PROCESS

A HANDHELD ANALYZER BENEFITS DRUG BUSTS AND MORE

Stemming the tide of drugs in any given community takes careful planning and an immense number of man-hours, but it's a task that's well worth the outcome. In many instances, officers within a department's drug control unit will work undercover, buying narcotics in an attempt to establish probable cause. These drugs pose a huge safety risk to officers on the receiving end, as some can kill easily while others may be an entirely different substance than what they claim to be.

"When we buy drugs with our informants or as undercovers, we need to test them right after for two reasons – number one is safety," said Detective Brian Coen. "Because we aren't using the drug, we don't always know if it's real or not. Often times a dealer might call and say, 'Hey, how was it?' You're not going to say it was great when you just bought a bag of baking soda. Testing also helps establish probable cause to obtain search warrants for people's vehicles or houses. Knowing that a substance is actually a narcotic can also help us make a second buy to help further a case."

With over two decades of law enforcement experience, 19 of which have been as part of the drug control unit at the Quincy Police Department in Quincy, Massachusetts, Coen understands the importance of fast and accurate testing tools.

"We're trying to find the source of supply so we'll climb the ladder," he said. "We try to cut off the source and we need tools like the TruNarc to help identify what we're buying."

COMPLEX ANALYSIS MADE SIMPLE

When Coen started his law enforcement career, he noticed that identifying drugs on the street was relatively straightforward. "Nine times out of 10, a bag of white powder was cocaine," he explained. "Now it could be anything – fentanyl, methamphetamines, bath salts or even explosives."

Today, after completing a drug purchase, Coen and his team will bring narcotics back to the station and test them using the Thermo Scientific TruNarc Handheld Narcotics Analyzer. A small, handheld device with an extensive built-in narcotics library, it uses advanced technology to test substances without needing to make any contact. Not only does this minimize contamination but it provides a significant boost to officers' safety. Coen says officers have been cut with glass shards in the past while a gust of wind can scatter powder in the blink of an eye.

The TruNarc uses Raman spectroscopy – a testing method that shines a laser through glass or plastic packaging into a substance and produces a result based on how the substance's molecules react to the laser. While the TruNarc library will inform officers whether an unknown material is one of over 500 narcotics, a substance without a library result can be analyzed by a Ph.D. spectroscopist through the company's reachback service.

Substances with low concentrations of narcotics can pose a challenge when using traditional Raman spectroscopy as they can be hard to read or emit high levels of fluorescent light which interferes with the results. To overcome this, TruNarc users can turn to a Type H kit to help officers determine if a pill or powder poses a safety threat. This is especially useful with dark-colored substances like black tar heroin, says Coen.

Qunicy PD was the first agency to adopt the TruNarc and began beta testing when the device came onto the market in 2012. At that time, Coen used it to scan known narcotics in the department's drug locker and noted the analyzer produced results with 100% accuracy.

"We looked at the TruNarc from the beginning as something that's safer because it's non-contact," he said. "You can't put a price on safety, so that's why we adopted it. Then we realized not only how valuable it was for safety reasons but the accuracy of the device."

QUICK RESULTS BRING MANY BENEFITS

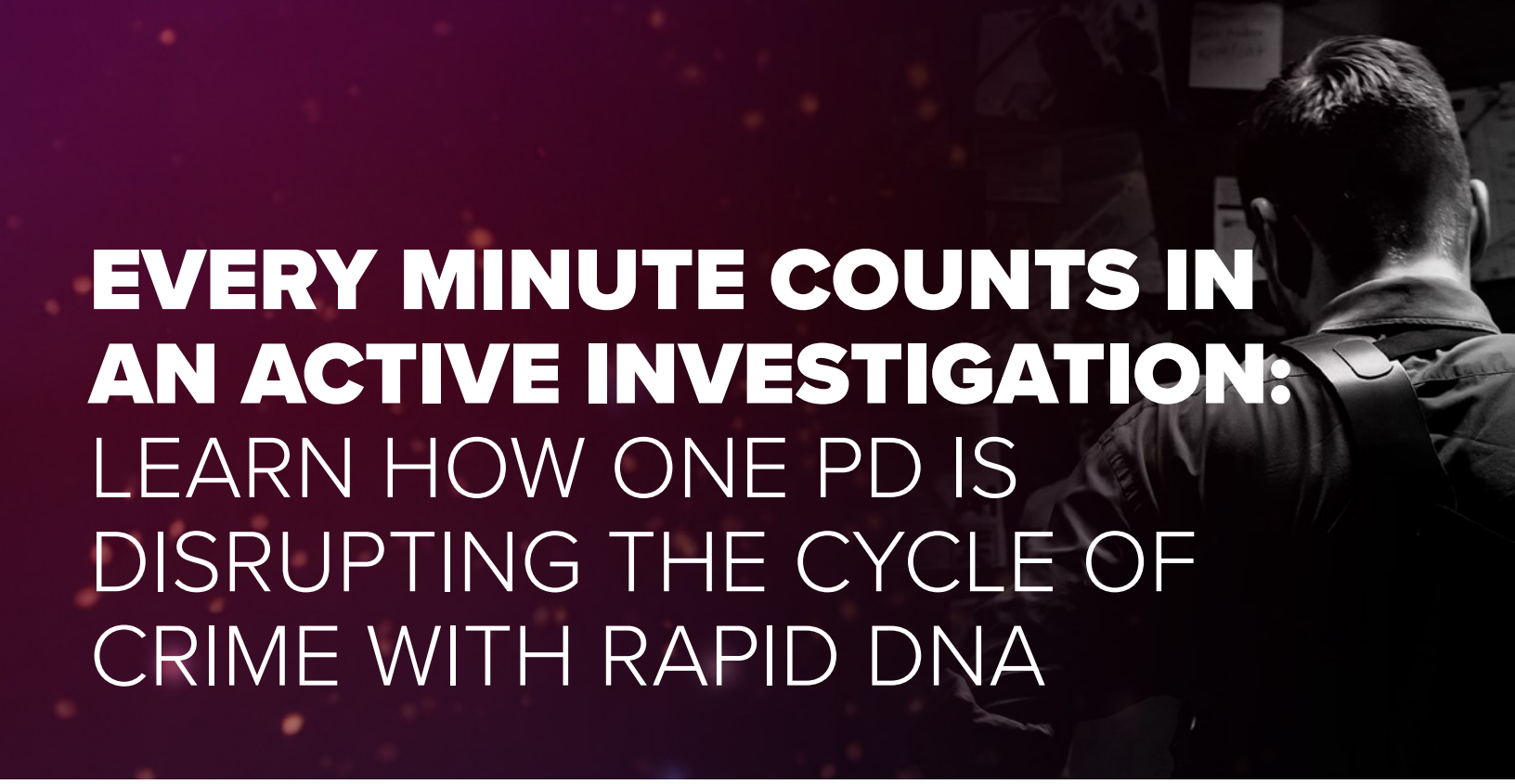
The TruNarc helps Quincy PD stay safe when purchasing drugs undercover yet also helps expedite investigations in another, less obvious way. Coen notes that by having preliminary results from the TruNarc, many cases result in plea agreements rather than remaining on track for a full court hearing – and potentially letting the offender back out onto the street.

"If we're going to criminally charge someone with either possession or possession with intent to distribute, we now know how to charge them correctly rather than waiting on lab results," he said. "We still need lab results for confirmatory testing and prosecution, but many times the cases are pleaded out."

Additional types of investigations also benefit from the TruNarc too – not just undercover drug operations. If an individual needing medical treatment is found with drugs on or near their body, officers can use the analyzer to test the drugs and let fire or EMS crews know what they're dealing with, explains Coen.

Immediate, on-scene testing is also helpful at the scene of a death where an overdose is suspected. Since narcotics have a finite lifespan in the body, the testing of any drugs in the area can help medical examiners know what to look for during an autopsy.

"Safety is paramount in everything that we do," said Coen. "Just knowing what we're dealing with is essential."



EVERY MINUTE COUNTS IN AN ACTIVE INVESTIGATION: LEARN HOW ONE PD IS DISRUPTING THE CYCLE OF CRIME WITH RAPID DNA

FASTER DNA RESULTS ALLOW INVESTIGATORS TO CLOSE CASES SOONER AND PREVENT ESCALATING CRIMES

The thrill an investigator feels when they've gotten a really great lead is indescribable. So, too, is the frustration one can experience when an investigation seems to be going nowhere. Leads can make or break a case, and more and more agencies are turning to advanced tools to help identify persons of interest.

There are a lot of technology platforms in the law enforcement space today that can help with facial recognition or geolocation tracking, but the results they provide are still just another step in the right direction – they don't necessarily provide concrete proof as to an individual's involvement in a crime.

What does help investigators close cases is DNA evidence. Unfortunately, receiving results from a DNA lab can take weeks or even months, possibly allowing a perpetrator to commit another crime instead of being held behind bars. With the invention of Rapid DNA technology from Thermo Fisher Scientific, that long wait time can now be a thing of the past.

RAPID DNA TESTING IN ACTION

Police in Fishers, Indiana don't see a lot of violent crime in their suburb of just over 100,000 residents. Their town does, however, border Indianapolis, a more metropolitan area where criminals don't abide by county lines. The Fishers Police Department adopted the RapidHIT ID system as a way to help build their DNA database and close cases more efficiently.

"What we really try to focus on is disrupting the cycle of crime while specifically targeting low-level offenders and getting their DNA in our database before they escalate," said Lt. James Hawkins, a 19-year law enforcement veteran and integral part of the forensic services unit. "When a patrol officer stops a car and there are guns

and drugs in the vehicle, they're going to get a search warrant for the suspect's DNA. We're going to use conventional DNA to test the illegal crime gun for the suspect's DNA, but we're also taking those samples and putting them into the RapidHIT ID system."

Hawkins explains that moving toward using the RapidHIT ID system required a mindset shift, particularly for officers on the streets day in and day out. "How many homicides start as a low-level drug offense where a drug deal went bad?" he pointed out. "When we got patrol officers on board with increasing our consent program, we found about 80% of subjects who we asked for consent for DNA would give it to us."

STARTING FROM THE GROUND UP

While command staff at Fishers PD were excited about bringing Rapid DNA technology into their investigation processes, establishing the program took some time and careful planning. Hawkins was responsible for its implementation and started with an immense amount of research.

"At the time, we were the only ones in the state of Indiana who had Rapid DNA," he said. "I had to educate myself about what it could do and what possibilities for advancements it could bring to the forensic services unit."

From learning about the testing mechanism itself to exploring best practices and staffing logistics, Hawkins spent nearly a year getting the program ready before the department started using the machine on a daily basis. An integral part of using RapidHIT ID to its full potential was Fishers PD's ability to connect with other agencies throughout the state.

"Any time you're the first agency in the state to do something like Rapid DNA, you don't have that outline to follow," he said. "There are a lot of learning curves involved in making sure all the right agencies and all the right units are involved."

Fishers PD not only collects DNA during some traffic stops and at crime scenes, but the department partners with their crime reduction unit, internet crimes against children unit and the FBI's violent crimes task force based out of Indianapolis to gather samples and add to their database.

"You're really only limited by your own imagination on how you can use Rapid DNA within your agency," Hawkins expressed. "There's a strong likelihood that there's a way to make it work well, so agencies shouldn't be afraid to be the first in their area to do something like this."

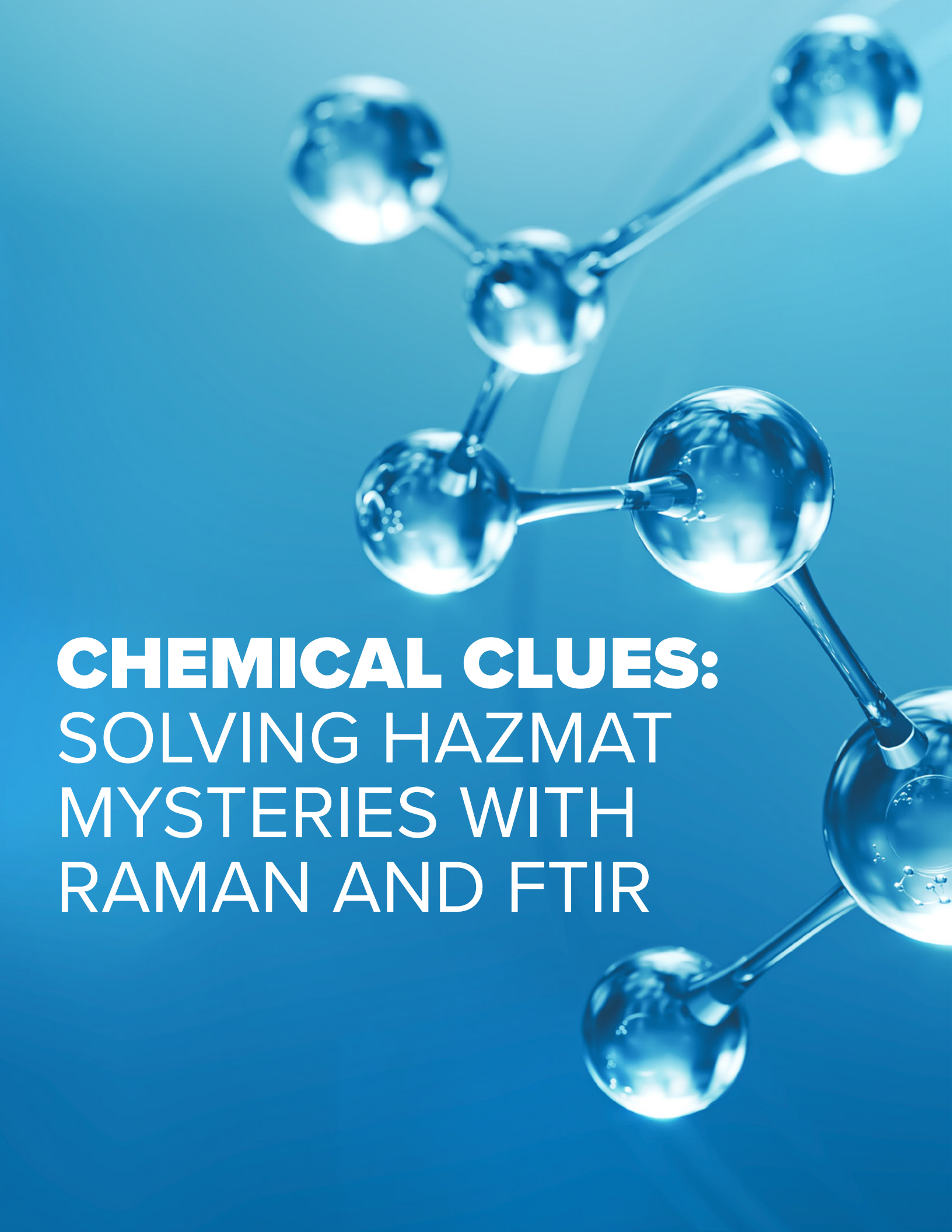
EFFICIENCY AND EFFICACY IN ONE

It makes sense that the sooner a criminal is convicted, the safer a community will become. But confirming a suspect's DNA in as little as 90 minutes with the RapidHIT ID system does more than get perpetrators off the streets before they can commit another crime – it helps free up valuable time for officers to pursue other investigations.

"When you start looking at how much time you are spending on an investigation chasing down the wrong leads, focusing in on the wrong person – yes, the testing consumables have a price tag but how does that price tag compare to the three detectives you had spending four days chasing after someone who had nothing to do with a crime?" explained Hawkins. "You have to look at it from the perspective of just being reactive to these crimes, going to the crime scene and cleaning up after compared to getting ahead of it."

Getting ahead of violent crimes is exactly what Hawkins and the Fishers PD have done, a high priority given how quickly technology is changing. He notes that criminals are rapidly adapting to such changes and are taking forensic countermeasures to help ensure they aren't caught. The ability to generate DNA matches in under two hours is key to staying one step ahead.

"The long-term cost to an agency for just maintaining the status quo and having an 'if it ain't broke, don't fix it' mentality is arguably going to be much more expensive than the investment in Rapid DNA technology," he explained. "It's hard to quantify how much money I would've saved by solving a case more quickly, but because I had someone's DNA profile in my system and I was able to get them on a drug or burglary offense, we're able to get them off the street before they escalate to a sexual assault or a homicide." 1



CHEMICAL CLUES: SOLVING HAZMAT MYSTERIES WITH RAMAN AND FTIR

HOW THIS ADVANCED ANALYZER CAN LEAD TO MORE EFFICIENT INVESTIGATIONS

No one thinks mowing their lawn on a hot summer day would turn into a hazmat situation, but that's exactly what happened to one man. Having only purchased his home and the property it sat on about a month prior, he finished mowing his yard and stored his mower away in an aluminum shed. Minutes later, chaos ensued as the shed exploded and the state's bomb squad arrived.

What this man didn't know is that the previous property owners, who were now incarcerated, were running a meth operation and disposing of chemical waste into the well in their backyard. As the waste started to off-gas in the heat, it created an explosive atmosphere inside the shed, and the hot lawn mower caused it to ignite.

While the bomb squad attempted to determine the cause of the explosion, Bill Bennett, president at Houghtons, Inc., began analyzing residuals he found on pieces of broken glass. Drawing on over 30 years of experience in hazmat identification, he used two testing procedures – Raman and Fourier-transform infrared (FTIR) spectroscopy – to uncover petroleum naphtha, the chemical name for Coleman stove fuel. This discovery instantly informed law enforcement that they were dealing with a former drug operation.

"At the time, someone asked me, 'Are you sure that's what this is?'," explained Bennett. "I said, 'I have two different technologies giving me the same answer, and those answers are akin to a chemical fingerprint – and that's Raman and FTIR.'"

TWO TECHNOLOGIES TO RELY ON

Law enforcement investigators can often discern a lot of information about a scene by using only their five senses, but not all substances can be so easily identified. In hazmat situations, where liquids or powders may pose a safety threat, it's important to identify what a substance is quickly and with certainty.

Most hazmat teams use spectroscopy testing to determine the chemical makeup of a substance. Both Raman and FTIR spectroscopy offer reliable results, and many choose to use both methods as they work in different ways.

RAMAN SPECTROSCOPY

This testing method uses a laser to disrupt the molecules in a substance. When the molecules react to the light, some of their photons scatter, and that produces a measurable energy vibration. The results obtained using Raman spectroscopy are displayed visually with noticeable peaks, each representing the molecular vibrations.

FOURIER-TRANSFORM INFRARED SPECTROSCOPY (FTIR)

The science behind this process is somewhat similar to Raman technology except it uses infrared light rather than a laser. Some molecules in a given substance will absorb light instead of scattering. Like results gathered from Raman testing, FTIR will also show visual peaks that correlate to levels of infrared absorption.

CHANGING THE STANDARD

Both Raman and FTIR are considered the gold standard of hazmat testing methods, with investigative teams often using multiple devices to retrieve such results. Yet in 2019, Bennett and the teams he works with found themselves in a position to simplify the process by using only one instrument – the Thermo Scientific Gemini Chemical Identification Analyzer. The only tool to combine both Raman and FTIR testing methods into one device, the Gemini can help streamline hazmat situations.

"It gives officers in the field the ability to determine what's known as a presumptive positive result, meaning you get the same chemical identification with two distinct technologies instead of just one," explained Bennett. "It's a more reliable and, hence, actionable result."

This efficacy not only eliminates the need for multiple tests to confirm the identity of a substance, but it allows scenes to be cleared more quickly, boosting the safety of all investigators present.

While the science behind the Gemini is complex, using the analyzer is simple. It's designed for both novice users with no background in chemical testing as well as those who are experienced in hazmat testing techniques by offering a wide range of onboard tools.

The benefits of combining Raman and FTIR into one instrument extend beyond convenience too, as there is only one device to maintain and stay abreast of software updates. Designed to work in all environments from hot and dry to humid, cold or dusty, the Gemini combines a rugged exterior with sophisticated science.

"It's a very robust instrument for the level of technology it offers in the field," said Bennett.

ADDITIONAL HELP WHEN YOU NEED IT

The chemical library of the Gemini is regularly updated but, in some instances, investigators may come across a substance that yields a "no match found" result despite having an inkling about what it is. In these cases, the Gemini allows users to search for a specific chemical and overlay their results against the search result to see if the visible peaks line up.

In the event a substance can't be matched against an existing library entry, Thermo Fisher supports investigators with its reachback service. Available 24/7, 365 days a year, Ph.D. spectroscopists are available to help – users simply download their results and send them to the company.

"I once used the reachback service at 4:30 in the morning on a Sunday," said Bennett. "After going through the necessary steps and submitting my result, I got a call within seven minutes."

Some substances in small concentrations can also be more easily identified using the Gemini, despite a natural concentration threshold gap that Raman and FTIR both possess. When less than 10% of a substance's concentration is present, the LowDoseID accessory can help yield identifiable results.

"Raman and FTIR really work in a complementary fashion to provide on-scene, verifiable, presumptive chemical analysis," said Bennett. "It's amazing how applicable the Gemini is for hazmat and all levels of law enforcement."

ABOUT THE SPONSOR

When it comes to the detection and identification of radioactive materials, chemicals, narcotics, or explosive threats, ensuring that on-site teams are properly equipped requires a strategic approach. Thermo Fisher Scientific is constantly working to protect against these threats with advanced technology and innovative instruments that offer real-time security threat detection and immediate results.

From routine security monitoring and surveillance to emergency response situations, Thermo Fisher Scientific's integrated analytical instruments help safety and security professionals detect and mitigate hazardous materials, chemicals, narcotics, explosives, and radiological threats to keep the public, and themselves, safe.

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