

2015 Thermo Scientific Customs Applications

World Customs Organization Technology and Innovation

“From laboratory to field: preventing the proliferation of narcotics and explosives at the point of inspection”

Dr Aaron Sean Poynton

Director of Global Programs, Safety and Security

We Are The World Leader in Serving Science

Global Scale

- 50,000 employees in 50 countries
- \$17 billion in annual revenues
- Unparalleled commercial reach

Unmatched Depth

- Leading innovative technologies
- Applications expertise
- Lab productivity partner

Premier Brands

Thermo
SCIENTIFIC

invitrogen

F **Fisher**
Scientific

appliedbiosystems

Unity Lab Services

Enabling our Customers to Keep the World Safer

Police Bomb Squads



HAZMAT Response Teams



Counter-Narcotics Units



Customs & Border Patrol



Military EOD & Chemical Teams



Forensic Crime Laboratories

Inspection, Interdiction and Prevention



Air Cargo



Sea Cargo



**Passenger
Inspection**



**Rail Border
Crossing**



Vessel Boardings



**International Postal
Inspection**



**Vehicle Border
Crossings**



**Bonded
Warehouses**

Customs' Mission

Revenue Recovery



Narcotics Interdiction



Counter-Terrorism



Counterfeit Medicine

Customs' Challenges

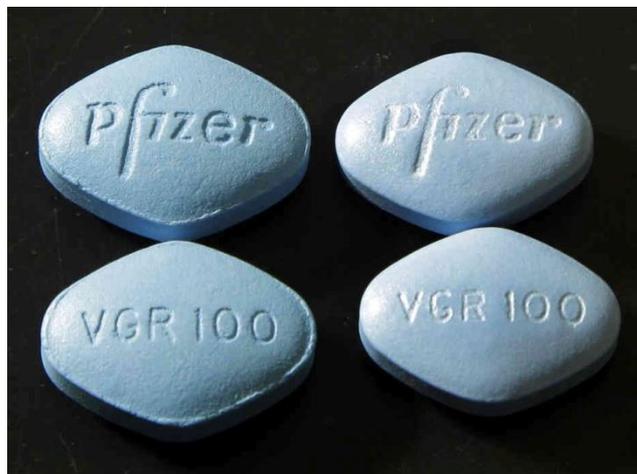
Unknown Substances



Unlabeled Containers



Mislabeled Packaging



Counterfeit Drugs

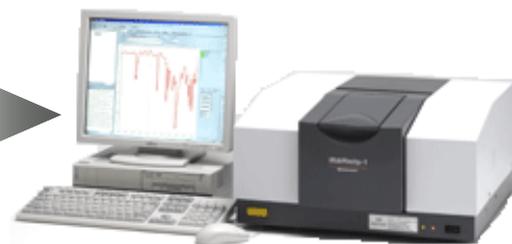
Trend: FTIR: Lab to CBRN Responders



Original



Laboratory



Benchtop



Man Portable

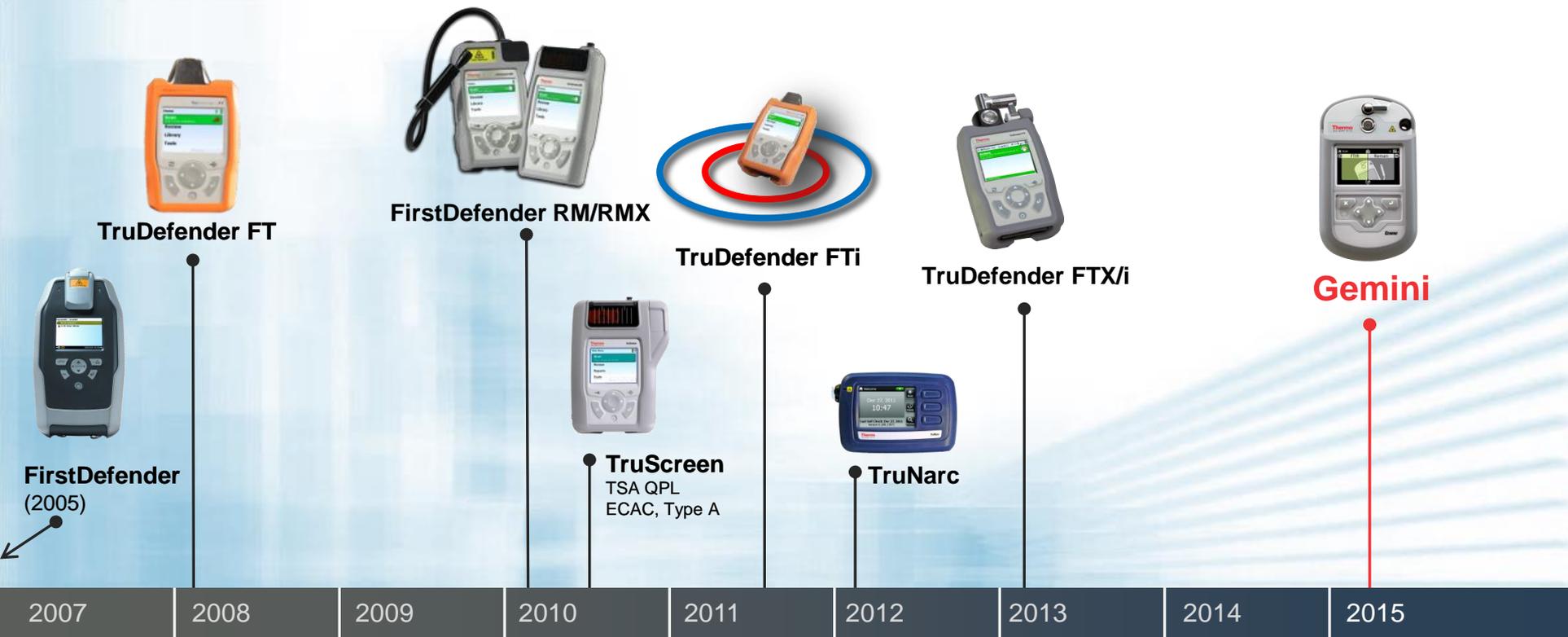


Portable



Handheld

A Legacy of Innovation



2007 2008 2009 2010 2011 2012 2013 2014 2015



- Raman Spectrometer**
 - First handheld for S&S
 - Chemometric software
 - Ultra compact low power laser
- FTIR Spectrometer**
 - First ever handheld
 - Michelson interferometer
 - Sealed ATR
- Generation II Raman**
 - 5X Faster, 50% smaller
 - Integrated optical components
 - Robot integration
- Counter-Narcotics**
 - Purpose-built for law enforcement
 - Fluorescence solution
 - Pay-per-scan option
- Software & Hardware Advancements**
 - Customizable screening algorithms
 - GSM wireless
 - Tagging
 - Improved anvil
- Elite 2-in-1 Raman & FTIR**
 - First and only 2-in-1 handheld
 - Motorized FTIR anvil
 - Scan assist
 - Touchscreen

Elite Users Around the World - 12,000+ Deployed

Military EOD & CBRNE, Customs, Police Forensics, Fire HazMat units:

• Key US Customers

- U.S. Military (Air Force, Army, Navy, Marine Corp, National Guard, SOCOM)
- Bureau of Alcohol Tobacco and Firearms and Explosives
- Department of Homeland Security – Customs & TSA
- Federal Bureau of Investigation (FBI) HazMat & EOD



• Global users:

- World Customs Organization
- German Bundespolizei
- Japanese Ministry of Defense
- Europol
- Dutch National Police & Customs
- United Kingdom Ministry of Defense
- Royal Norwegian Ministry of Defense
- Australian Defense Force & Federal Police
- Indian Police & Mumbai Airport
- South Korean National Police & Presidential Security Service
- Singapore - HSA & Civil Defense

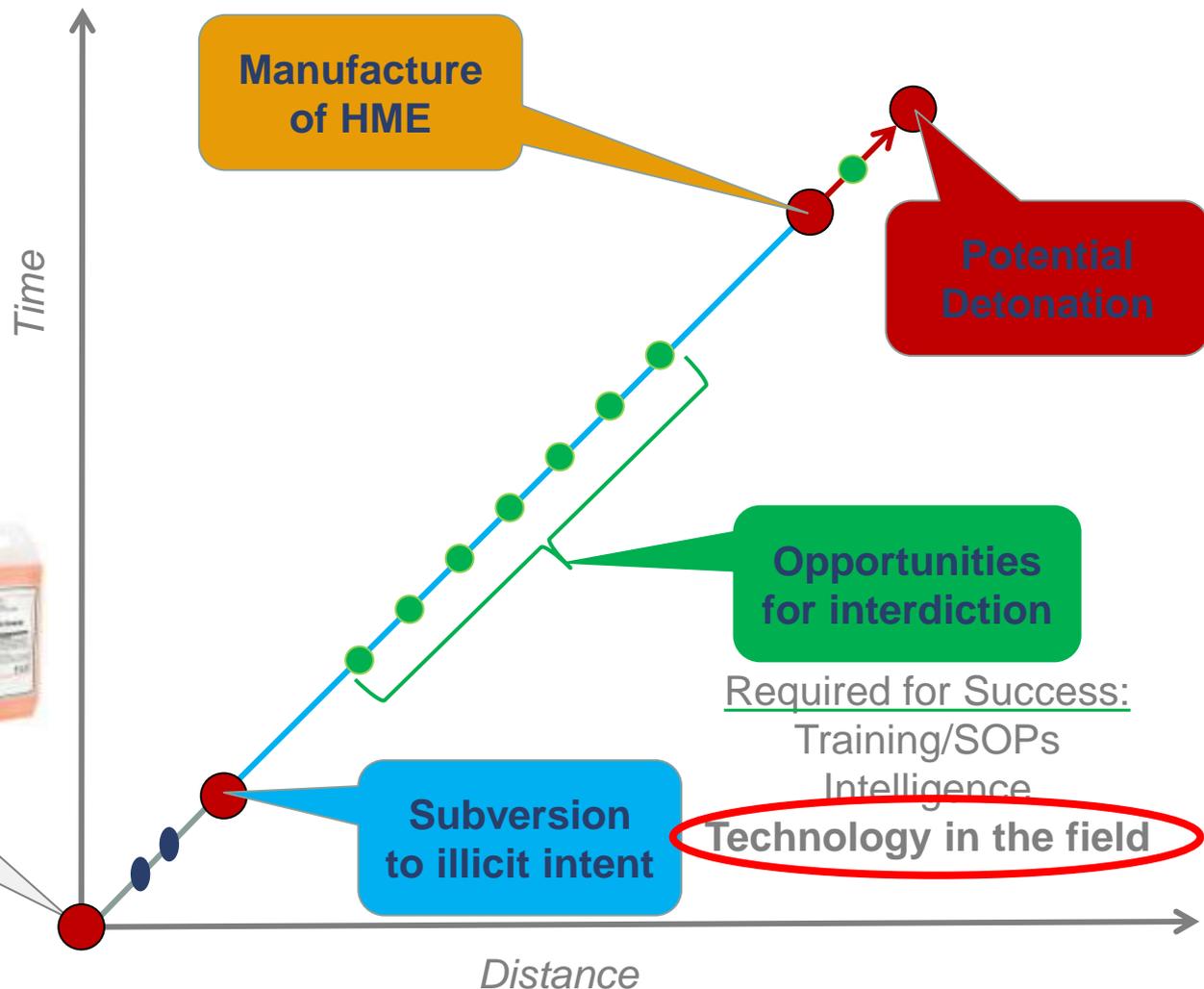


High-Risk Precursors – Priority & Opportunity

- Precursors tend to travel farther than finished HMEs
- More opportunity for interdiction



Legal manufacture of precursor materials



Program Global Shield: High Risk Chemical Precursors



World Customs Organization
Organisation Mondiale des Douanes



Index	Chemical Name	Raman	FTIR
1	Acetic anhydride	Y	Y
2	Acetone	Y	Y
3	Aluminum powder*	N (requires XRF)	N (requires XRF)
4	Ammonium nitrate	Y	Y
5	Calcium ammonium nitrate	Mixture	Yes, as a mixture
6	Hydrogen peroxide	Y	N
7	Nitric acid	Y	Y
8	Nitromethane	Y	Y
9	Potassium chlorate	Y	Y
10	Potassium nitrate	Y	Y
11	Potassium perchlorate	Y	Y
12	Sodium chlorate	Y	Y
13	Sodium nitrate	Y	Y
14	Urea	Y	Y

Session002 : Scan012

Acetone
EPA-HVP 1990, Household/Commercial, IT.
CAS: 67-64-1

▶

“Tag” priority items

1 match found

* Metals, such as aluminum, are not amenable to Raman or FTIR analysis.

** The components of calcium ammonium nitrate (calcium carbonate + ammonium nitrate) are currently in the FirstDefender RM library as individual chemicals, which would both appear in a result labeled as a mixture.

Global Shield – Flagged for buying sodium nitrate & aluminum powder



NORWAY KILLER WAS FLAGGED BY ANTI-TERROR OPERATION

OSLO, Norway -- Months before Anders Behring Breivik went on a killing rampage in Norway, officials say he was flagged for buying bomb materials. A Norwegian customs official said Breivik's name was spotted by the Global Shield Program four months before the July bombing and shooting spree that killed 77 people.

His name came up after he bought chemicals from a company in Poland.

The official said the information was given to Norway's security police, PST in March. PST confirmed the transaction was legal and that there wasn't enough information to warrant further investigation.

Breivik has admitted he was behind the bombing outside the government headquarters in Oslo and the shooting spree at a summer camp on Utoya island. His lawyer has said Breivik denies criminal responsibility, saying he's in a state of war.

In a manifesto released just before the attacks, Breivik describes ordering sodium nitrate and aluminum powder from a Polish company, as well as other chemicals that can be used in explosives from other suppliers.

Investigators have said Breivik's low-key and law-abiding lifestyle before the attacks made it difficult to pinpoint him as a potential threat. They say he kept his plans to himself, and have found no evidence to support his claims of being part of a network with other militant cells.

Unprecedented Seizure of Diluted Cocaine in Mexico

Hallan cocaína diluida en pulpa de mora en Manzanillo

● El SAT informó sobre el hallazgo de la droga, la cual se intentaba introducir al país congelada en 120 tambos



Foto: Especial

Cocaine found in diluted Mulberry pulp in Manzanillo

MEXICO DF. (Proceso.com.mx) .- In an unprecedented discovery in the country, federal authorities detected 24 thousand kilos of natural mulberry pulp in a shipment of cocaine from Colombia diluted hiding.

In a statement, the Tax Administration System (SAT) reported that natural mulberry pulp is trying to introduce frozen and packed in 120 dairy country.

Once the substance became liquid, subtract possible samples, finding that 16 drums merchandise was made up of mulberry pulp, water and cocaine paste. The SAT said that this method of concealment is difficult to detect, but new technologies and exchange of information between agencies of the federal government allow preventive alerts. He said the company intended to import the goods have mainly engaged in provision of agriculture and horticulture, and is registered in Zamora, Michoacan.

However, in place of the offices there is only a work abandoned in residential area; no transactions with third parties or foreign trade and its 2014 annual statement is presented in zeros. For detection was necessary exchange of information between the Navy, the Attorney General's Office and the Tax Administration Service, who determined the provisional seizure of all merchandise, which is the Public Prosecutor's Office. The SAT indicated that legal proceedings against the importer began smuggling and drug crimes.

Synthetic Drugs in Chile on the Rise

EL MERCURIO
LUNES 17 DE AGOSTO DE 2015

NACIONAL

C 7

Según datos de la Policía de Investigaciones, se pasó de 4.613 a 56.715 unidades

Droga sintética: decomisos aumentan 1.129% entre 2009 y julio de este año

Fuerte alza en los últimos dos años coincide con el inicio de incautaciones de la peligrosa NBOME. De un total de 600 que hay en el mundo, en Chile ya se encuentran 11 drogas de síntesis.

PEDRO LEZAMA

Este año, aproximadamente **50%** del decomiso de droga sintética corresponde a NBOME (de reciente ingreso en nuestro país).



El resto de las incautaciones se reparte principalmente entre "extasis", PMMA (se vende como "extasis") y el conocido LSD.

"La irrupción de las drogas de síntesis en nuestro país no es un hecho aislado ni estacional". Así de contundente es el inicio de un informe de la Policía de Investigaciones (PDI) que acompaña a un set de datos que muestran un explosivo aumento de 1.129% en el decomiso de esas sustancias entre 2013 y julio de este año.

El compendio estadístico (ver infografía) muestra precisamente a 2013 como el año en que las incautaciones comienzan a subir y, según datos policiales, es entonces cuando irrumpe en Chile la peligrosa NBOME, que se ha consolidado como sustancia ilícita emergente.

Desde 2009, cuando se comenzaron a materializar las primeras capturas de estos estupefacientes, las cantidades de drogas sintéticas sacadas del mercado no superaban las 3.900 unidades.

Para el subcomisario Patricio Navarro, jefe del Departamento de Investigación de Sustancias Químicas, el fenómeno apunta a una mayor demanda por estas sustancias, lo que ha llevado a la policía "a redoblar los procesos y acciones de control". El experto apunta a que muchas veces las drogas sintéticas llegan por canales poco tradicionales, como encomiendas. "Por ello se hace

todo un trabajo sin dejar de lado la cooperación interinstitucional", en referencia al trabajo con organismos como Aduanas y Correos.

Navarro confirma un dato que aparece en el informe antes citado y que indica que a nuestro país han llegado 11 tipos diferentes de drogas de síntesis (ver recuadro). Pero advierte: "En el mercado mundial existen no menos de 600 diferentes".

"La mayoría de ellas, por no decir todas, son altamente peligrosas. Algunas tienen una partida lenta, es decir, los efectos se demoran más que las drogas tradicionales, y por eso los consumidores tienden a elevar la dosis y eso resulta letal", enfatiza.

Los estupefacientes decomisados en nuestro territorio, explica, son producidos por laboratorios y "algunos tratan de imitar sustancias que se encuentran en la naturaleza y otras que copian efectos de drogas ya conocidas". Alude con ello a los casos en que se han decomisado partidas de "súper marihuana", una sustancia que emula los efectos de la yerba y también unidades de químicos que generan los estados producidos por el "ácido" o LSD.



56.715
(enero - julio)
2015

32.206
2014

Tecnología.
La Policía de Investigaciones cuenta con aparatos especializados para reconocer rápidamente sustancias ilícitas decomisadas.

Nuevas y sin regulación

"Uno de los puntos capitales para mejorar el control de estas sustancias es trabajar para que sean reconocidas como peligrosas y sean prohibidas. Varias de ellas no están reguladas y de esta forma llegan a los consumidores como una sustancia más", explica Navarro.

En efecto, el mismo informe

de la PDI explica que "el origen de estas nuevas drogas es con el motivo de burlar las regulaciones legislativas de cada país. De esta forma, los traficantes no tienen una persecución penal. Hoy es-

tas drogas (sintéticas) reciben la denominación de NSP (Nuevas Sustancias Psicoactivas), que se refiere a todas aquellas drogas de diseño y sustancias de abuso que no se encuentran reguladas por las convenciones internacionales de droga, existiendo al año 2014 un total de 450 NSP".

■ Once tipos de sustancias

A nuestro país han ingresado potentes drogas tales como el "éxtasis", NBOME, LSD, PMMA, DMT, Triptamina, 2-C-D, 5F-AKB48, DOC, Dimetilona y gamma butirrolactona (GBL), que es un químico que se disuelve en agua.

Según los datos policiales, estas sustancias generalmente vienen de laboratorios ubicados en Asia. En el mercado nacional, la dosis de drogas como la NBOME alcanza un valor de \$20 mil y se distribuye en fiestas de gran concurrencia. Genera un efecto alucinógeno y estimulante que comienza unos 20 minutos después de su ingesta.

Según los datos policiales, habría muertes de jóvenes en Santiago, Rancagua y Concepción que se indagan como posiblemente asociadas al consumo de estas potentes drogas de síntesis.

3.825

2009

2.304

2010

3.187

2011

3.305

2012

4.613

2013

Planeta
Policía de Investigaciones

Synthetic Drugs :

Seizures increased 1,129 % between 2013 and July this year

Sharp rise in the past two years coincides with the start of seizures of dangerous NBOME.

Technology – Investigative Police has specialized equipment to quickly recognize illicit substances seized (TruNarc).

Example: Global Sensor Network

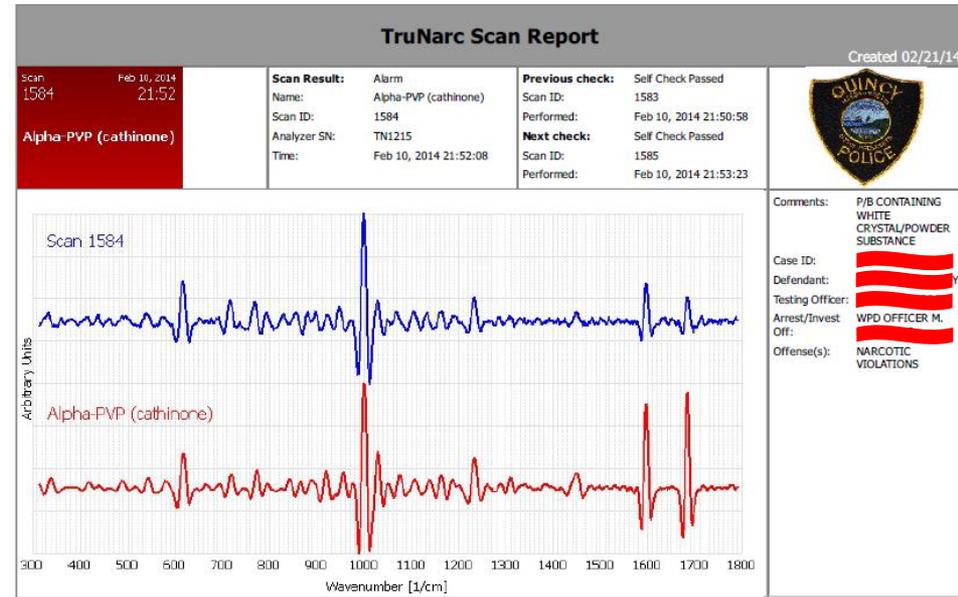
Smart. Connected.



Data & user privacy are secure. Any information shared is voluntary and protected.

“Gravel” in Massachusetts – February, 2014

- Feb 21 – Quincy Police, TruNarc users, receive request from neighboring town on unknown sample – drugs suspected
- **TruNarc immediately identifies Alpha-PVP (a.k.a. “Gravel”)** a synthetic cathinone
- First seizure in Massachusetts; Police immediately move against distributor
- 1 day later: State officials send state-wide warning



GULF COAST MEDIA INVESTIGATIVE SUPPORT NETWORK
Investigative Bulletin
"GRAVEL"

Overview:
GRAVEL, a highly addictive synthetic stimulant is an emerging drug of abuse similar to the synthetic known as bath salts. While the primary component of GRAVEL is alpha-pyrrolidinovalpropionone (alpha-PVP), it is often used in combination with other drugs. Samples of the drug have also been found to contain methamphetamine, Ecstasy and bath salts. The Drug Enforcement Administration lists alpha-PVP as a Schedule I controlled substance analog, similar to other synthetic drugs like bath salts. Law enforcement testing confirms that no precise and quantitative assays are also trained to detect the alpha-PVP.

Law enforcement officials report that mail delivery systems are used for the transportation and distribution of alpha-PVP in bulk quantities. Police in England, Tennessee have noted alpha-PVP labeled as "Your Partner" with an other markings. Current believe that law-enforcers in the state of Tennessee are detecting the alpha-PVP with numerous and other drugs to produce the rock-like substance sold as GRAVEL on the street.

Effects:
GRAVEL is found in a form similar to small rocks or pieces of rock and can be injected or smoked. Short-term effects of GRAVEL show an increased blood pressure, elevated heart rate, violence, paranoia, hallucinations and mood changes. GRAVEL is extremely rare and therefore long term effects have not been documented. Law enforcement officials have reported a high propensity for property crimes by abusers.

Physicians have reported a serious deterioration in physical appearance after consistent abuse of the drug. The injection of GRAVEL can result in the deterioration of the tissue as well around the injection site leaving gaping holes in the body tissue that can be visible long.

Statistics:
The Georgia, Tennessee Police Department and the Sullivan County, Tennessee Sheriff's Office have reported approximately 20 incidents involving GRAVEL in the past year.

In August 2013, Sullivan County, Tennessee Sheriff's deputies responded to a domestic disturbance at an apartment complex. A man, who had reportedly taken GRAVEL, had appeared paranoid, became uncooperative with the girlfriend, claiming the had him under surveillance. Other reports of erratic behavior have been linked to GRAVEL abuse in the Georgia, Tennessee area.

In November 2013, Washington County, Tennessee officials conducted a traffic stop that resulted in the seizure of 6 bags of GRAVEL.

Source: Drug Enforcement Administration, US DEPTA/DOJ/State Dept., Georgia Tennessee Police Department, Sullivan County Tennessee Sheriff's Office.

Etowah County, Alabama – AB-Pinaca Seizure

- **“Arrests for possession of AB-Pinaca mark first in state”**

- August 13, 2014

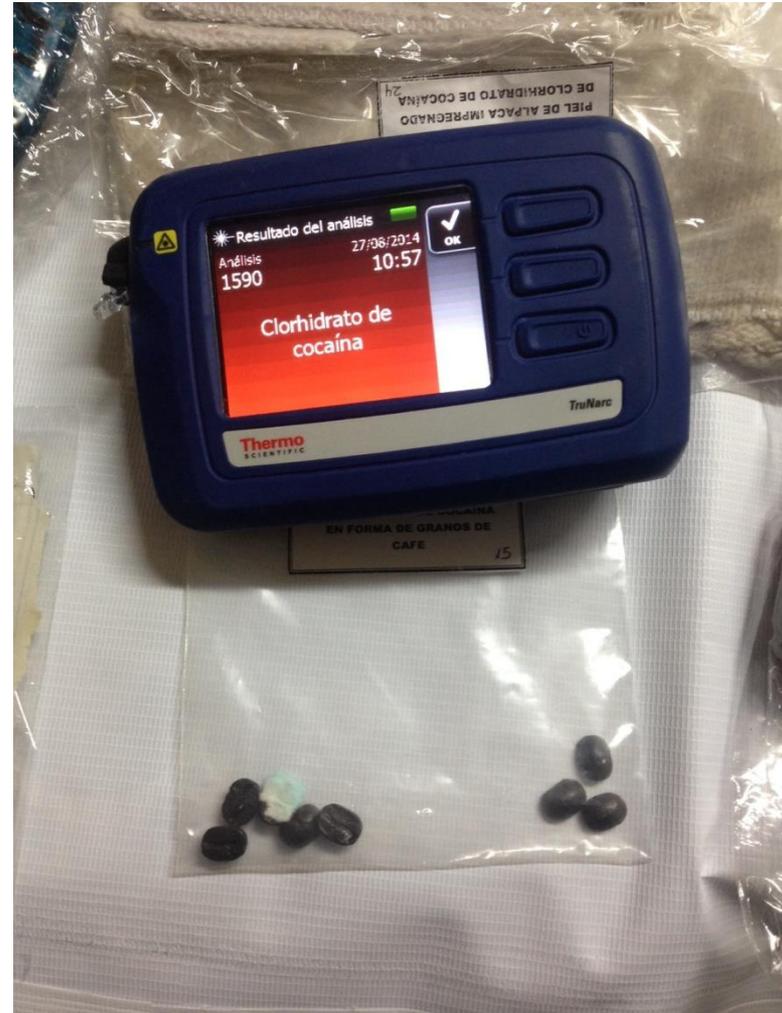
- *Synthetic cannabis first emerged in Japan in 2012*
- *"We're **definitely seeing a benefit because of TruNarc**. We're able to take cases to the grand jury where before we didn't have a toxicology report. Now, a defendant doesn't have to wait for his day in court. **It's been a godsend.**"*

- *District Attorney, Jimmie Harp*
July 9, 2014



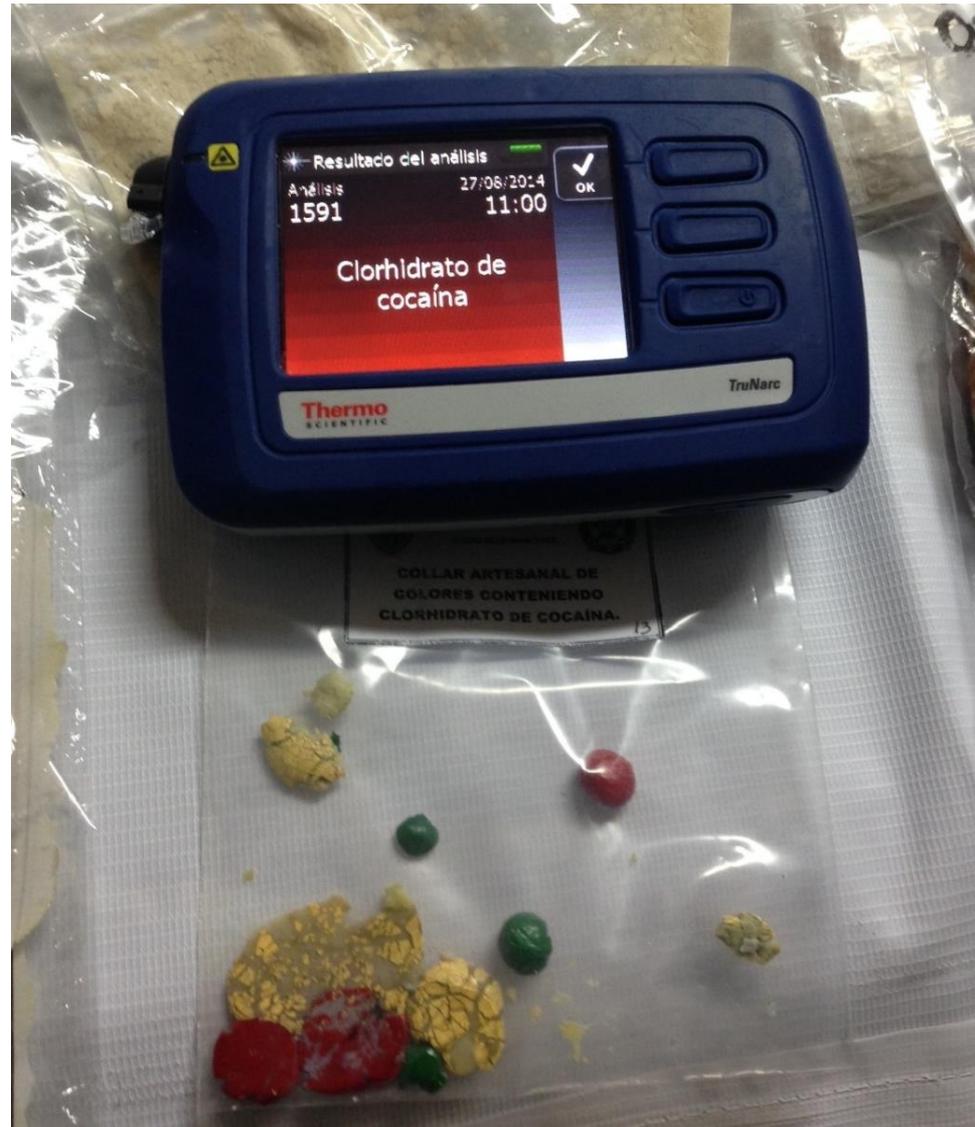
Peru 2014

- Coffee beans - Cocaine pressed into the shape of coffee beans and painted
- Mixed with regular coffee beans in shipment
- Dogs unable to detect



Peru 2014

- Seemingly harmless ladies necklace -Cocaine shaped into beads and hand painted
- Beads were put together into a necklace
- Cocaine was soft, gel like consistency



Peru 2014

- Suitcase lining- Cocaine mixed with soft plastic and shaped into suitcase lining
- This is just a few cut up segments
- It felt very soft, just like rubber



Peru 2014

- Tourist gift-Cocaine mixed with ceramic, shaped into ornament, cooled, and painted
- Solid piece - unpainted section was tan colored
- Scanned cross section with TruNarc identified Cocaine Base



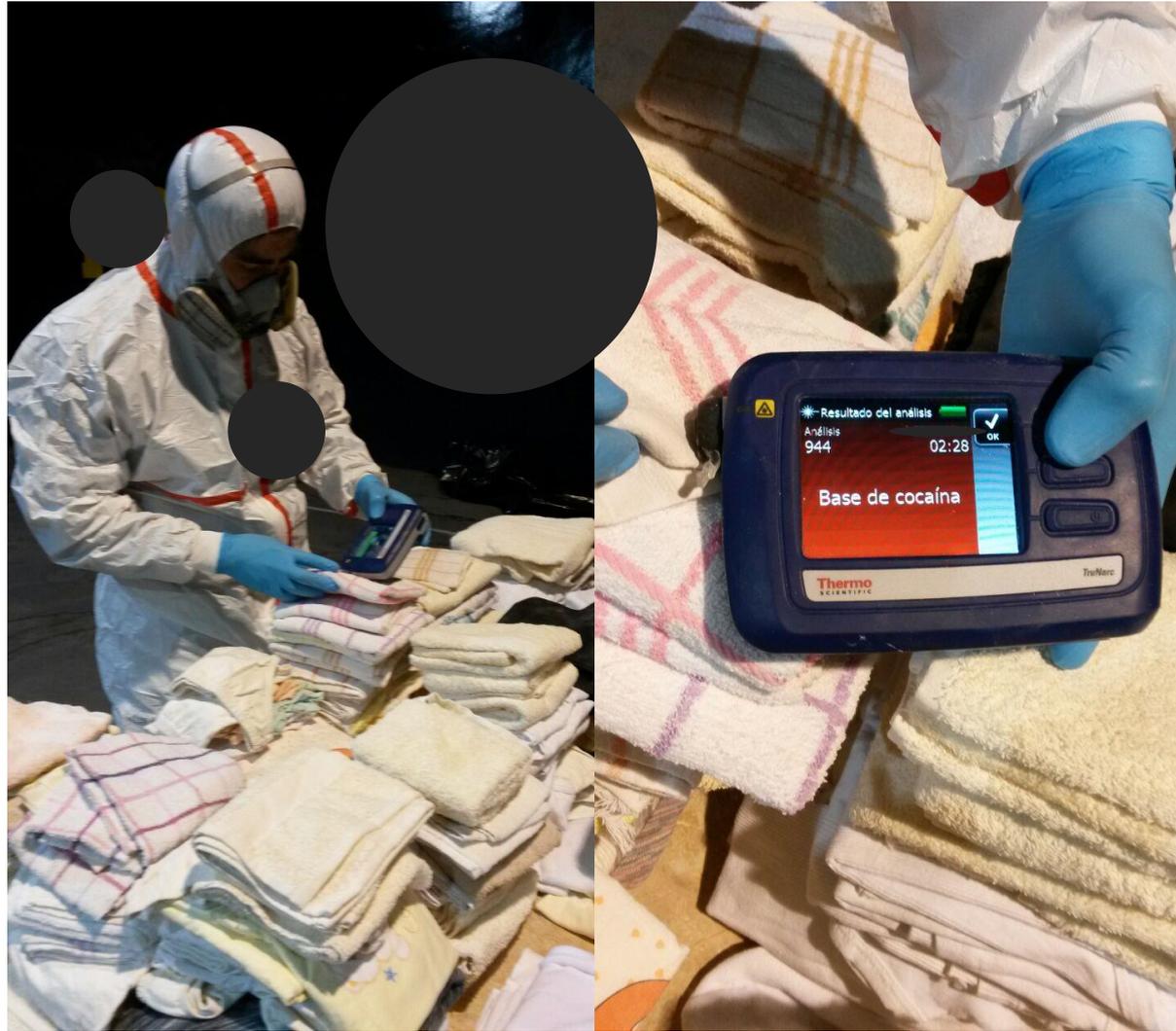
Peru 2014



- Variety of examples of ways that Cocaine HCL and Base are smuggled out of Peru - Customs/Police agencies around world will encounter. Got TruNarc?

Recently – Undisclosed User Location

- First seizure of cocaine in base form
- Indicates a mid-supply chain shipment, requiring further processing
- Knowledge changed next steps for police
- Identification in the field provided significant law enforcement value
- Waiting weeks for a lab result would have been too late



Benefits of Handheld Chemical Identification Systems

Presumptive testing in the field

- Technology in the hands of frontline staff
- More efficient use of limited resources
- Less samples required to be sent to laboratory for analysis



Conducting quick scans & expediting legitimate trade

- Most scans take less than ten seconds
- More time to sample more suspect materials
- Keeps commerce moving



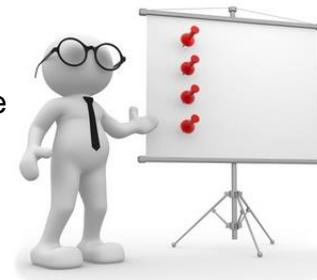
Not opening packaging

- Reduces sampling time
- Raman offers non-contact scanning
- Non-destructive to substance
- Maintain integrity of packaging



Equipment is easy to learn & operate

- Simplicity of TruNarc enables entire frontline staff to be proficient
- All systems designed with intuitive interface
- Confidence of users grows from TruNarc



Operate faster / Safer

- Scan delay for improved safety
- Customizable user profiles
- Faster analysis time



Assurance that presumptive tests will be confirmed in the laboratory

- Laboratories have limited resources
- Internal (or external) budget charges
- May take days, weeks, months for an analysis depending on lab's workload



The Utility of Chemical Identification – Complementing the Customs Mission

Mission	Target	Solution Options
<p>Revenue Recovery</p> 	<p>High-Value Cargo</p> <ul style="list-style-type: none"> • Chemical identification of undeclared or under-declared content 	 <p>Gemini RMX/FTX TruScan RM</p>
<p>Narcotics Interdiction</p> 	<p>Narcotics & Precursors</p> <ul style="list-style-type: none"> • Banned illicit narcotics • New Psychoactive Substances <ul style="list-style-type: none"> ◦ Synthetic Cannabinoids ◦ Synthetic Cathinones ◦ New Opioids 	 <p>Gemini RMX/FTX TruNarc</p>
<p>Counter-Terrorism</p> 	<p>WMDs</p> <ul style="list-style-type: none"> • Explosives • Chemical Warfare Agents • Precursors 	 <p>Gemini RMX/FTX</p>
<p>Counterfeit Medicine</p> 	<p>Precursors Identification</p> <ul style="list-style-type: none"> • Identification of the contents of unlabeled or mislabeled packaging 	 <p>TruScan RM RMX</p>

Choosing the Right Tool for the Mission

Solution	Mission Task	Key Attributes
<p>TruNarc</p> 	<ul style="list-style-type: none"> • Narcotics Interdiction 	<p>Excellent for non-technical users</p> <ul style="list-style-type: none"> • Extremely easy to operate • Value to Price • Compact
<p>TruScan RM</p> 	<ul style="list-style-type: none"> • Counterfeit Medicine 	<p>Authenticates Legitimate Pharmaceuticals</p> <ul style="list-style-type: none"> • Pass/Fail non-destructive analysis • Identification through sealed packaging • Custom build libraries
<p>RMX/FTX</p> 	<ul style="list-style-type: none"> • Revenue Recovery • Narcotics Interdiction 	<p>Meets Expanded Mission Needs</p> <ul style="list-style-type: none"> • Expanded substance libraries • User library for adding substances • Complementary & confirmatory technologies
<p>Gemini</p> 	<ul style="list-style-type: none"> • Counter-Terrorism 	<p>Combined Technologies in one unit</p> <ul style="list-style-type: none"> • Better, faster decision making • Increased confidence in results • Safer operation w/automated anvil • Easier field use

Gemini Analyzer

Expanded Sampling Options for Safer Operation

- Through sealed transparent containers, Pressure sensitive substances, Samples diluted in water, Dark colored solids, Fluorescent samples
- Motorized anvil enables industry-first **FTIR scan delay** for increased safety

Better Informed Decisions

- **Complementary and confirmatory** results from a single instrument
- **Increases confidence** in next course of action

Less Time on Target

- Quickly **switch between technologies** with no downtime
- **Pre-loaded profiles:** Chemical, Clan Lab, Explosives, Hazmat, & Narcotics

Intuitive to Use

- Interface **guides technology selection** and workflow
- Consistent interface enhances **efficiency** and minimizes user error

Handheld & Ruggedized

- **MIL-STD 810G** and built for field use
- **Smaller and lighter** than separate technologies



Raman and FTIR: The Best of Both Worlds

Raman: More Tactical

- Non-contact analysis
- Non-destructive analysis
- Substances in translucent containers
- Simple operation
- Light colored HMEs
- Better for aqueous solutions



FTIR: More Utility

- Direct contact analysis
- Wider familiarity
- Darker colored substances
- Fewer chemical limitations
- Better for waste chemicals
- Better with high fluorescent substances



***Increases level of confidence in results.
Increases confidence in next course of action.***

Summary – Field Technology Helps Customs

1

Increase duty & tariff collection

Improve regulatory enforcement



2

Interdict core drugs & new synthetics



3

Identify explosives & precursors
(Programme Global Shield)



Priorities for Customs – Order may vary!

1. Restrict contraband:

- Narcotics & precursors, especially bulk shipments
- IED materials & high risk chemical precursors (Program Global Shield)

2. Increase duty & tariff collection

3. Greater regulatory enforcement

4. Operate faster / Safer

- Waiting for lab results can be painful & expensive

5. Speed up legitimate trade

