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TECHNOLOGIES

FALCON 4G DEMO at NOBLE INNOVATION DAY 2024

SEC TECHNOLOGIES

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CHEM

1. INTRODUCTION

The **Falcon 4G** is a long-range active stand-off **chemical detector** that can detect, identify and measure chemical warfare agents (**CWA**) and toxic industrial chemicals (**TIC**) using two independent eye-safe pulsed tunable CO_2 lasers. Its patented laser technology is undetectable by laser warning devices, making it an effective tool for **military, homeland security and industrial applications**.

2. TRIAL CONDITIONS

Date	November 14, 2024, 7:30 AM – 3:00 PM
Place	Harford County Airport, Churchville MD, USA
Weather	Cloudy with occasional light rain
Wind speed	15 – 20 km/h
Humidity	74 – 80 %
Temperature	3 – 11 °C
Simulants[1]	Ethanol (Denatured Alcohol) Methanol (Gas Fuel Treatment)
Demonstration	1. Morning Release – Methanol 2. Midday Release – both simulants

[1] Please refer to the last page of the report for detailed information about the simulants.

3. METHODOLOGY

The demonstration ("**demo**") took place in Churchville, MD USA, where the measuring path was laid out in a field adjacent to the main road and Harford County Airport. The area provided excellent visibility—an open space with no significant obstacles. Occasional movements of agricultural tractors were observed, but they did not obstruct the view, maintaining ideal conditions for the measurement.

The Falcon 4G with MTU P&T Platform was set-up in under 10 minutes and was mounted on a tripod and positioned on the side road (Fig.1 Falcon4G). The team from NOBLE released simulants at the designated location (Fig.1 Release Site). The active stand-off detector Falcon 4G's operation was controlled from a ruggedized Getac PC from the heated Command Center tent located 200m from the Falcon 4G.

Fig. 1

Communication between Falcon 4G and GETAC PC was established through MPU5 Smart Radio from Persistent Systems, LL.C (Fig.2) for remote but real time communication.

Fig. 2

Falcon 4G software was integrated with the C2 system TAK to display the result in real time for the observers in the Command Center (seeing the whole scenario on the screens Fig.3 and Fig.4).

Fig. 3

Fig. 4

4. DEMONSTRATION

The map (Fig.1) shows the **distance** between **gas release site** and the **Falcon 4G detector** as **370m which was the maximum distance available at the test site**. During the actual measurement, the range varied from 371 m to 373 m. Deviation +- 10 meters is allowed.

The release site was a white box truck used for moving and a blue metal container. Simulants used for release were solutions of **Ethanol** and **Methanol**. The simulants were released from a simple manual 2-gallon pump sprayer set for a fine mist.

4.1 MORNING RELEASE:

At 07:40 AM the SEC Technologies' operator started the demo (Fig.5) with a test scan of surrounding area and finding the range. During the first measurement, the operator was positioned next to the Falcon 4G. For all subsequent measurements, the operator controlled the Falcon 4G remotely from the heated Command Centre tent. The test measurement showed clear air with no dangerous gasses present (Fig.6) At this point no simulants were released. The results were displayed in the result window – blue bar chart (Fig.7).

Fig. 5

Fig. 6

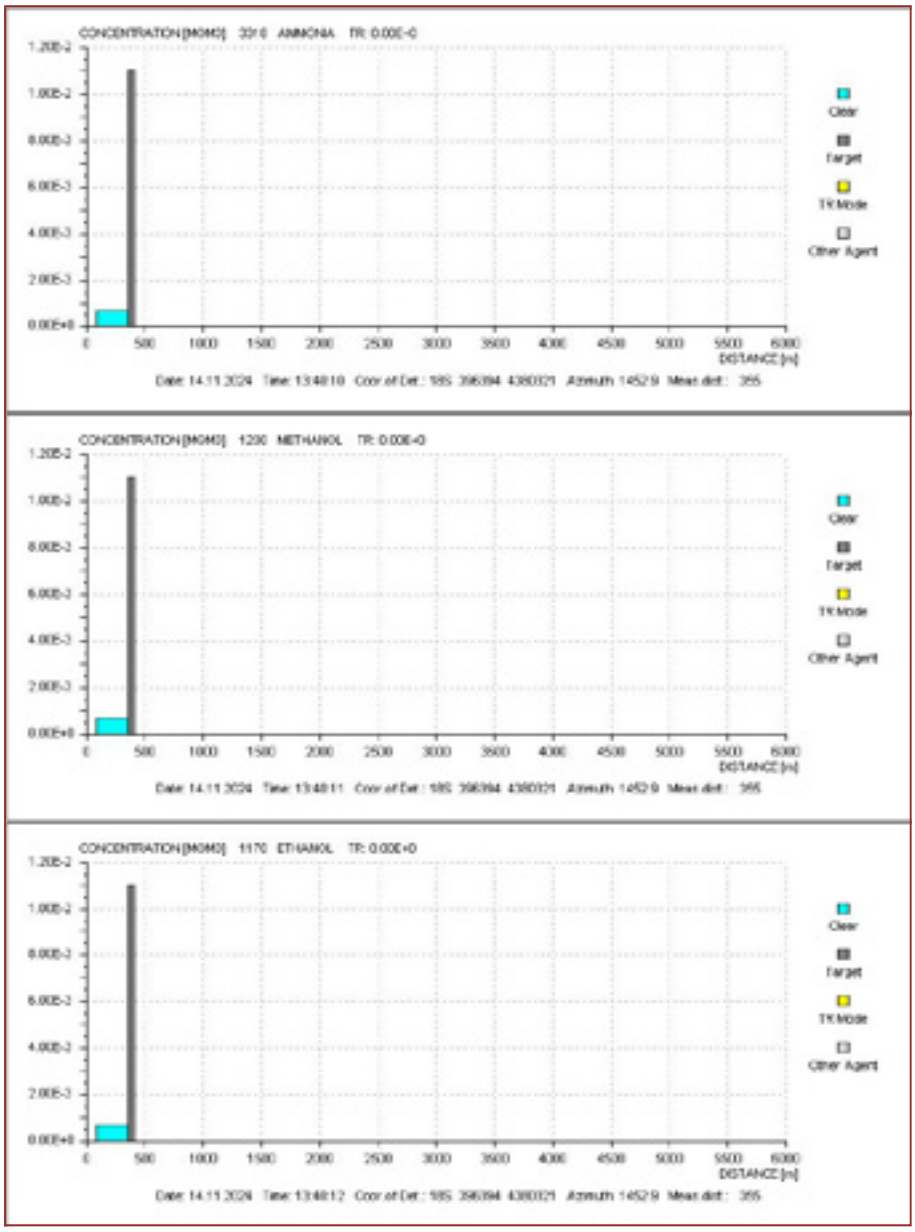


Fig. 7

At 7:43 AM the simulants were released from the truck, which meanwhile moved several meters from its initial position (Fig.8). SEC Technologies' representative operating the device repeated the measurement. At the moment of release, no simulants were detected, as the chemical cloud was just beginning to form and the concentration was extremely low. The **results** were displayed in the result window - **chart** (Fig.9).


AMMONIA
NOT PRESENT
METHANOL
NOT PRESENT
ETHANOL
NOT PRESENT
SCAN IN PROGRESS...
RANGE: 370 m

Fig. 8

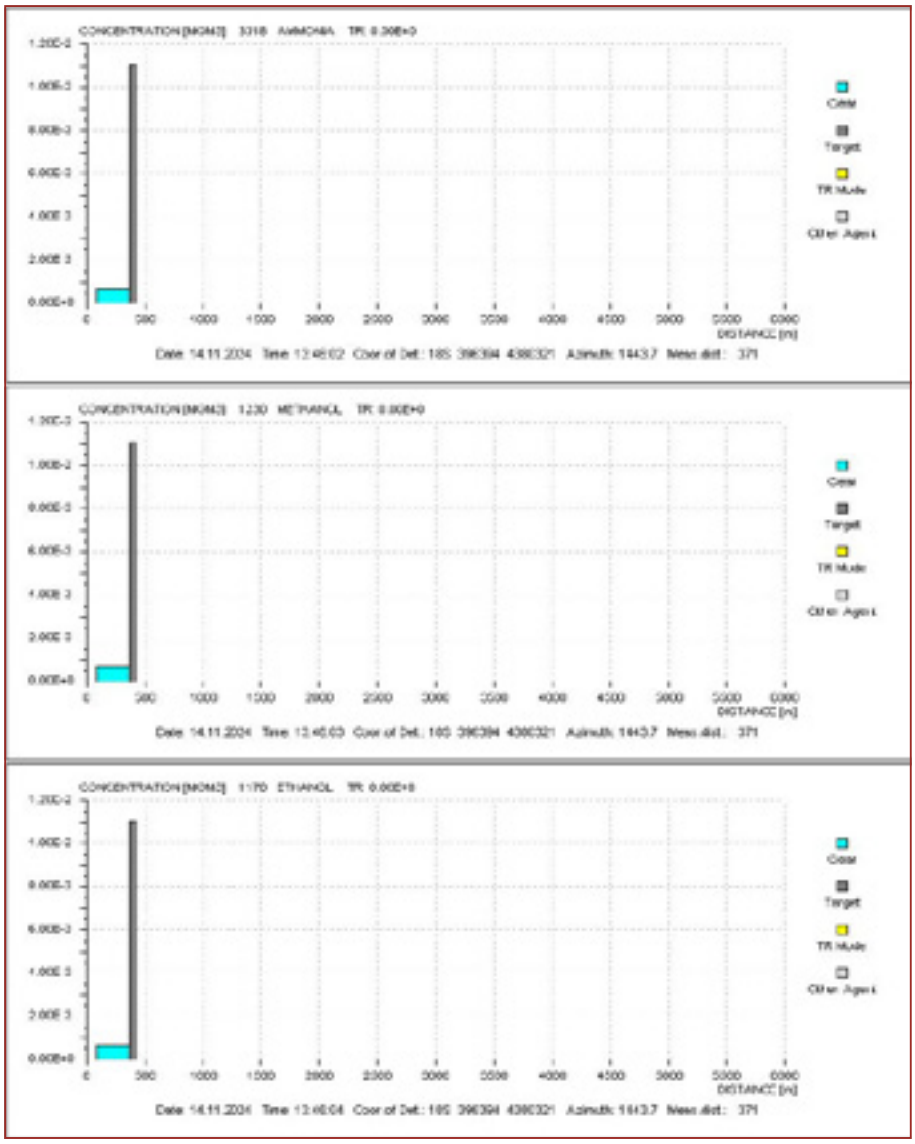


Fig. 9

At 7:46 AM After three minutes of the initial release, **Methanol was detected** (Fig.10). Upon detection of the simulant, a confirmation message appeared on the camera image, followed by the automatic display of a result window with a chart (Fig. 11). This window includes details such as date, time, coordinates, and measured distance. Simultaneously, the software stores detection results in a predefined folder as text files and generates CBRN messages in ATP-45(E) format (Fig. 12).

Fig. 10

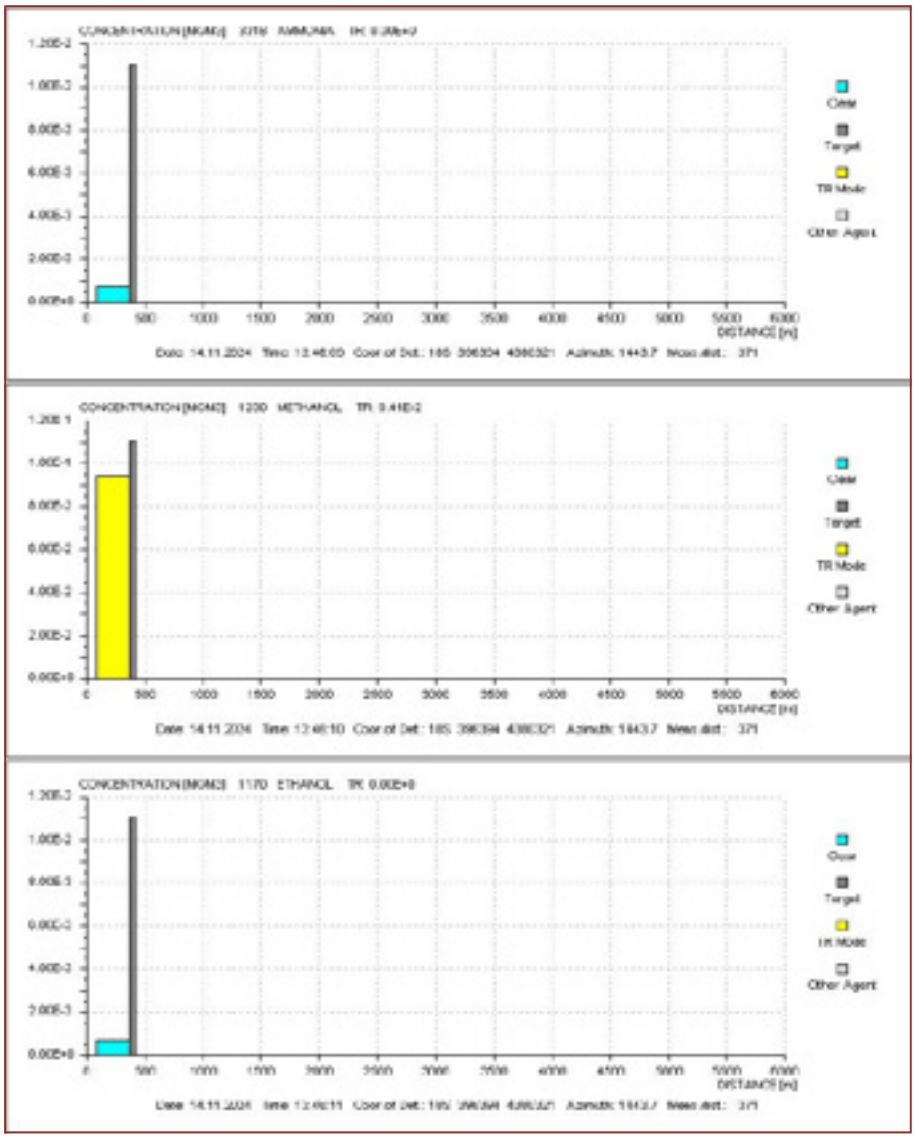

DISTANCE [m]
Other Agent
DISTANCE [m]
Other Agent
DISTANCE [m]
Other Agent

Fig. 11

```
Classification: NATO UNCLASSIFIED
VZCZCNBC000
R 141246Z NOV 2024
FM FALCON4G
TO CBRNANALYSIS
RT
EXER/NOBLE USA/-//
MSGID/CBRN 4 CHEM/APP-11(C)/CHANGE02/FALCON4G/-/NOV/-/-/-/-/-//
GEODATUM/WGE/UTM//
DTG/141246ZNOV2024//
ORGIDDFT/SECTECH/UNIT/-/-/-/-/-/HFN/-/-//
CBRNTYPE/CHEM//
INDIA/-/1230/NKN/MSDS//
QUEBEC/18 396468E4380332N/VAP/MSDS/ACD//
ROMEO/CON:0.09413GMGM3//
SIERRA/CON:141246ZNOV2024//
QUEBEC/18 396614E4380355N/VAP/MSDS/ACD//
ROMEO/CON:0.094136MGM3//
SIERRA/CON:141246ZNOV2024//
QUEBEC/18 39G7G0E4380378N/VAP/MSDS/ACD//
ROMEO/CON:0.094136MGM3//
SIERRA/CON:141246ZNOV2024//
GENTEXT/CBRN INFO/DETECTOR FALCON4GV
```

Fig. 12

Conclusion of the Morning Release:

Despite lower morning temperatures and light drizzle, the Falcon 4G successfully detected the chemical within seconds of the release. The test was successful and confirms the system's reliable performance even in challenging weather conditions.

4.2 MIDDAY RELEASE:

At 12:06:47 PM and at 12:07:07 two releases were conducted. The aim was to test if the Falcon 4G could detect the presence of both simulants, each 30 seconds apart, from the same point. The device successfully detected both simulants in both releases, demonstrating its capability to identify chemicals in the mixed cloud withing a brief 30-second window even though both chemicals were in the low single digit mg/m3 concentration range (Fig.13) and (Fig.15). The result window was displayed automatically to the operator – chart (Fig.14) and (Fig.16). CBRN4 message format (Fig.16) was stored in a predefined folder as text file.


AMMONIA
NOT PRESENT
METHANOL
PRESENT
ETHANOL
PRESENT
FLAP:
2 AGENTS PRESENT
U-HAUL

Fig. 13

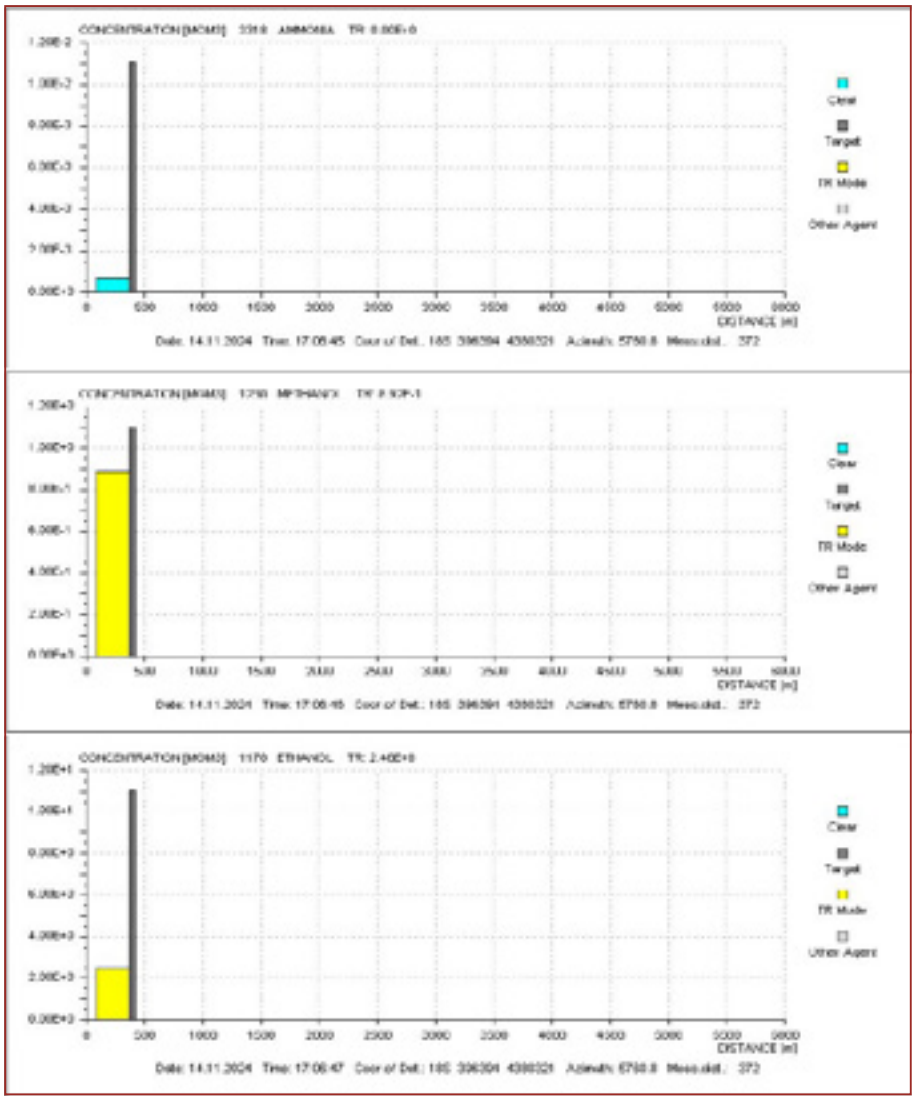

DISTANCE [m]
Clear
Target
TR Mode
Other Agent

Fig. 14


AMMONIA
NOT PRESENT
METHANOL
PRESENT
ETHANOL
PRESENT
FLAP:
2 AGENTS PRESENT
RANGE: 372 m
U-HAUL

Fig. 15

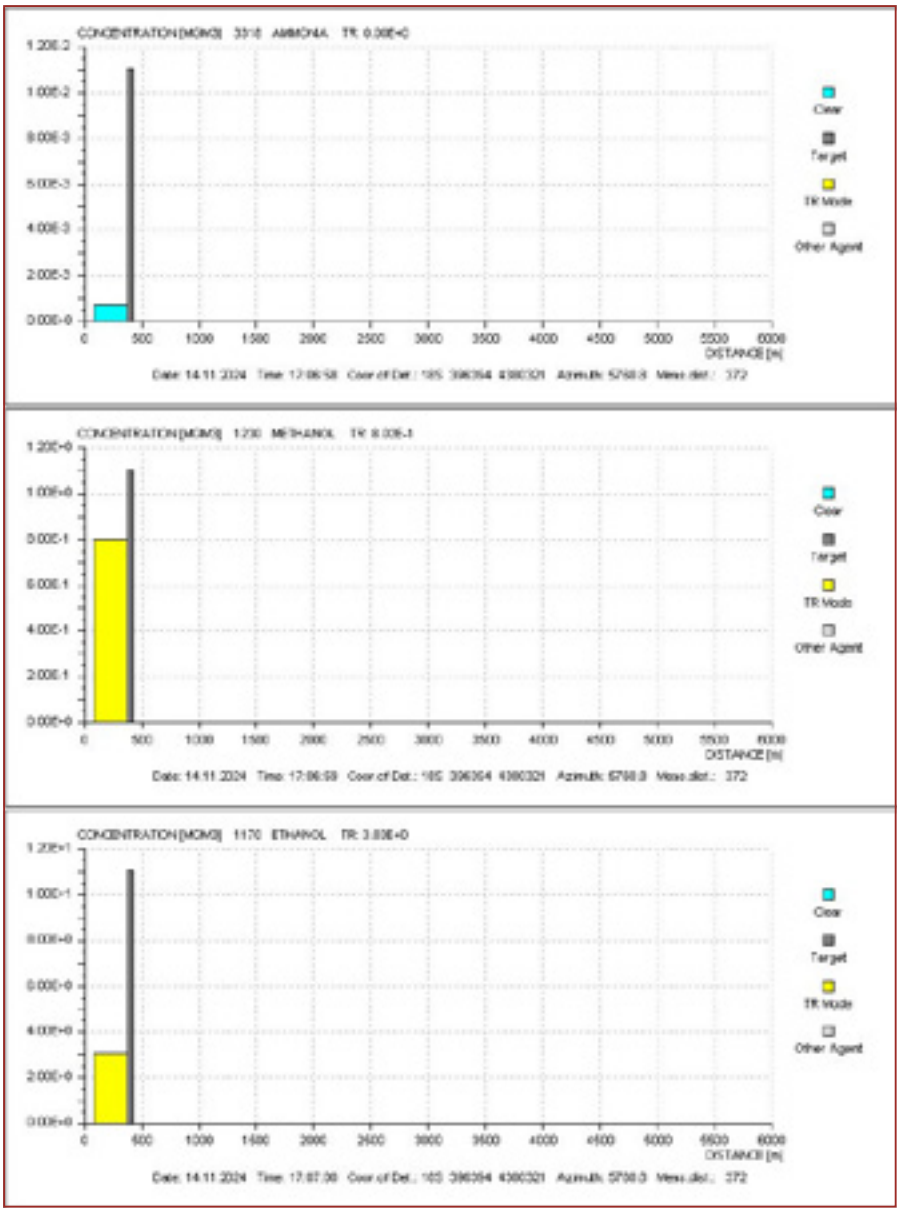

CONCENTRATION [MG/M3] 33.0 AMMONIA TR: 0.00E+0
CONCENTRATION [MG/M3] 1.230 METHANOL TR: 8.03E-1
CONCENTRATION [MG/M3] 1.170 ETHANOL TR: 3.83E+0
Clear
Target
TR Mode
Other Agent
DISTANCE [m]

Fig. 16

```
Classification: NATO UNCLASSIFIED
VZCZCNBC000
R 141704Z NOV 2024
FM FALCON4G
TO CBRNANALYSIS
BT
EXER/NOBLE USA/-//
MSGID/CBRN 4 CHEM/APP-11(C)/CHANGE02/FALCON4G/-/NOV/-/-/-/-/-//
GEODATUM/WGE/UTM//
DTG/141704ZNOV2024//
ORGIDDFT/SECTECH/UNIT/-/-/-/-/-/HFN/-/-//
CBRNTYPE/CHEM//
INDIA/-/1170/NKN/MSDS//
QUEBEC/18 396350E4380382N/VAP/MSDS/ACD//
ROMEO/CON:1.2MGM3//
SIERRA/CON:141607ZNOV2024//
QUEBEC/18 396263E4380501N/VAP/MSDS/ACD//
ROMEO/CON:1.2MGM3//
SIERRA/CON:141607ZNOV2024//
QUEBEC/18 396177E4380621N/VAP/MSDS/ACD//
ROMEO/CON:1.2MGM3//
SIERRA/CON:141607ZNOV2024//
GENTEXT/CBRN INFO/DETECTOR FALCON4GV
```

Fig. 17

Conclusion of the Midday Release:

The Falcon 4G **successfully detected two chemical simulants within a single mixed cloud** released 30 seconds apart, demonstrating its capability to identify multiple substances in a brief timeframe with automatic result display to the operator.

5. RESULTS

All three scenarios were observed in real time from the heated Command Center tent, where representatives from various agencies were present. A video feed showed them the gas release point and a map of the region (Fig.3). The Falcon 4G software records detections on the map and is integrated with the TAK system (Tactical Assault Kit – a geospatial tool for real-time situational awareness Fig.4). Each detection result was also instantly displayed on the GETAC laptop screen (Fig.18) and (Fig.19).

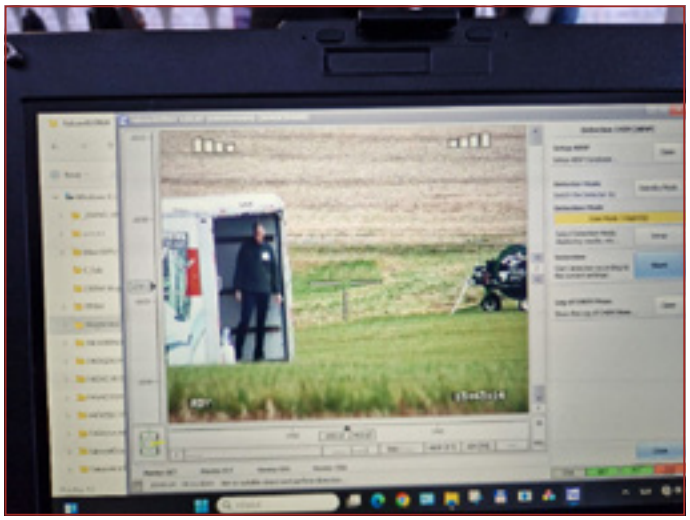


Fig. 18

Fig. 19

All measured data from the demonstration during the Noble Innovation Day are summarized and presented in graphs. During each measurement, each detection was shown to the operator in real time in a result window.

6. CONCLUSION

NOBLE Innovation Day was a professionally executed event, with significant support from NOBLE representatives at both the gas release and detection sites.

During the demonstration, the long-range active stand-off detector **Falcon 4G reliably and swiftly detected vaporized simulants in minimal quantities**, unaffected by changing weather conditions throughout the day. Mounted on a tripod in the field, the **device was powered by batteries, which lasted for the**

entire duration of the demo. The Falcon 4G confirmed its unique performance and **unmatched sensitivity** during all releases.

Participants from various agencies and private companies had the opportunity to observe the capabilities of multiple stand-off detectors from different manufacturers, with the Falcon 4G from SEC Technologies consistently delivering comparatively **better results**, highlighting its superior efficiency and sensitivity **in real-world conditions**.

Comments from attendees included "the Falcon 4G has **good Size, Weight, and Power (SWaP) characteristics** for its potential detection range of up to 6 km and sensitivity". In addition, "Being able to deploy in a dismounted or mounted configuration makes the **Falcon 4G a versatile tool for Integrated Early Warning** keeping the warfighter at a safe distance from unknown or potential threats" Also "**Battery life of up to 8 hours** operation as well as the ability to be powered by ground, air or shipboard power were seen as a real benefit and hot swappable batteries are a **real benefit to the users**."

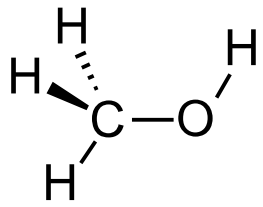
FALCON 4G

Long-Range Active Stand-off Chemical Detector

The 4th generation active stand-off detector is based on **eye-safe** and **undetectable laser technology**.

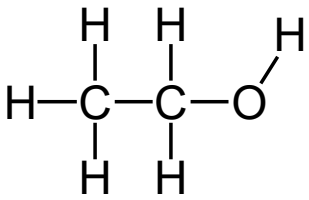
- **Detection**
- **Identification**
- **Quantification**
- **Up to 6 km**
- **Best sensitivity on the market**
- No calibration needed
- Distance to the cloud without triangulation
- Refractors not required
- No need to scan background

SIMULANTS



METHANOL
(CH_3OH, Molecular weight: 32.04 g/mol)

Is a colorless, volatile, and flammable liquid with a mild alcohol odor. It is the simplest alcohol, commonly used as an industrial solvent, fuel, and antifreeze. Methanol is toxic to humans if ingested, inhaled, or absorbed through the skin, and can cause serious health effects including blindness or death.



ETHANOL
(CH_3CH_2OH, Molecular weight: 46.07 g/mol)

Ethanol is a colorless, volatile, and flammable liquid with a slight characteristic odor. It is the type of alcohol found in alcoholic beverages and is widely used as a solvent, disinfectant. In high concentrations, it can be toxic or lethal if ingested.

Source: www.worldofmolecules.com.

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