

Analyze That episode transcript

Turning Unknown Threats into Informed Action: Chemical and Narcotics Identification Analyzers

This transcript has been lightly edited for clarity, readability, and length. The content reflects the original discussion and technical intent of the speakers.

Mike Parsons: Hi everyone, welcome to the Analyze That series. Today we'll be covering our chemical analyzers, which are handheld devices used in safety and security applications here at Thermo Fisher. My name's Mike Parsons, I'm our Senior Product Manager for our safety and security devices. So that includes Gemini, TruDefender, FirstDefender, and our 1064Defender and Defender Omega products.

I've been in this role a little over a year, still learning a lot, but also really learning about what our customers do and how our products serve them in those needs. I will pass it over to Mike Bates to give just a quick introduction on himself and why he's here today.

Mike Bates: Sure. Thank you. My name is Mike Bates. I'm an application scientist with Thermo Fisher. I've been with the company about eight years, working on product development and application development. Our team drives library updates to stay current with emerging threats. We also work closely with customers, reach back support, our offline analysis service, along with method development and case studies.

Mike Parsons: Awesome. Thank you, Mike. Super glad to have you here today and to talk about a really important topic, right? So just to frame the discussion for folks, we'll start off just understanding the macro environment that our instruments are used in and our devices are used in. Then we'll dive into some product specific questions, right? TruNarc, Gemini, and other products that we have in our portfolio and how they serve needs and how we keep up with that evolving landscape that is threat identification and chemical identification.

And so Mike, with that being said, can you paint for the audience a picture of what a typical day for a first responder, an officer in the field, or a hazmat team is that relies on Thermo Fisher safety and security instruments in the field?

Mike Bates: Sure. So we support a wide range of customers. A typical day can mean suspicious powders, pills, vials, packages, drums, spills, residues, or even commercial products that may not be what they seem. So law enforcement customers are often focused on narcotics and contraband. Hazmat and fire teams are focused on unknown chemicals and scene safety. And then customs may see both in the same shift. But what they all need is confidence at the point of decision.

What is this, how risky is it, and what do we do next? So the real value of field analyzers is getting confident answers on the scene instead of having to send samples out to a lab and waiting days or weeks for results.

Mike Parsons: Awesome, thanks Mike. And can you maybe just elaborate a little bit more on how the day in the life of a law enforcement officer is different than a hazmat team at a fire department and just give a little bit more color around that.

Mike Bates: So law enforcement, we might use a customized tool such as TruNarc. And so law enforcement officers are going to encounter hazardous samples that are unique to that role. They're going to want confidence, presumptive positive results, and chain of custody documentation as well.

Mike Parsons: Thanks, Mike. And I think what's clear there is a law enforcement officer's day in the life may look a little bit different than hazmat, right? Law enforcement really focused on narcotics and narcotic threats, whereas fire departments more focused on hazardous material. It could be a chemical spill, could be an unknown package with a white powder inside. It's really, the end application is the same, but the situation looks a lot different across our customer base. So thank you, Mike.

When you think about the impact our devices have on Thermo Fisher's mission to enable our customers to make the world healthier, cleaner and safer, what comes to mind?

Mike Bates: The clearest impact is obviously safer. So we provide safer decision making in the field. We're able to identify the threat sooner. We choose the right response faster and we reduce the guesswork. It's also safer for operators because these tools can reduce the handling and potential exposure when dealing with unknown dangerous materials. Many of these are point and shoot through packaging.

It's also safer for communities because they help officers and responders intercept illicit substances and manage chemical threats before they spread or escalate. We do also certainly make the world cleaner and healthier because these incidents can be contained, documented, and resolved more efficiently when responders understand what they're dealing with right there on the spot. Ultimately, we help the customers turn uncertainty into informed action.

Mike Parsons: I think that's a great punchline, Mike, which is turning that uncertainty into informed action, which is really confidence in the field. That's what our operators and users are looking for is that confidence to make that next decision based on the threat that they're looking at. So thank you.

If we think about those threats, right, they're constantly evolving. There's new synthetic drugs that are coming onto the market, new chemical mixtures, new radiological risks. How do our products help our customers keep up with such a fast changing landscape.

Mike Bates: Yeah, this is definitely a challenge, but keeping communities safe is a never-ending battle, right? So especially with the threat of new narcotics, synthetics, analogs, new mixtures that are constantly appearing. What our team does is we regularly review forensics and law enforcement trends, bulletins, updates to ensure that we can detect these emerging threats. We also work closely with our customers to get direct feedback.

And in addition to these things, we offer reach back support. So for particularly challenging samples that may be an emerging threat that might not even be in the library yet, we can do offline analysis when the customer sends us a scan and our expert scientists can review that and provide a deeper dive to help them make a quick decision.

Mike Parsons: Great. And Mike and the scientific team here at Thermo Fisher do a lot of work here, right? They are constantly monitoring those external reports, customer feedback, and then feedback from our internal teams too, as to what do our customers need to really stay on top of those evolving and new threats in the world. So kudos to Mike and team, you guys do a really great job of that.

Now shifting into a little bit of the product specific, we'll start with TruNarc, right? That's our narcotics analyzer just at its highest level. For listeners who haven't seen it in action, Mike, can you tell us a little bit more about the TruNarc handheld Narcotics Analyzer and what problem it was originally created to solve?

Mike Bates: Sure, so TruNarc is a really purpose-built, handheld narcotics analyzer. So it uses the lab-proven Raman spectroscopy for presumptive field identification. It was created specifically for law enforcement and customs teams that need fast answers on suspected narcotics. We also have precursors, cutting agents. We can quickly identify these things without waiting on the long lead times from lab results.

So one of the biggest value points is the contactless testing because this is point-and-shoot. The Raman laser can transmit directly through most clear or semi-transparent paper packaging and the officer doesn't ever have to take the suspected contraband out of the packaging, right? That really helps to protect them. Reduces exposure, also helps to preserve evidence in chain of custody proceedings.

Overall, it reduces the guesswork and enables officers to focus on the situation at hand by giving them clear, actionable results.

Mike Parsons: That's great. And I think this really it's the confidence, right? For someone focused on narcotics, it gives you that solution you can be confident in in the field to identify narcotics, reduce the need for exposure and sampling material before testing, and really our targeted narcotic solution. That's what TruNarc is.

So if we think about this use case specifically, a narcotics officer, maybe law enforcement officer, walk us through what a typical field encounter looks like and how TruNarc would fit in that workflow.

Mike Bates: Sure, during routine stop or search, say an officer finds suspected contraband, maybe it's a bag of white powder. If the sample's in a clear plastic bag or a clear glass container, the officer can analyze that directly through the packaging so there's no need to open it. There's no risk of exposure to the officer.

Now once they have identified that sample and they've got their device out and powered up, the workflow is very direct: point and shoot scan, minimal handling, and you get results in seconds. A very complex mixture with cutting agents might take up to a minute, but we're talking about a few seconds for analysis time.

And once that analysis is complete, the officer gets very clear results. So they either get a green screen, orange screen, or red screen. Green is ID of non-hazardous substances. Orange is for hazardous materials or known precursors, known cutting agents. And then red for narcotics. So it's very clear results. It takes the guesswork out of looking at the data.

If the device does return an inconclusive result, that can still be the right outcome. So our algorithms are optimized to minimize the false positive results rather than guess at an answer that might have a weak library match. And finally, as I mentioned before, if more help is needed, if the officer really thinks it's suspected contraband, some illicit substance, but there's inconclusive results, they can plug that into a computer, transmit the data back to our reach back service, and they can have our staff scientists analyze that and really use our expertise to give them a deeper dive result.

Ultimately, this presumptive field testing, it helps the officer choose the next step quickly and safely. Clear results, quickly.

Mike Parsons: Clear results, easy to use, presumptive field testing. That's really what TruNarc is designed for and what purpose it serves in the field.

Okay, so Mike, you walked us through a great scenario, right, in terms of what this looks like and how TruNarc's used in a suspected narcotic investigation. So let's say you get your result in the field. Explain to me a little bit about chain of custody. What happens if you need support on your result from your TruNarc, that reach back. Can you just talk us through those two things? One, chain of custody, and then two, a little bit more about that reach back service and what that provides to our users in the field.

Mike Bates: Sure. So again, the value is not only the answer, but the digital record that comes with the answer. So TruNarc captures scan results with a date and time stamp. You have the records of system self-checks, and the data can be exported for reporting and evidence workflows. This creates a much stronger paper trail or digital trail than older field methods, and it helps support chain of custody documentation.

Also, since we can have scanning right through sealed packaging, evidence can stay more intact, handling is minimized, and it can support through package capability for later evidence audits. So these are all really helpful things for chain of custody.

Our reach back service is when the targeted library for TruNarc is streamlined to really focus on narcotics cutting agents, precursors, and fast results. It does have a smaller library than our entire database. So if a customer sends in a reach back, we'll evaluate that against the entire database. We'll use the expertise of the scientists to really give them a more thorough and confident result.

Mike Parsons: Thank you. Yeah, there's a lot more to it than the product itself, right, which is part of this or the analyzer itself. It's the admin tool, which has the reports that you're talking through in terms of supporting evidence, as well as the second piece, which is reach back support, right? That's a complex mixture. You need further analysis. That's where you and the team really support us and our customers in terms of their needs for identifying complex samples.

Let's move into the new products, right? So we've recently launched TruNarc Delta and Tau. What innovations do these products bring and how did customer feedback shape these updates?

Mike Bates: Sure, so TruNarc has been trusted by law enforcement and government agencies for over a decade. So these are a proven workflow. We didn't reinvent this device. We kept the same workflow, and we made it faster. We expanded the library for emerging threats, as we've discussed. And we've got a more modern overall user experience.

For instance, the Delta and Tau devices pretty much doubled the library size and now have over 1,200 substances. We're also doing regular library updates as we monitor emerging threats, get those into the library, get those out to our users.

In addition, we improved our Type H2 capabilities. So Type H2 we haven't touched on yet, but for low dose samples that may be below the detection limit for a direct scan, the operator can scoop a little bit of the substance out, dissolve that in some rubbing alcohol, some ethanol, and then use our Type H2 kit to amplify the signal and get better results with lower detection limits.

So we've actually enhanced that feature of the device, and that's much more reliable. Now we're expanding that library as well, and we're really excited about that, especially for the fentanyl threat. So that rarely occurs at high doses like previous narcotics have. Additional features include automated record keeping, reach back support. We really ensured that we spoke with customers, we got customer feedback and maintained the workflow that's tried and trusted and we kept what works.

Mike Parsons: And I'll reiterate from the product management point, Mike, just listening to customer feedback throughout the development of the next generation of TruNarc, that was key, right? Is listening to what our customers need and what they want out of the next generation device was really critical and helped us form what TruNarc, Delta, and Tau look like and what we ultimately delivered in the new products in the portfolio.

So switching gears a little bit, Gemini is another product in our portfolio. Handheld analyzer that combines both Raman and FTIR spectroscopy in one device. So Mike, if I switch gears here, we start to talk about Gemini. In the simplest terms, what is a Gemini analyzer and why is combining that FTIR and Raman spectroscopy in one handheld device so useful to our customers?

Mike Bates: Yeah, Gemini is a fantastic product. It's Thermo Fisher's flagship handheld chemical identification system for unknown chemicals, explosives, narcotics, precursors, and other threats. So where TruNarc is very fit for purpose, Gemini does it all.

The biggest differentiator is that the Gemini device combines Raman spectroscopy and FTIR spectroscopy in one handheld device. That means customers don't have to choose between two separate instruments, carry two instruments into the field, they've got it all in one unit.

Because the two techniques are complementary, Gemini covers a wider range of sample types and gives higher confidence on some of these difficult samples. It's also designed for field use. There's an intuitive workflow, minimal training required, compact format, easier to deploy than two tools. It's like having a lab in a box.

Mike Parsons: That's great. Yeah, it's that two in one analyzer. It can do a lot, right? So it leverages both Raman and FTIR, those complementary techniques to expand its capabilities. And so if we think about that, right, can you give me an example of a situation where having both the FTIR and Raman in Gemini provides an answer that one technology alone can't?

Mike Bates: Sure, so Raman's obviously an excellent technology for many field samples, and it's often the fastest path to an answer. But some materials fluoresce or glow when you shoot them with a laser. Darker colored materials will actually combust when you shoot them with a laser. Strongly colored samples, right? So some narcotics are actually cut with dyes either for user experience or just to try to circumvent some of these analysis methods.

So that's where FTIR comes in, right? It doesn't suffer from the fluorescence or the interference from dark material or dyes, and it can give clean identification in the cases where Raman struggles. The reverse is also true, right? There's lots of situations where Raman is the easier first choice, right? Minimal contactless analysis is preferred, and the value of Gemini is that the officer can seamlessly switch between the techniques right on the device instead of going back and forth to a truck or somewhere where the two devices are located.

Again, the dark colored material is probably one of the best examples of a challenging sample where Raman simply wouldn't be able to get results, but FTIR could quickly give clear actionable results.

Mike Parsons: Absolutely. That's where FTIR really shines, right? Is in those fluorescent challenging samples for Raman and where there's limitations on that side of the product. It's all in one device, right? So you can easily switch over to the FTIR. Yes, you have to sample the material, but it's all in one device and a pretty simple workflow to work through for the user all in one instrument.

So that's really what we're doing with Gemini is taking the strengths of both technologies and putting them in one device and making those available to the user in the field. Gemini is used for hazardous materials, explosives, narcotics, and even more than that. How does one instrument support such different missions without overwhelming the user?

Mike Bates: Sure, many customers and users don't know what they're going to encounter on any given day. So they need one instrument that can cover a lot of ground. And Gemini does that primarily with a broad onboard library. So there's more than 14,000 chemicals and we have automated mixture analysis. It's user friendly. So we've got a Scan Assist tool. You don't need to be an expert. It can walk you through choosing the right technique with a few simple questions.

It's got configurable user profiles to let agencies tailor the device settings to their mission, to the threat tolerance, to the standard workflow before they even enter the scene. And the interface is very simple. Clear results, it's got a large tactile keypad, it's got glove-friendly touchscreen and a consistent workflow across both Raman and FTIR technologies.

It also offers for especially difficult cases the same reach back support that our other devices offer. So if the user encounters an inconclusive result but they really want a deeper dive, they can hook that up to a computer, send the result in to us, and we'll perform some additional analysis for them.

Mike Parsons: Great. Thanks, Mike. It definitely has a feature set that supports our users, right? Especially those users in the field that are in those demanding circumstances. With Scan Assist, it walks you through that workflow based on what you have in front of you and what technologies are on the device, what's the right path to analyze that specific material. So it really supports the user in the field to get to the answer that they need at that point in time.

And so if we think about more features, right, we also have scan delay. It has a rugged design when we're talking about Gemini that makes it suitable for EOD or hazmat environments. How do those design choices improve safety for teams in the field?

Mike Bates: Sure, well scan delay is a very important and fundamental safety feature, right? So you can set the instrument, set a delay time, step away and let the scan run with the user at a safe distance. This is obviously for energetic materials, something that could combust or be reactive when analyzed with the lasers. Gemini supports scan delay for both Raman and FTIR modes, right?

We've got the motorized anvil, so you don't have to crank down the anvil like on some of the older devices. It's especially valuable when teams suspect sensitive or hazardous materials. Safety is paramount for our users. The ruggedness obviously matters because these teams work in heat, cold, lots of vibrations, rough handling environments.

And Gemini is certified to MIL-STD-810G and IP67. The physical design is field driven. It's got a grippable form factor. It's got tactile buttons. It's got a resistive touch screen that can be used with gloves or with heavy PPE. And the end benefit of all this is less time in the hazard zone, right? Safer standoff and more confidence that the device will work in harsh conditions.

Mike Parsons: That's awesome. I think that's a great way to just close off the Gemini conversation. That's just a great summary and conclusion of what Gemini does and how it supports folks in the field on their mission.

Thanks for giving an overview of Gemini, Mike. Let's shift a little bit into our broader safety and security product portfolio, its applications and agencies our products serve. So Thermo Fisher Scientific instruments are used by military, law enforcement, fire services, and customs. We talked through that in some of the prior questions. How do the needs of these groups differ and how are analyzers designed to work for all of them?

Mike Bates: Sure, so the missions of our diverse customer base differs, but the needs are often the same, right? They want fast, reliable answers in the field. So law enforcement is usually focused on narcotics and precursors. Fire and hazmat team focus on spills and unknown chemicals. Customs may see both contraband and legitimate commercial materials. And military users could face chemical or explosive threats. All right, these products cover all those different categories.

The analyzers are designed so the users don't need deep scientific training, right? They provide clear workflows, intuitive interfaces, and clear results. In addition to the rugged construction, which includes glove-friendly controls, we have the reach-back support. They make these tools practical across lots of different operating environments.

In all scenarios, it's essentially like our customer is able to bring a scientist along in a box, right? Provide insight without lab conditions.

Mike Parsons: Thanks, Mike. And if we dive into a specific group here, customs and border protection, how do tools like TruNarc and Gemini help officers? So a customs officer or border patrol officer keep legitimate trade moving while intercepting dangerous materials.

Mike Bates: Sure. Customs, speed matters twice. So we want to stop contraband quickly. We also want to enable our customers to avoid slowing legitimate trade unnecessarily. So TruNarc and Gemini let officers screen suspicious materials on the

spot instead of routing everything off to a lab. Just as important is they can identify benign or legitimate materials.

So 14,000 chemicals in the library. We have lots of commercial products there as well to clearly identify non-hazardous and legitimate materials. Contactless, minimal handling analysis helps preserve evidence. It reduces exposure for officers working in busy inspection environments.

And again, the broad libraries really help officers distinguish all sorts of different commercial goods. Or maybe it's something that's got cutting agents, maybe it's a chemical precursor to an illicit substance, or maybe it's just a household material. And so we've got all that in our libraries. I think overall these tools help keep legitimate trade moving while sharpening the focus on actual contraband.

Mike Parsons: That's great. And I think it's two things, Mike, right? Ease of use in the field. So that contactless testing with Raman, as well as the workflows and the buttonology that really makes it that field device. And then the breadth, right? If you think about Gemini, you have the two technologies, you have the broad library that allows you to understand chemical threats across much broader landscape.

And to your point, what is an illicit or dangerous chemical? What is a legitimate chemical and how do we keep things moving? So I very much appreciate that insight. And I think you did a great job of framing that and what that looks like in terms of how our products fit that customs and border protection environment and application.

Shifting gears into another key segment, hazardous materials response. So if we think about a fire department or another first responder agency, how do instruments like FirstDefender, TruDefender, Defender Omega, and Gemini improve safety and efficiency during chemical spills or unknown substance incidents in the field?

Mike Bates: Sure, so for chemical spills or unknown substance incidents, the first job is turning unknown into actionable as quickly as possible, right? So across the portfolio, these tools reduce guesswork, right? They shorten the time of the operator in the hot zone and they help teams decide what PPE to use, what isolation methods to use, containment, and what next steps to take, right?

So FirstDefender and TruDefender represent Thermo's most field proven spectroscopy heritage, while Gemini adds that dual technology identification in one handheld instrument. A strong point for hazmat and fire is that fast identification helps teams move immediately into response planning instead of spending valuable time on uncertainty of unknown materials.

Mike Parsons: That's awesome. And it's really, I think the strong message is right. Faster identification in the field, the ability to respond to incidents where the threat is unknown, right. And start to drive that clarity and understanding of what is it that the team or the organization is up against so that they can keep their community and themselves safe in the field.

If we shift, bringing this all back around Mike, right. And talking about the future. Looking forward five, 10 years, what trends will shape the future of field-based threat detection and where do TruNarc, Gemini and our other safety and security products fit into that evolving threat and chemical identification landscape?

Mike Bates: Yeah, certainly. Emerging threats are a constant challenge, right? So they're going to keep getting more complex. We're going to see more synthetics, more mixtures, more low-dose, high-potency materials, faster turnover of analogs. And I think that we're really trying to stay ahead of that, stay up to date and close the gaps as soon as they appear. The field also is going to demand safer workflows, right? Less handling, more standoff capability.

More decision support and confidence for non-expert users. Anyone can use these devices, right? Doesn't take long training regimens. So a big part of that is obviously what the role of what my team does, library updates. And decision support is going to have to move faster with stronger connectivity, stronger reach back support behind the scenes.

Ultimately, the way we view this is we're not just shipping hardware, right? We want to work closely with customers. We want to make sure that customer feedback drives product innovation, drives library updates, drives new features and new case studies, and really helps our customers track real threats and improve their workflows. And so that's our goal, and we look forward to working with anyone that's a part of our customer base.

Mike Parsons: Thank you, Mike, for giving the view into the future, right? None of us have a crystal ball and understand exactly what that is, but what you see and how you see that evolving over the next five to 10 years is really enlightening and helps us show, okay, providing applications and products that support our customers today, what does that look like in the future and working really closely with our customers to make sure our products are continuously evolving and that we have plans in place that support them five years down the road as those needs, challenges, and that landscape changes.

And so with that, I want to thank Mike Bates for really going into the detail here in terms of our customers, our products, and the applications that our products have in those specific segments like law enforcement, first responders, and customs.

With that, I'd like to close out the session here today. Please visit us at thermofisher.com/threatdetection to learn more about our products and sign up for our newsletter to get the latest product news and educational resources on our portfolio. So thank you again for listening today. Hopefully this was insightful in terms of what our products in the safety and security portfolio provide and what they do. And please stay tuned for future episodes of Analyze That.