



From Environmental Science to BMP

The Canadian Experience

Major Rob Lajoie – DLE 5, Environmental Projects

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14. ABSTRACT In 2000, due to increasing public concerns and regulatory requirements about the impact on the environment of military activities such as the firing of munitions, demolition, and the destruction of obsolete ammunition by open burning and open detonation, the Canadian Army Director Land Environment (DLE) mandated Defence Research and Development Canada (DRDC) to undertake a research program in collaboration with the Institut National de la Recherche Scientifique (INRS) to study the environmental impact of ammunition residues on the soil, surface water and groundwater of military ranges to determine the environmental state maintain and improve the sustainability of Canadian Army operational ranges and to apply due diligence. The research program allowed the Canadian Army to better understand the fate and behaviour of ammunition residues on these ranges and also enhanced the Army's ability in the development of innovative risk management strategies based on hydrology and hydrogeology. It also allowed the development of a unique expertise and positioned the Canadian Army to better understand the impacts of live fire training and to be ready to answer any public inquiries and take corrective actions if needed. The newly acquired knowledge is currently changing how the Canadian Army is developing and managing their current and new operational ranges. The on-going development of new risk management plans, range design, range management, maintenance procedures sampling protocols, awareness programs and mitigation measures are only a few of the positive changes that the research program has contributed to. As the lead Project Manager of the characterisation projects, I will provide an overview with some specific examples of the Canadian Army's best management practices to operational ranges.		

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KEYNOTE ADDRESS

OVERVIEW OF THE POSITIVE IMPACTS OF RANGE AND TRAINING AREA CHARACTERIZATION ON THE DEVELOPMENT OF A CANADIAN ARMY RANGE AND TRAINING AREAS BEST MANAGEMENT INITIATIVES

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As the lead Project Manager of the characterisation projects, I will provide an overview with some specific examples of the Canadian Army's best management practices to operational ranges.

Overview

- Research program history
- From scientific to operational
 - Bridging the Gap
- Scientific Reports put into Action
 - Keys elements to successfully implement BMPs
 - Accomplishments
 - Next steps



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Research Program History

RTA Characterization Program

- 1997- DND discovered trichloroethylene (TCE) in the aquifer under the Valcartier Garrison
- 1997 - Environment Canada - Risk Management Framework for Contaminated Sites
- 2000 - German Army leaves Base Shilo



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Research Program History

RTA Characterization Objectives

- Identify sources of contamination
- Identify type of contamination associated with specific range training activities
- Describe behavior of contaminants in the environment (soil and water)



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Research Program History

11 years of Research

- \$13 M
- 6 bases characterized
 - 100s of ranges characterized
 - 720 GW wells
 - 1000s of soil and water sampling results
 - 100s of reports



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From Scientific to Operational

Bridging the Gap



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From Scientific to Operational

Bridging the Gap

- Research results were numerous and decentralized
- Results were complicated to use
- Difficult to prioritize work for the Army
- Challenge in obtaining a picture of the true environmental risks

Before



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From Scientific to Operational

Bridging the Gap

Turning point:

In 2009 the Army decided to create a single report:

- Consolidated summary
- Defined contamination by type of range
- Incorporated only the highest detected contamination results



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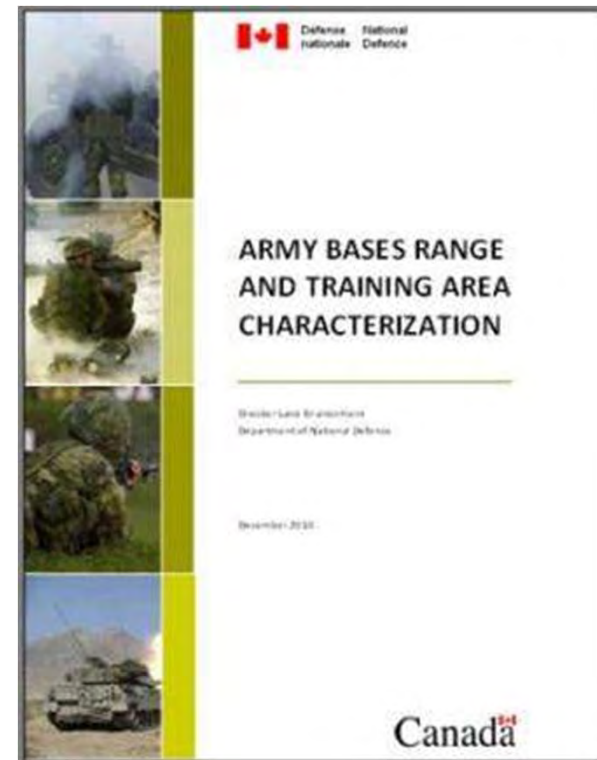


From Scientific to Operational

Bridging the Gap

Characterization Report

After



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From Scientific to Operational

Bridging the Gap

Anti-tank Range Contamination

Energetic

HMX, TNT, RDX

Propellants

NG, 2,4 DNT

Metals

Pb



Small Arms Range Contamination

Metals

Pb, Sb

Propellants

NG



Demolition Range Contamination

All types of ammo destroyed

Energetic : TNT, RDX
(low detonation)



Artillery Range Contamination

Energetic

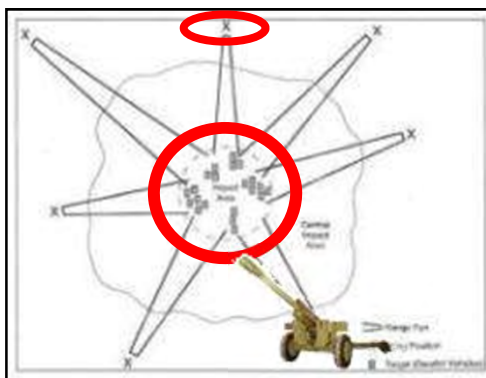
RDX, HMX, TNT

Propellants

NG, 2,4 DNT

Metals

Pb, Zn, Cu....



Grenade Range Contamination

Energetic

RDX

Metals

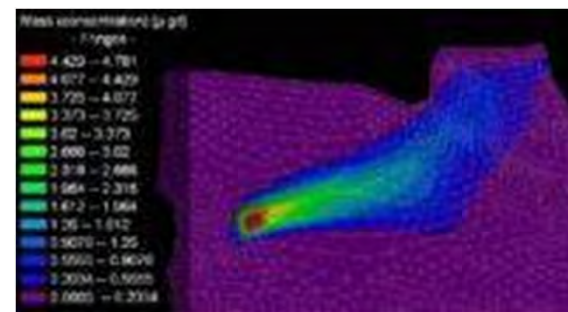
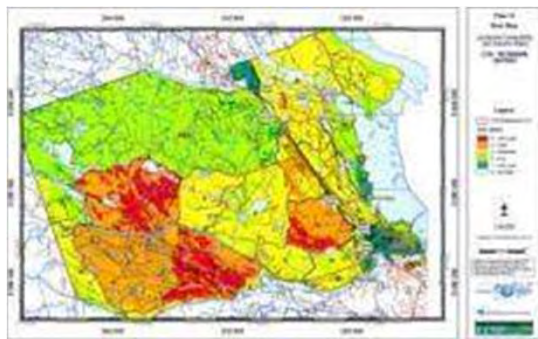
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Scientific Reports Put Into Action



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Scientific Reports Put Into Action

The RTA Characterization Report became a tool to:

- Manage ranges
 - Decisional tool (siting, designing...)
- Understand the environmental situation
 - Reference and guidance tool
- Foster pro-activity rather than reactivity
- Define future range requirements



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Keys Success Factors



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Keys Success Factors

● Vision

- 2008 Army Strategy
- Baseline funding
- 5 yrs R&D Framework
- Clear environmental priorities and development of prevention and mitigation measures
- Continuous improvement

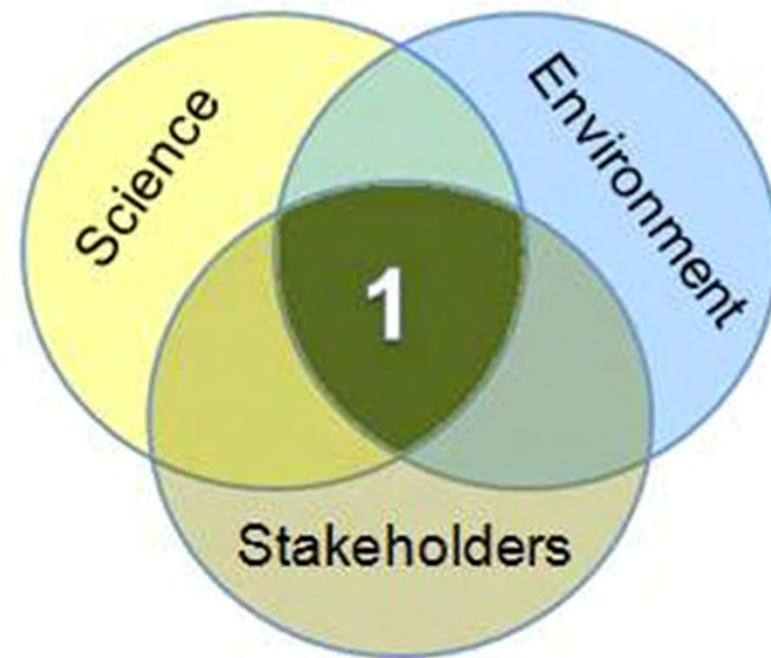


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Keys Success Factors

The success of any project depends on the common understanding of the needs and requirements



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Keys Success Factors

- The Team



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Keys to Success

● Stakeholders

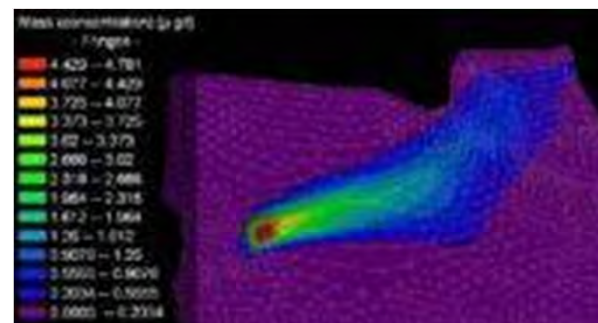
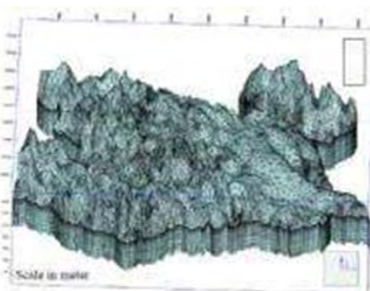
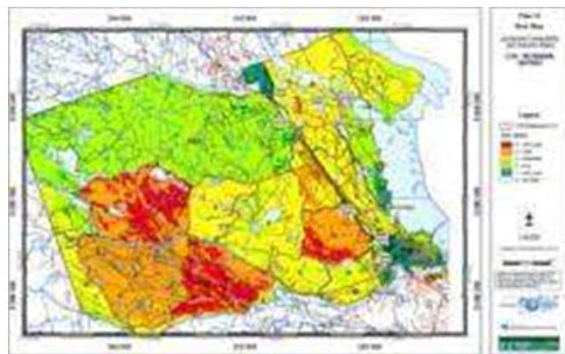
- Define
- Inform
- Engage
- Excite
- Train



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Accomplishments



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Accomplishments

- 6 Bases Characterized *(soil, SW and GW)
- Ground water monitoring system in place
- 5 out of 6 major training bases with risk maps
- Sampling protocols for SW and soils wrt heavy metals, energetic materials

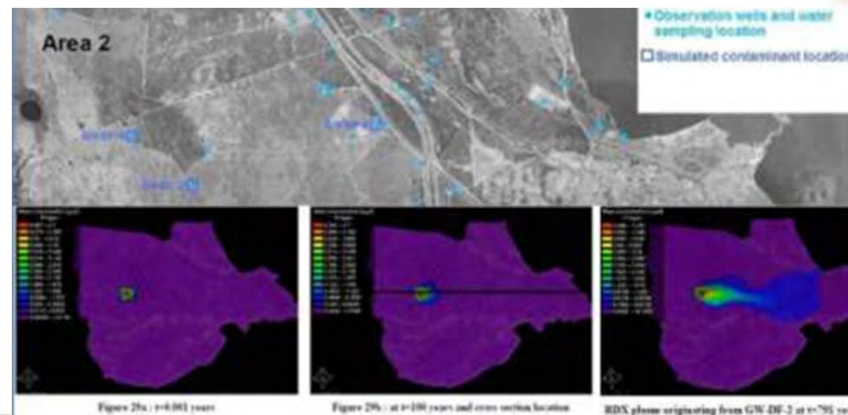
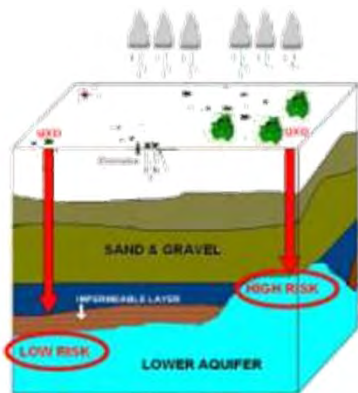


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Accomplishments

- Burning Tables deployed across Canada
- Development of new small arms range design
- Significant reduction of environmental liability and risks

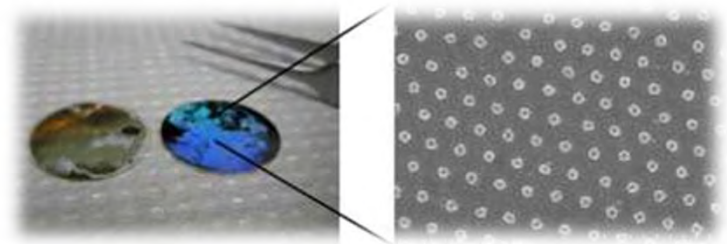


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Next Steps

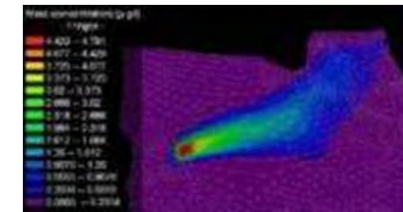
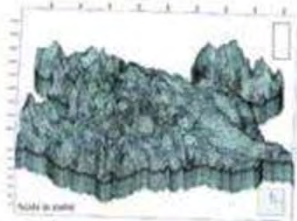
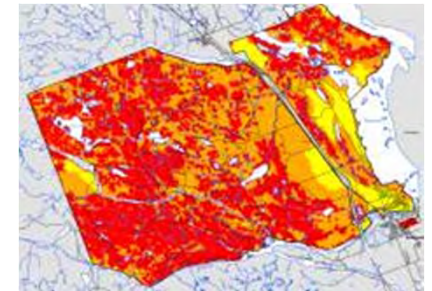
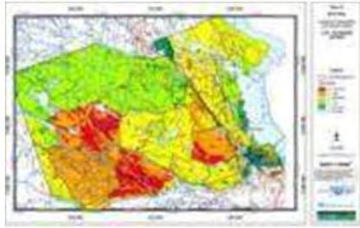
- Improving the hazard maps
- New range design
 - Demolition ranges
 - Anti-tank ranges
- Develop & test innovative remediation technologies
- Develop site specific criteria for RTA
- Prioritize all ranges (risk level)
- Developing new contaminant management plan



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The End - Thank You



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