DEFENCE R&D DÉFENSE

Defence R&D Canada – Valcartier

Passive Standoff Detection of Chemical Vapours

Over the past few years, Defence R&D Canada – Valcartier has developed the necessary infrastructure and instrumental techniques for the standoff detection of chemical vapours in the atmosphere. DRDC Valcartier is well equipped to detect a large number of chemical warfare simulants and industrial pollutants with our 5.7-km long, open-air corridor

Long-Range Open-Air Path Facility

The open-air facility at DRDC Valcartier consists of a 5.7-km corridor with one end terminating at the laboratories housing the remote sensing equipment. The other end of the path terminates at a small laboratory erected for the purpose of discharging the chemical warfare simulants or industrial pollutants into the atmosphere in a controlled release. In addition, this building contains a large parabolic dish with a diameter of 1.5 m. Essentially any type of source can be placed at its focal point in order to provide a means for using active remote sensing techniques over the 5.7-km long path. The building is also equipped with a meteorological station consisting of an anemometer 2-m high, a wind vane and dry and wet bulb thermometers to monitor wind speed, direction, temperature and humidity. A second station is located at the opposite end of the 5.7-km corridor to provide additional meteorological data.

This long-path corridor facilitates passive or active measurements of ambient air, dust and chemical vapours, whether they are chemical warfare simulants or industrial pollutants.

A 1.5-m diameter parabolic mirror for use as an active source for the 5.7-km long path

Laboratory that terminates one end of the 5.7-km long path

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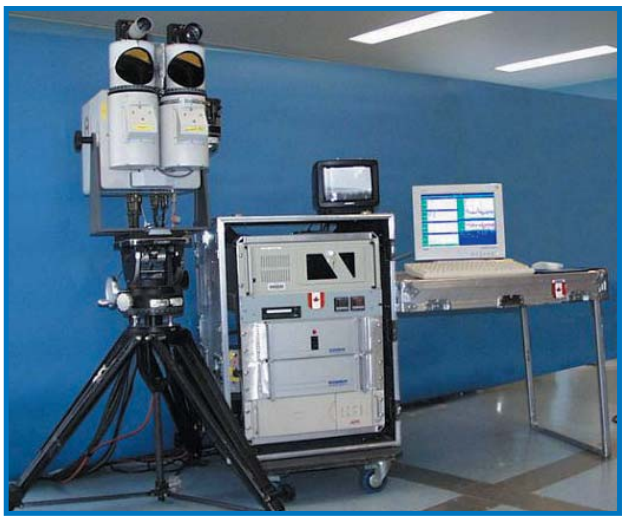
CATSI System

The Compact ATmospheric Sounding Interferometer (CATSI) is a passive infrared system designed for the standoff detection of chemical vapours. Its differential detection capability (U.S. patent) provides two unique features for a field-deployable instrument. First, CATSI, as shown on the picture, maintains a constant calibration, thereby providing reliable quantitative measurements over a long period of time. Secondly, it can perform the real-time optical subtraction of the background signal from the target signal without the need for extensive calculations. Supported by unique acquisition software (called GASEM), CATSI is capable of on-line chemical vapour identification based on the spectral emission signatures of gases measured in the infrared region from 7 to 14 µm. CATSI is a tripod-mounted portable instrument (40 kg), with a single FOV detector (9 mrad) and full pointing capability.

The results obtained with the CATSI instrument at two major U.S. open-air field trials in Kansas (1998) and Nevada (2001) have shown the successful passive standoff detection of a number of chemical vapours at short and medium ranges of 100 m and 1.5 km, respectively. As well, CATSI has successfully measured SF6 gas amounts at the 5.7-km range at DRDC Valcartier. These experiments clearly demonstrate the outstanding capability of the technique (CATSI and GASEM) for on-line monitoring and surveillance.



Photograph of the CATSI instrument mounted on a tripod

For more information

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