

## Research Highlights

# Photonics Work at Defence Research & Development Canada – Valcartier



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### Introduction

Defence R&D Canada Valcartier is one of seven research centers of Defence R&D Canada (DRDC), an agency of the Canadian Department of National Defence that responds to the scientific and technological needs of the Canadian Forces. It has world-leading expertise in optronic, information, and combat systems. The scope of activities includes spectral and geospatial exploitation, tactical surveillance and reconnaissance, command and control decision support systems, intelligence and information, energetic materials, precision weapons, weapons effects and protection, and electro-optical warfare. These research activities result in innovative applications and meaningful impact in the defence and security environment.

DRDC Valcartier brings together multidisciplinary teams to offer the Canadian Forces state-of-the-art scientific expertise, world class facilities and turnkey project management. Its mission is to support the various operational needs of the Canadian Forces is achieved in collaboration with industry and numerous partners from the regional, national and international scientific communities.

### History

The intention of the Canadian Government in authorizing the formation of the Canadian Armament Research and Development Establishment (CARDE) by Order-in-Council in 1945 was to preserve the main elements of the military technological complex which had been developed in Valcartier during the Second World War. In reality, it gave way to more than 60 years of major technological discoveries in Defence science.

At the end of the 1960's fundamental work on the transverse excitation technique using many parallel pin electrodes distributed along the laser tube was undertaken. This work

allowed scientists to gain new knowledge on the physics of electrical stimulation in gas lasers. The CARDE researchers were the first in the world to use CO<sub>2</sub> lasers at atmospheric pressure to simultaneously produce high peak power and repetition rates unparalleled in the field of lasers. It thus became possible to design modules of small physical dimensions that would produce laser peak pulse powers of several megawatts, ideal for laser radar applications. For a while, due to the efforts of CARDE scientists and despite limited resources, Canada was a leader amongst world nations in laser research.

Closer collaboration between military and scientific staffs resulted in a greater number of studies and projects in electro-optics to exploit the advances made in laser and infrared technologies. Surveillance, including night vision, is one of the major areas which have received considerable funding over the past twenty years. Optical and infrared countermeasures may also be regarded as a major project, encompassing activities related to obscurants, decoys, signature reduction, camouflage, and laser countermeasures. Between 1950 and 1974, CARDE—which by then became Defence Research Establishment Valcartier (DREV) employees have been awarded 366 patents in Canada and in 14 other countries, mainly the United States, Japan, Australia as well as the former USSR.

The late 1990s marked a new shift for the center, which took its present name of DRDC Valcartier as a vital link in the network of Defence R&D Canada—an agency within the Department of National Defence. Previously, DRDC Valcartier had helped build up local firms in the optics/photonics industry as their main contractor. Now, it was emerging as an ideal partner for businesses looking for opportunities to become more competitive on world markets. The Centre has become a leader in standoff detection of chemical vapours

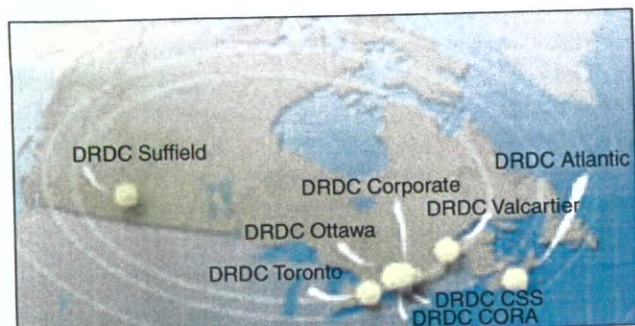


Figure 1. Locations of DRDC research centres across Canada.



Figure 2. Aerial view of DRDC Valcartier.