

RD **LASER TRIAL 2006 - Halifax- October 2006 Objectives**

- Illuminate a laser dump (a small tent) and measure the off-axis signal near the laser dump, at distances from 4 meters until about 70 meters (half the size of a Canadian frigate) away from the dump

Defence R&D Canada • R & D pour la défense Canada

RD **LASER TRIAL 2006 - Two Laser Locations (Yellow)**

Defence R&D Canada • R & D pour la défense Canada

RD **LASER TRIAL 2006 - Test Plan**

Laser Off-Axis Measurements

Vertical Plane

Horizontal Plane

Laser dump

Off-Axis

Off-Axis 2

Off-Axis 1

Laser beam dump

70 m

0

(Off-Axis represents the detector positions where the off-axis signal is measured from 0 to 70 meters)

Defence R&D Canada • R & D pour la défense Canada

RD **LASER TRIAL 2006 - Laser Safety Distances**

Nominal Optical Hazard Distance (NOHD):

Naked vision: 24 km

Assisted vision: 142 km

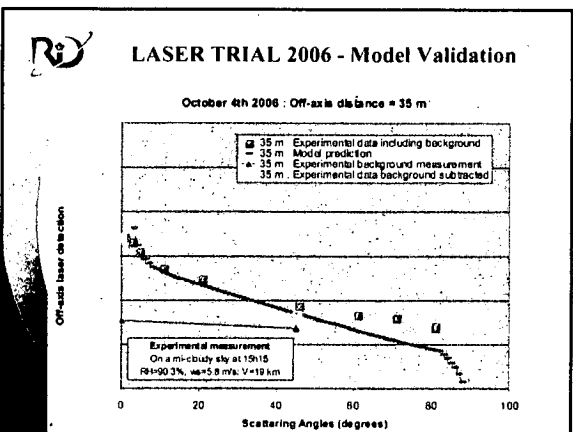
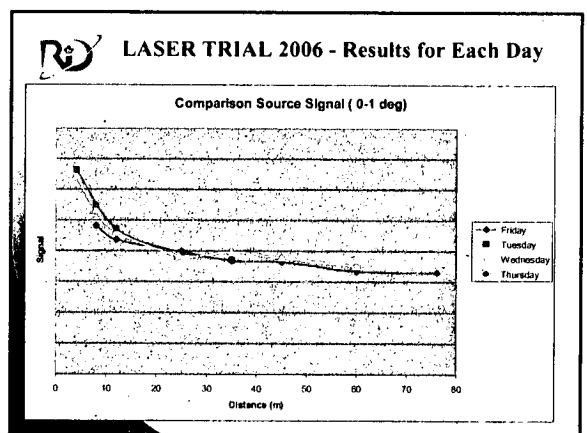
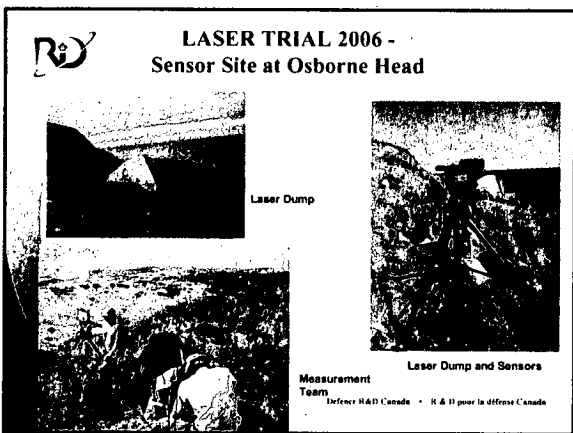
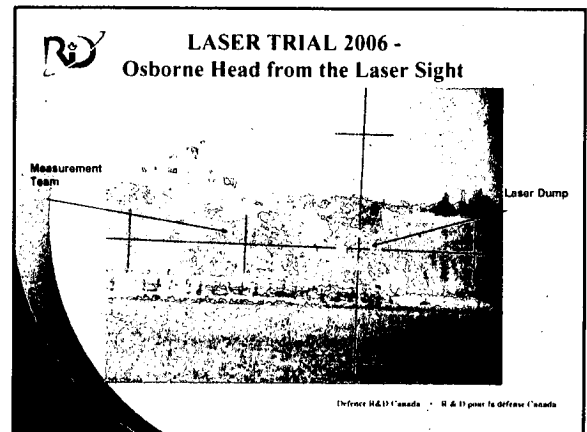
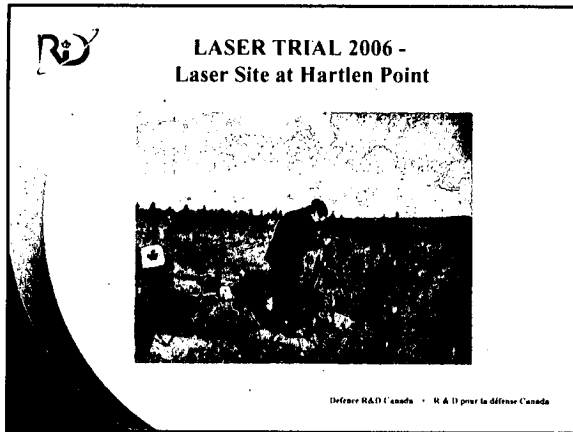
Defence R&D Canada • R & D pour la défense Canada

RD **Osborne Head - Naval Electronics Systems Test Range (NESTRA) near Halifax**

Defence R&D Canada • R & D pour la défense Canada

RD **LASER TRIAL 2006- Measurement Sites**

Defence R&D Canada • R & D pour la défense Canada



DEFENCE RiD DÉFENSE

Laser Trial 2007
Halifax
September 2007

F. Reid and J. Dubois

Defence Research and Development Canada / Recherche et Développement pour la Défense Canada

Canada

R&D Trial Objective

- Test laser detection, tracking and CM capabilities developed at DRDC against:
 1. Laser Beam Rider (LBR) and
 2. Laser Target Designators (LTD)

Defence R&D Canada - R & D pour la défense Canada

R&D Trial Objective 1 - Defeat LBR

- Location: near Osborne Head
- Laser used: LBR simulator
- Eye Safety: safe for the eyes (except for people near the laser)

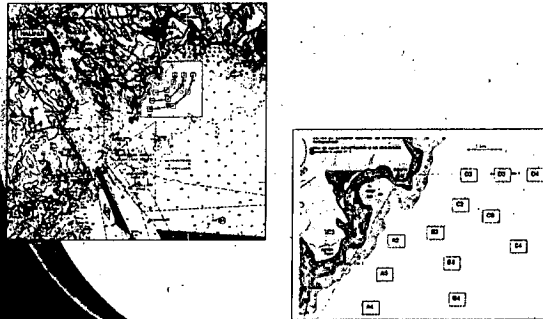
Defence R&D Canada - R & D pour la défense Canada

R&D Trial Objective 1 - Defeat LBR (con't)

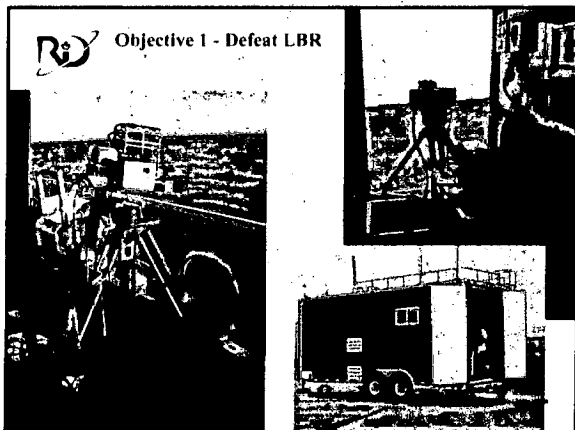
- Test Plan
 - Laser at Osborne Head (O.H.)
 - Laser illuminates CFAV Quest
 - Laser detectors and tracker located onboard Quest
 - Quest at different locations from 2 to 4 km distance from O.H.

Defence R&D Canada - R & D pour la défense Canada

R&D Trial Objective 1 - Defeat LBR (con't)



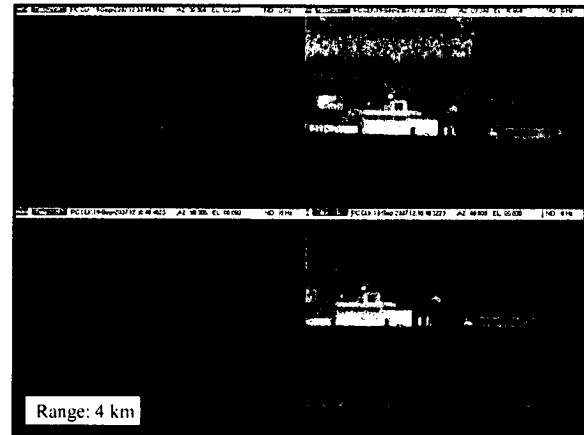
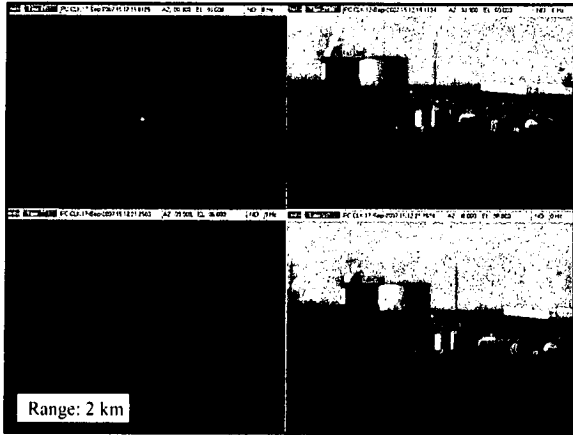
Defence R&D Canada - R & D pour la défense Canada



R&D Objective 1 - Defeat LBR Results

- BRILLIANT worked perfectly well at sea
- Alternate tracking system worked perfectly well too at 2, 3 and 4 km

Defence R&D Canada - R & D pour la défense Canada



**Objective 1 - Defeat LBR
Auxiliary Tracking
(Range: 3 km)**

Gated camera

Visible camera

**Trial Objective 2 -
Off-Axis LTD Detection**

- Location: open sea
- Laser used: GLTD (Ground Laser Target Designator)
- Eye Safety: not safe for the eyes (NOHD 24 km and 142km if assisted vision)

Defence R&D Canada - R.A. D pour la défense Canada

**Trial Objective 2 -
Off-Axis LTD Detection (con't)**

- Test Plan:
 - Laser on a Glen tug
 - Laser illuminates CFAV Quest
 - Laser detectors located onboard Quest (port side)
 - Quest and tug maintain same heading at slow speed, 2 km apart and later, 4 km apart.

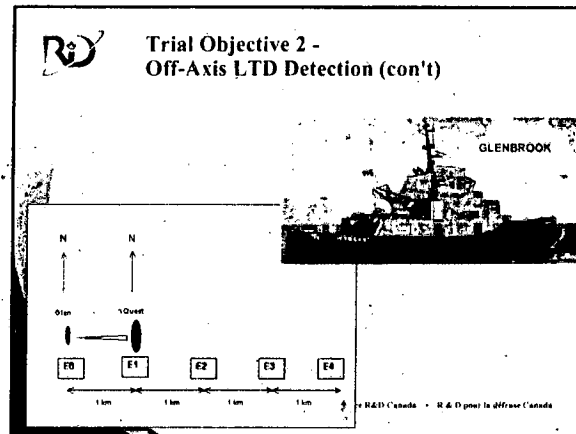
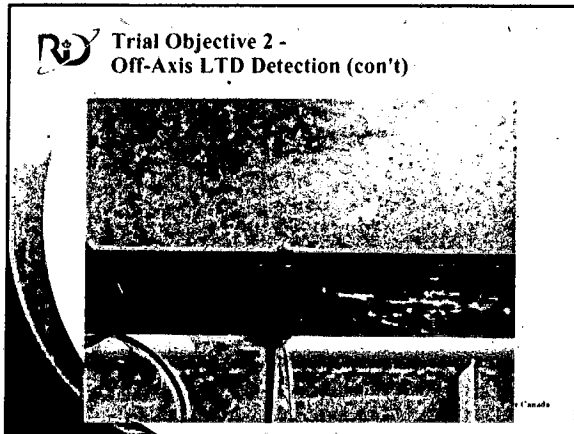
Defence R&D Canada - R.A. D pour la défense Canada

**Trial Objective 2 -
Area Closed to Maritime / Air Traffic
During LTD Measurements**

Maritime Traffic:
Circle 64 km diam.

Air Traffic:
Rectangle 210 x 180 km

Defence R&D Canada - R.A. D pour la défense Canada



Objective 2- Off-Axis LTD Detection Results

- These tests had to be cancelled after trying for a couple of hours due to bad sea state.

- Objectives 1 and 2- Issues to Solve**
- Objective 1: Defeat LBR
 - Acquire a real beamrider firing post from the Army
 - Objective 2: Off-Axis Detection
 - Illuminate the ship using a laser designator aboard a CF-18 instead of another ship.

DEFENCE **R&D** DÉFENSE

LOCATES Trial
(9 September - 3 October 2008)

Franoise Reil and Jacques Dubois
Threat Detection Group, DRDC-Vulcaniser
26 September 2008

Defence Research and Development Canada / Recherche et développement pour la défense Canada

Canada

- Trial Objectives - 29 September 2008**
1. Test BRILLIANT laser detection and tracking capability developed at DRDC against Laser Beam Rider (LBR)
 2. Test GLARES capability to detect optical devices based on laser retro-reflections
 3. Test LASSOS laser detection and tracking capability developed at DRDC against Laser Target Designators (LTD)



Trial Part 1 - LBR Detection/Tracking

- Test Plan - BRILLIANT system
 - Idem 2007 trial, but using a more realistic LBR

Defence R&D Canada - R & D pour la défense Canada



Trial Part 1 - LBR Detection/Tracking Results

- BRILLIANT detected perfectly well a realistic LBR at 2, 3 and 4 km, in axis and off-axis
- Brilliant could track the threat very easily in axis and off-axis

Defence R&D Canada - R & D pour la défense Canada



Trial Part 2 - Threat Optics Detection/Tracking

- Test Plan - GLARES
 - Same setup and location
 - Lasers on Quest illuminate optical devices (binoculars, weapon sights, etc) located at O.H.
 - GLARES detects retro-reflections from optical devices, locates and track optical devices.

Defence R&D Canada - R & D pour la défense Canada



Trial Part 2 - Threat Optics Detection /Tracking Results

- GLARES worked well in all conditions, all the electronic, software, tracking system and optics worked perfectly well.
- GLARES recorded perfect retro-reflections when looking to a corner reflector.
- GLARES recorded good retro-reflections from some of the optical devices tested (binoculars, cameras, weapon sights, etc) but the signal back was not as strong as expected
- Some adjustments to the parameters and optical components have to be made

Defence R&D Canada - R & D pour la défense Canada



Trial Part 3 - LTD Detection

- Location: open sea
- Laser used: CF-18 laser pod
- Eye Safety: not safe for the eyes

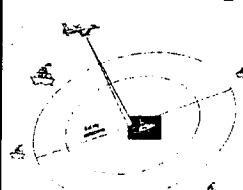


R & D pour la défense Canada



Trial Part 3 - LTD Detection (con't)

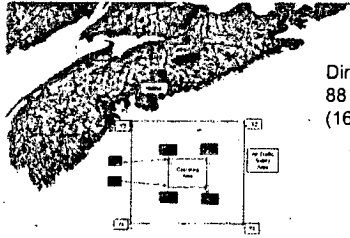
- Test Plan - LASSOS:
 - Laser on CF-18
 - Laser illuminates CFAV Quest at various distances and altitudes
 - LASSOS laser detectors located onboard Quest (port side), detection in-axis and off-axis



Defence R&D Canada - R & D pour la défense Canada



Operating Area - Trial Part III Determined by NAVCAN



Dimension:
88 x 79 Nm
(163 x 146 km)

Defence R&D Canada - R & D pour le défense Canada



CF18 Runs - Trial Part III Results

- The cloud ceiling was very low (less than 1000 ft), and the visibility was too low to illuminate the ship at a distance. Less aircraft time than expected.
- LASSOS successfully recorded some off-axis detection

Defence R&D Canada - R & D pour le défense Canada