CROSH CRSST

centre for research in occupational safety and health

centre de recherche sur la santé et sécurité au travail

ANNUAL REPORT 2011

CONTENTS

About CROSH

The Centre for Research in Occupational Safety and Health (CROSH) was established by Laurentian University to provide a formalized structure for industry, safe workplace associations, labour groups, government organizations and researchers to share workplace injury and disease problems and solutions.

WHO WE ARE AND WHAT WE DO

Because we envision a northern Ontario where workplaces join together to ensure that every worker gets home safe and healthy everyday, we will be an active agent for discovery and innovation to solve the most relevant and pressing problems facing northern industries – such as mining, natural resources and health care – so that they can eliminate occupational injury and disease from their workplaces.

To make this happen we will

- engage with workplace parties in all phases of research;
- create a network of international research partners to share and build expertise;
- develop a framework to facilitate knowledge utilization and sharing to ensure our findings are accessible to agencies dedicated to workplace health & safety; and
- promote new discoveries to government and industry in order to positively influence policies and practices.

CROSH EXPERTISE

CROSH brings together researchers with expertise in ergonomics, human factors, occupational health nursing, epidemiology, mental health, computer science, risk, fatigue, clinical physiology, labour studies and occupational disease.

Message from the Director

On July 1, 2011 the general membership of CROSH elected the first full executive committee. We immediately got to work fundraising and establishing an external advisory committee. By the end of 2011 we had confirmed 11 of 15 members of the advisory committee, and $210,000 in labour and industry donations to support CROSH's application for a Northern Ontario Heritage funded research Chair in OHS. We also hosted the 2nd annual CROSH Symposium bringing together researchers, community stakeholders, government officials and student trainees.

CROSH Director

2011

With the leadership, dedication, and passion of CROSH's advisory and executive committees, I believe we have made great progress in 2011. I am grateful for all the support, and I look forward to working with all the CROSH members, and community partners as we continue to move closer to a shared goal that will culminate in the elimination of occupational injury and disease from northern Ontario workplaces.

Live well, work safe!

Leadership Team

Steered by an 10 member Executive Committee (EC), CROSH's strategic direction is guided by a 15 member Advisory Committee (AC) comprised of leaders from mining, forestry, health care, and government (Figure 1, Table 1). The EC is charged with operationalizing CROSH's Strategic Research Plan (SRP), and with the overall management of CROSH. The AC meets semi-annually and works closely with CROSH researchers to ensure CROSH's strategic direction by 1)providing strategic advice in terms of research directions and private sector funding opportunities, 2)supporting the development of fruitful and collaborative research relationships between CROSH researchers, workplaces and other Centres of Research, 3)developing collaborative, inclusive, community based research partnerships, 4)encouraging effective knowledge exchange enhancing CROSH's impact to change policy and practice, and 5)assisting CROSH in developing and maintaining a "clearing-house" of OHS research. The EC meets 4-5 times per year to develop and carry-out the SRP that addresses AC feedback that is in line with financial means. The General Membership (Table 2), composed of faculty and graduate students, meets 4-5 times/year to fulfill the primary roles of conducting research, student training, and participating in knowledge dissemination.

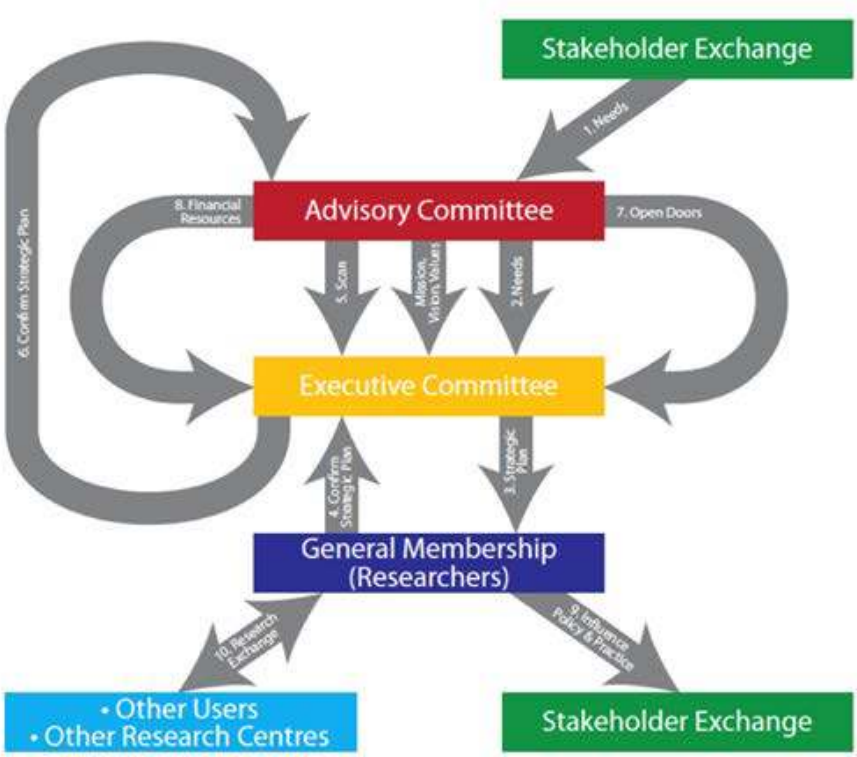


Figure 1: CROSH management structure illustrating the relationships between community stakeholders, advisory committee, executive committee, CROSH researchers, and other research Centres.

Table 1: Composition of the CROSH Advisory Committee and Executive Committee

Advisory Committee

Leo Gerard
International President, USW
(Seat: Labour, Mining)
Richard Pacquin
President, CAW Mine/Mill 598
(Seat: Labour, Mining)
John Closs
President, Sudbury and District Labour Council
(Seat: Sudbury and District Labour Council)
William Shaver
Executive Vice President of QuadraFNX,
President & CEO of DMC Mining Services
(Seat: Management, Mining)
Jody Kuzenko
General Manager of Sustainability
North Atlantic Base Metals, Vale
(Seat: Management, Mining)
Donna Campbell
Executive Director
Occupational Health Clinics for Ontario Workers
(Seat: Occupational Health Clinics for Ontario Workers)
Candys Ballanger-Michaud
Chief Executive Officer, Workplace Safety North
(Seat: Workplace Safety North)
Wayne Glibbery
Workers Health & Safety Centre, NE-ON Office
(Seat: Workers' Health and Safety Centre)
Nancy Johnson
Labour Relations Specialist
OHS/Workers' Comp., ON Nurses' Association
(Seat: Labour, Health Care)
Rhonda Watson
Vice President, Human Resources
Chief HR Officer, Health Sciences North
(Seat: Management, Health Care)
Marianne Matichuk
City of Greater Sudbury
(Seat: Northern Ontario Mayors' Council)

Note: Four AC positions remain open (Labour-Forestry/Mills/Pulp and Paper; Management-Forestry/Mills/Pulp and Paper; Management- open category; Ministry of Labour Prevention Division)

Executive Committee

Director
Dr. Tammy Eger
School of Human Kinetics

Associate Director
Dr. Michel Larivière
School of Human Kinetics

Secretary
Dr. Nancy Lightfoot
School of Rural and Northern Health

Treasurer
Dr. Glenn Legault
Department of Psychology

Communications
Dr. Ratvinder Grewal
Department of Math and Computer Science

Community Liaison
Ric deMeulles

Research Development
Dr. Alison Godwin
School of Human Kinetics

Health and Safety Liaison
Dr. Sandra Dorman
School of Human Kinetics

Medical Liaison
Dr. Joel Andersen
Northern Ontario School of Medicine

Graduate Student Representative
Mathew Felton
Master in Human Kinetics Student

Table 2: CROSH researchers and graduate student members

Faculty Researchers	Graduate Students
Dr. Joel Anderson Northern Ontario School of Medicine	**AJ Boulay** Computer Science
Dr. Celine Boudreau-Larivière Associate Professor, School of Human Kinetics	
Dr. Roger Couture Dean of Professional Schools	**Kacey Cayen** Computer Science
Dr. Sandra Dorman Associate Professor, School of Human Kinetics	**Alexandra Clement** Psychology
Dr. Tammy Eger Associate Professor, School of Human Kinetics	
Dr. Alison Godwin Assistant Professor, School of Human Kinetics	**Mathew Felton** Human Kinetics
Dr. Sylvain Grenier Associate Professor, School of Human Kinetics	**Hilary Gordon** Human Kinetics
Dr. Ratvinder Grewal Associate Professor, Dept. of Math and Computer Science	**Caleb Leduc** Human Kinetics
Prof. Judith Horrigan Lecturer, School of Nursing	
Dr. Michel Larivière Associate Professor, School of Human Kinetics	**Mallorie Leduc** Graduate, Master in Human Kinetics
Dr. Glenn Legault Assistant Professor, Department of Psychology	
Dr. John Lewko Professor, Human Development	
Dr. Nancy Lightfoot Associate Professor, School of Rural and Northern Health	
Dr. Rueben Roth Assistant Professor, Department of Sociology	
Dr. Olivier Serresse Director, School of Human Kinetics	
Dr. Liz Wenghofer Director, School of Rural and Northern Health	

Research at CROSH

To impact policy and practice, the multidisciplinary team of CROSH experts and their research partners will engage stakeholders in three broad streams for research - Human Factors and Ergonomics (HFE); Occupational Health (OH); Occupational Physiology and Environment (OPE) - that will support eight core research programs (Figure 2). The focus and objectives of each program are summarized below.

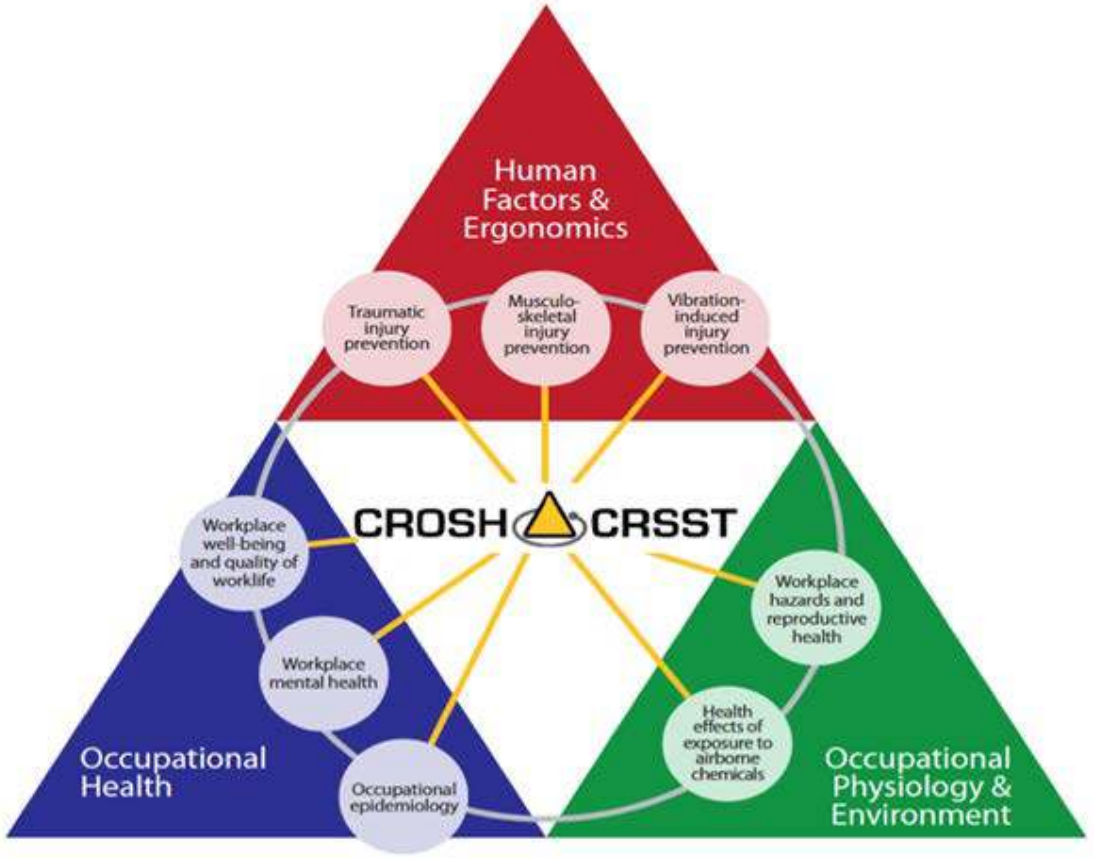


Figure 2: CROSH will support eight integrated research programs drawing from expertise in human factors & ergonomics, occupational health, and occupational physiology & environment.

CROSH RESEARCH PROGRAMS – 5 Year Vision

1. Vibration induced injury prevention research program

This program will examine vibration exposure, vibration transmissibility, vibration-induced disorders and stem-cell therapy. Vibration data will be collected during the operation of mobile equipment used in resource based industries (RBIs) and replicated at the CROSH lab using the vibration simulator robotic platform. This will lead to ground-breaking work on human response to vibration under rotated working postures (which are common amongst RBI equipment operators) and necessary to change international health and safety standards. In partnership with occupational physicians, the CROSH research team will document clinical evidence of vibration induced injury, with particular focus on linking workplace exposures to clinical evidence of vibration induced white-foot. The team will also collaborate with the National Institute for Occupational Safety and Health and the Stem-Cell Network, to develop a mouse-model to test the efficacy of utilizing stem-cells as a therapy for vibration induced injury. To the team's knowledge, no such research approach is currently being undertaken in Canada. If shown to be beneficial in treating vibration-induced injury, stem cell therapy will revolutionize treatment for workers suffering from hand-arm vibration syndrome and vibration induced white foot.

2. Prevention of traumatic injury research program

This program will examine mobile equipment accidents from three perspectives: a) Machine Design and Driving Behaviour, b) Machine Interface Design and Cognitive Load and c) Fatigue and Traumatic Injury Occurrence.

The primary objective of the machine design and driving behaviour research program is to identify an optimal secondary navigation aid or collision avoidance system designed to provide nearly 360 degree view around underground machinery that has notoriously poor line-of-sight. Once the camera system has been validated and deployed in the field, the team will measure the impact the system has on operator safety, comfort, cognitive load and ultimately, productivity. This will be accomplished through a lab-based study using a quantitative electroencephalograph (QEEG) and eyetracker to understand cognitive load and operator point of regard, while using the new display in a mocked-up cab and driving scenario. The machine interface design and cognitive load program will use an innovative QEEG technique to monitor the level of activity in different regions of the brain during machine/equipment interface usage. This work will lead to improved interface design, and decreased mental workload. The fatigue and traumatic injury occurrence research program will use portable sleep recording units to investigate the link between chronic sleep disorders and performance on a variety of cognitive factors, like processing speed, reaction time, executive function and memory. Impairments in any of these cognitive domains are likely to influence the subjects' capacity for safe performance during work-related tasks. The sleep data recording unit will be used to objectively determine the quantity and quality of sleep a subject experiences during the night

(or day if the subject is working the night shift) and the resulting cognitive deficits that may increase the risk for workplace accidents.

3. Musculoskeletal injury prevention research program

Using advanced methods of biomechanical analysis, CROSH researchers will explore how skill acquisition and motor control affect spine stability and spine loading. A lab-based research program will quantify the effect of vibration on neuromotor measures, as well as the impact of emotion on spine stability measures. The impact of cumulative spinal load associated with the operation of mobile equipment will also be evaluated to determine the benefits of improved seating posture and vibration attenuation on cumulative spinal loading reduction.

4. Occupational Epidemiology

CROSH researchers in this area will undertake surveillance studies of mortality and cancer incidence in various occupational cohorts and compare the results to standard populations; previous experience has been with four cohorts in the minerals industry for nickel workers and copper-zinc workers, and this could be expanded to other industries. Additionally, quantitative aetiological studies will be conducted to identify risk factors for various chronic diseases (particularly cancers) of occupational health interest and it is intended that this information be supplemented in future with qualitative information to better inform exposure assessment, exposure standards and compensation boards.

5. Workplace Mental Health and Cognitive Factors

The CROSH researchers will focus on the status of worker mental health and cognitive functioning. Of particular interest is the relationship between measures of sleep quality and adverse health consequences, particularly among shift-workers. The researchers are also interested in understanding the complex interactions between mental health, sleep pathology, fatigue, cognitive impairment, and traumatic accidents involving mobile equipment. Interventions will be developed to impact policy and practice aimed at improving mental health in the workplace.

6. Workplace Well-being and the Quality of Worklife

CROSH researchers will use large-scale survey methodologies, quantitative analyses and qualitative measures of workplace well-being to better understand issues such as job stress, job satisfaction, organizational commitment, and work engagement. These variables will then be used to tackle issues such as absenteeism, and workplace injuries and illnesses. The link between physical fitness, leisure, work-life/work-family balance will also be investigated as these relate to worker health and wellbeing and workplace effectiveness and productivity.

7. Health Effects of Exposure to Airborne Chemicals in the Workplace

CROSH researchers will examine the health effects of air quality in the workplace, specifically the inflammatory effects in the airways and blood. This research group proposes to collect occupational exposure data in real-time and will also collect biological and physiological data while workers are on-the-job, to better describe the health effects of air quality. The air quality

standards for some components of occupational air pollution (e.g. particulate matter) are based primarily upon technological capabilities, rather than health impacts. It is important to determine what is a safe level of exposure, particularly given that novel technologies are emerging to reduce emissions. Without worker data, it will be impossible to determine the health benefits of these changes. Likewise, this data can inform policy on standards development. Globally, worker populations are aging and generally this demographic shift is associated with an increased prevalence of chronic diseases amongst workers. Accordingly, one aspect of this innovative research will include longitudinal studies aimed at describing how air quality in the workplace impacts new, and experienced workers as well as workers with varying health profiles (e.g. obesity, hypertension, age).

8. Workplace Hazards and Reproductive Health

CROSH researchers will explore an emerging area of research linking vibration exposure to Penile Raynaud's. The team will determine the prevalence of Penile Raynaud's in 'at risk' worker populations (i.e. those afflicted with vibration white finger/white feet) through surveys. Interventions to reduce vibration exposure will also be implemented and evaluated.

Research Output at CROSH in 2011

Research publications, grants held and graduate student supervisions are summarized below.

Publications

Peer-Reviewed Journals

House, R., Jiang, D., Thompson, A., **Eger, T**., Krajnak, K., Sauve, J., and Schweigert, M. (2011) Vasospasm in the feet in workers assessed for HAVS. Occupational Medicine, 61, 115-120.

Kociolek, A., **Eger, T**., and **Grenier, S**. (2011) A Biomechanical Investigation of Forces Applied to the Lift Truck Steering Wheel: Effects of Posture, Gender and Hand Contact on Cumulative Low Back Loading. Theoretical Issues in Ergonomics Science, 12(6); 544-557.

Eger, T., Contratto, M., and J.P. Dickey (2011) Influence of Driving Speed, Terrain, Seat Performance and Ride Control on Predicted Health Risk Based on ISO 2631-1 and EU Directive 2002/44/EC. Journal of Low Frequency Noise Vibration and Active Control. Vol.30(4) 291-312

Leduc, M., **Eger**, T., **Godwin**, A., Dickey, J. And House, R. (2011). Examination of vibration characteristics and reported musculoskeletal discomfort in workers exposed to vibration via the feet. JLFNVAC. 30(3): 197-206.

Eger, T., **Stevenson**, J., Grenier, S., Boileau, P.E., Smets, M. (2011). Influence of vehicle size, haulage capacity and ride control on vibration exposure and predicted health risks for LHD vehicle operators. Journal of Low Frequency Noise, Vibration and Active Control. 30(1).

Godwin, A., **Eger**, T., **Grenier**, S. (2011). Using visibility tools in Classic JACK to assess line-of-sight issues associated with the operation of mobile equipment. International Journal of Human Factors Modelling and Simulation. In Press.

Gauthier, A. P., **Larivière**, M., Pong, R., Snelling, S., & Young, N. L. (In press). Differences in Occupational, Transportation, Domestic, and Leisure-Time Physical Activities: Do Geographical Location and Socio-Cultural Status Matter?" *Journal of Physical Activity & Health.*

Legault, G. (2011). Sleep and heat related changes in the cognitive performance of underground miners: A possible health and safety concern. Minerals, 1, 49-72.

Berriault C, **Lightfoot N**. 2011. Occupational Tellurium Exposure and Garlic Odour. Occup 61(2): 132-135.

Renton SJ, **Lightfoot N**, Maar MA. 2011. Physical activity promotion in call centres: employers' perspectives. Health Education Research. 26(6): 1050-1059.

Wenghofer EF, Timony PE, Pong RW. (2011) A closer look at Ontario's northern and southern rural physician demographics. *Rural and Remote Health* (online). 2011; 11: 1591. Available from: http://www.rrh.org.au.

Other Publications

Dorman, S. and **Boudreau-Larivière**, C. A guide to healthy pregnancies in the mining workplace. Laurentian University Press, in collaboration with Workplace Safety North.

Dorman, S.C. and **Boudreau-Larivière**, C. Pamphlet – A guide to healthy pregnancies in the mining workplace.

Godwin, A. (2011) Line of sight analysis on new and low profile carrier. Technical report for MacLean Engineering.

Presentations

Dorman, S. (2011) Occupational Physiology: Ongoing and Proposed Projects. CROSH conference.

Dorman, S. (2011) Workshop - "Health Effects of Diesel Exhaust" Mining Diesel Emissions Conference.

Thompson, A., **Eger, T**., Krajnak, K., and House, R. (2011) Vibration-White Foot in a Worker with Direct Vibration Exposure to the Feet. 12th International Conference on Hand Arm Vibration. Ottawa, ON, Canada, June 13-17.

Singh, P., **Eger, T**., Dickey, J., House. R., and Oliver, M. (2011) Evaluation of Gender Differences in Foot-Transmitted Vibration. 12th International Conference on Hand Arm Vibration. Ottawa, ON, Canada, June 13-17.

Boucher, D., Oliver, M., and **Eger, T**. (2011) Quantification and Comparison of Selected Material Properties for Anti-Fatigue Mats to Investigate Vibration Transmission Reduction Potential. 12th International Conference on Hand Arm Vibration. Ottawa, ON, Canada, June 13-17.

Leduc, M., **Eger, T**., **Godwin, A**., Dickey, J., and Oliver, M. (2011) Evaluation of the Transmissibility Properties of Anti-Fatigue Mats Used by Workers Exposed to Foot-Transmitted Vibration. 12th International Conference on Hand Arm Vibration. Ottawa, ON, Canada, June 13-17.

Gooyers, C., McMillan, R., Howarth, S., **Eger, T**., and Callaghan, J. (2011). The impact of posture and prolonged vibration exposure on the low-back: an in vitro study. Association of Canadian Ergonomist Conference Proceedings. October 18-20, London, ON, Canada.

Godwin, A., and **Eger, T**. (2011) Evaluating aspects of underground cap-lamp ergonomics and comfort. Association of Canadian Ergonomist Conference Proceedings. October 18-20, London, ON, Canada.

Gooyers, C., McMillan, R., Howarth, S., **Eger**, T., and Callaghan, J. (2011). The impact of posture on the transmission of vibration in the spine. American Society for Biomechanics Conference Proceedings. August 10-13.

Eger, T., House, R., Oliver, M., Thompson, A., and Hope, P. (2011). Occupational vibration: health effects, measurement standards and interventions, panel session. Association of Canadian Ergonomist Conference Proceedings. October 18-20, London, ON.

Eger, T. (2011). Whole-body vibration exposure: understanding, evaluating and predicting health risks. Ontario Stone, Sand and Gravel Association Operations Health and Safety Seminar. January 19-20, Toronto, ON.

Gordon, H., **Lariviere**, M. Physical and Psychological Determinants of Workplace Injuries: A Prospective Study of Seasonal Forest Fire Fighters. 2nd CROSH Symposium, Sudbury, Ontario, December 2011.

Horrigan J, Nowrouzi B, **Lightfoot** N. Quality of work life of registered nurses in rural and urban acute care environments in Northeastern Ontario Canada. Canadian Rural Health Research Society, Richmond, British Columbia, October 20-22, 2011.

Horrigan, J. Challenges Associated with Evaluating the Quality of Work Life of Northeastern Ontario Nurses working in Urban, Rural, and Remote Hospital Settings. Oral presentation at the

Faculty of Professional School's Scholarship Showcase, and Poster presentation Professional School's Scholarship Showcase Center for Research in Occupational Safety and Health (CROSH) Symposium. Laurentian University, Sudbury, ON, Canada, December, 13th 2011.

Leduc, C. & **Lariviere**, M. Identifying return to work predictors among individuals obtaining psychological services, Poster Presentation. 2nd CROSH Symposium, Sudbury, Ontario, December 2011.

Nowrouzi, B. & **Lariviere**, M. Quality of Work Life: Investigation of Occupational Stressors Among Nurses in northeastern Ontario, Poster Presentation. 2nd CROSH Symposium, Sudbury, Ontario, December 2011.

Lightfoot , N, Berriault C. 2011. Mortality and cancer incidence in a northeastern Ontario copper-zinc cohort. Xstrata-Copper Health and Safety and Metallurgical workers from CAW 599. Timmins, Ontario.

Research Grants

Principal Investigator: **Eger, T.**

Project: Examining the impact of non-neutral sitting postures on vibration transmissibility up the spine
Source of funding: Natural Sciences and Engineering Research Council
Funding Period: 2011
Type of Grant: Discovery Grant
Amount: $102,160

Principal Investigator: **Eger, T.**

Project: Field study to document and evaluate the characteristics of vibration for workers exposed to vibration via the feet.
Source of funding: Workplace Safety and Insurance Board
Funding Period: 2009-2011
Type of Grant: Solutions for Workplace Change
Amount: $64,000

Principal Investigator: Dickey, J.
Co-Investigator: **Eger, T**

Project: Assessment of the effectiveness of heavy machinery seats for multi-axis vibration environments

Source of funding: Workplace Safety and Insurance Board
Funding Period: 2008-2011
Amount: $300,000

Principal Investigator: Dickey, J.
Co-Investigator: **Eger, T**

Project: Proof of principle: assembly of an immersive virtual reality simulation for lift trucks
Source of funding: Workplace Safety and Insurance Board
Funding Period: 2011-2012
Amount: $40,000

Principal Investigator: **Godwin, A.**
Co-Investigator: **Eger, T.**

Project: Investigating the efficacy of various cap lamps in improving safety for underground pedestrians.
Source of funding: Centre for Research Expertise in the Prevention of MSDs
Funding Period: 2011
Type of Grant: Seed Grant
Amount: $8420

Principal Investigator: **Larivière, M**.

Source of funding: Ontario Government
Granting agency: Ministry of Natural Resources (MNR)
Funding Period: 2011
Type of Grant: Provincial
Amount: $10,000.00

Principal investigator: **Larivière, M**.
Co-Investigator: **Eger, T**

Source of funding: Center for Research Expertise in the Prevention of MSDs
Type of Grant: WSIB/CSPAAT (CRE-MSD)
Funding Period: 2011
Amount: $8,000

Graduate Students (2011 Graduates)

Kaylyn Sutcliffe (M.H.K – Graduated 2011) Inhalation of nebulized diesel exhaust particles: a safety study in healthy humans (Supervsior: Dr. Sandra Dorman)

Natalie Hortness (M.H.K – Graduated 2011) The effects of courtesy stigma on mental health and addictions nurses` job satisfaction (Supervisor: Dr. Michel Lariviere)

Mallorie Leduc (M.H.K – Graduated 2011) Examination of vibration characteristics and reported musculoskeletal discomfort in workers exposed to vibration via the feet (Supervisor: Dr. Tammy Eger)

Strategic Planning Update

CROSH EXECUTIVE AND ADVISORY COMMITTEE MEETING| DECEMBER 15, 2011

Meeting Summary

- **CROSH Update**
  July 1, 2011 | First CROSH executive committee was elected and the structure of the advisory committee was confirmed
  September, 2011 – Ongoing | Meetings with stakeholders to confirm members of the inaugural CROSH advisory committee. Funding applications for CROSH infrastructure (CFI/ORF) and endowed Chair in OHS (NOHF) begin.
  October, 2011 |Open invite to all Laurentian University researchers and graduate students with an interest in OHS research to join CROSH.
- **Leadership Team Introductions**
- **Current State of OHS Research in Ontario and Canada**
  Reviewed other Research Centres in OH&S in Canada and the location of Canada Research Chairs in OH&S. Discussed the distinctions of CROSH. (See Appendix A)
- **Chair in OHS**
  Laurentian University is committed to raising two million dollars for an endowed Chair in OHS.
- **Next Steps: 2012**
  Fill remaining four advisory committee seats. Confirm and prepare joint meeting of the CROSH Advisory and Executive Committee to establish vision, mission, and values. Advisory committee Chair and their terms of reference to be established under the leadership of the CROSH director and Advisory Committee members.

Funding Update

RESEARCH CENTRE GRANTS

Northern Ontario Heritage Fund Application for a Chair in OHS
Value: $2,000,000 (over 5-years)
Status: Submitted
Overview: This project is part of a larger initiative intended to establish Greater Sudbury and Laurentian University as the centre for international expertise in occupational safety and health. This submission is a request for funding to support the establishment of a Research Chair in Occupational Health and Safety associated with the existing Centre for Research in Occupational Safety and Health (CROSH) at Laurentian University, supported by the University's Strategic Plan. This proposal is based on Laurentian University's current research strengths in occupational health and safety (OHS), and Northern Ontario's and Laurentian University's ground-breaking work in the field of OHS. The Research Chair is intended to improve the quality of workplaces and worker health in industries present in Northern Ontario and beyond, by studying and determining best practices and appropriate technologies to support worker safety and health. The Research Chair will build on existing research and foster the export of best practices in OHS nationally and globally. Through the research activities of the Chair, we plan to promote better government standards and legislation based on research findings, improve the quality of workplaces, and decrease workplace injuries and illnesses that result in lost time and decreased productivity.

FedNor Phase 1 Application for an Industry Liaison Person
Value: $300 000 (over 3 years)
Status: Submitted
Overview: CROSH is seeking funding for an industry liaison person. This executive would interface with university researchers and local enterprises with a view of establishing long-term partnerships, translating academic knowledge into workplace solutions, implementing innovations, and facilitating worker well-being, and local prosperity.

Canadian Foundation for Innovation Infrastructure Grant
Value: $2 500 000
Status: Submitted
Overview: See Appendix B for the project summary

CROSH FUNDRAISING

The CROSH Director, Associate Director and Community Liaison Officer together with the Laurentian University Development Office have met with community partners throughout the year in order to promote CROSH and raise funds for the Centre. In 2011 partners have confirmed $210,00 over the next 5-years to support the application to the Northern Ontario Heritage Fund. Fundraising will continue in 2012.

Symposium

2nd Annual CROSH Symposium | Transferring Research to Practice

The CROSH symposium was held at Laurentian University on Tuesday, December 13th, 2011. CROSH researchers and community partners presented and displayed posters. Approximately 70 people attended. The program is shown below.

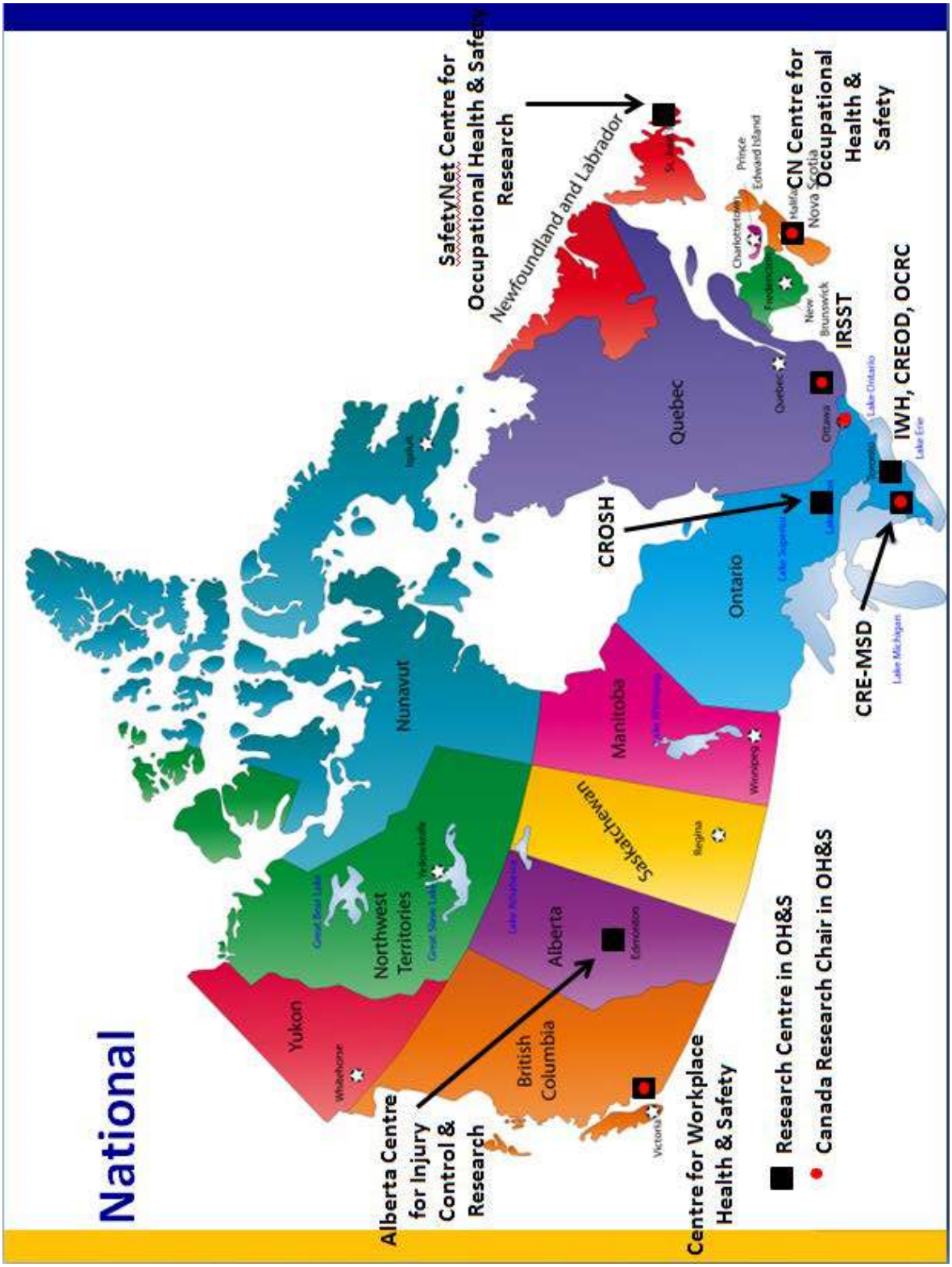
1:00 – 1:05	**Opening Remarks** **Dr. Yves Alarie, Director of Research, LU**
1:05 – 1:20	**CROSH – Official Symposium Opening** Dr. Tammy Eger, CROSH Director & Associate Professor School of Human Kinetics Mr. Roy Slack, President, Cementation Canada
1:20 – 2:00	**Keynote Address** Dr. Aaron Thompson, Occupational Physician & Assistant Professor University of Toronto and St. Michael's Hospital
2:00 – 2:20	**Applied Research Projects in the Steel Industry** Patricia Hope, Ergonomist, Essar Steel Algoma Inc
2:20 – 2:40	**HEALTH BREAK** **Posters Presentations by CROSH Researchers** **Food Break on 2nd floor SE**
2:40 – 3:20	**MNR Research Partnership in Fire Fighting** *Physical and Psychological Determinants of Workplace Injuries: A Prospective Study of Seasonal Forest Fire Fighters* Dr. Michel Larivière, CROSH Assistant Director Hilary Gordon, MHK Graduate Student Rob McAlpine, Ministry of Natural Resources
3:20 – 3:40	**Applied Research Projects – Pregnancy Booklet and Diesel Exhaust Research** Dr. Sandra Dorman, CROSH Researcher & Associate Professor
3:40 – 3:50	**Report on LOARC Initiatives** Nancy Johnson, Labour Relations Specialist, Ontario Nurses Association
3:50 – 4:05	**Advancing Line of Sight Research to Deployment Phase** Dr. Alison Godwin, CROSH Researcher & Assistant Professor
4:05 – 4:15	**Closing Remarks** **Mayor Matichuk, CROSH Advisory Committee Member**

Appendix A

Occupational Safety and Health Research Centers

In 2011 CROSH started to reach out to existing OHS Research Centres in Canada. This work will continue in 2012. A list of OHS research centres that CROSH will strive to liaison with include:

- Centre for Rural and Northern Health Research
- CN Centre for Occupational Health and Safety
- Safety-Net Centre for Occupational Health and Safety Research
- Centre for Research Expertise in Musculoskeletal Disorders
- Centre for Research Expertise in Occupational Disease
- Centre for Workplace Health and Safety
- Canadian Centre for Occupational Health and Safety
- Institut de Recherche Robert-Sauvé en santé et en sécurité du travail (IRSST)
- Occupational Health Clinics for Ontario Workers
- Workers Health and Safety Centre
- Canadian Centre for Health and Safety in Agriculture
- Institute for Work and Health
- National Institute for Occupational Safety and Health |USA
- Minerals Industry Safety and Health Centre| Australia
- Centre for Excellence in Mining Innovation


National
Yukon
Northwest Territories
Nunavut
British Columbia
Alberta
Saskatchewan
Manitoba
Ontario
Quebec
Newfoundland and Labrador
Prince Edward Island
Nova Scotia
New Brunswick
SafetyNet Centre for Occupational Health & Safety Research
CN Centre for Occupational Health & Safety
IRSST
IWH, CREOD, OCRC
CROSH
CRE-MSD
Alberta Centre for Injury Control & Research
Centre for Workplace Health & Safety
Research Centre in OH&S
Canada Research Chair in OH&S

Appendix B

Canadian Foundation for Innovation Infrastructure Grant Summary

Centre for Research in Occupational Safety and Health Project Summary

The Centre for Research in Occupational Safety and Health is requesting infrastructure to operationalize its strategic framework. It aims to support a multidisciplinary team of researchers with expertise in human factors & ergonomics, occupational health, and occupational physiology & environment. With a focus on addressing occupational health and safety issues relevant to resource-based industries, the infrastructure will support an innovative field-lab-field research program. A mobile laboratory (M-CROSH) will support the research team in the field by facilitating access to rural and remote worksites thereby enabling participation from marginalized workers (typically underrepresented in Occupational Health and Safety (OHS) research). Data gathered in the field will support controlled laboratory studies designed to impact policy and practice, which will subsequently be validated back in the field through the deployment of M-CROSH.

Occupational injury and disease have a tremendous societal and economic impact. Research addressing occupational injury and disease is often tackled from one perspective. For example biomechanists work in isolation to understand tissue tolerance for low-back loading, psychologists study the link between depression and back pain, and epidemiologists might conduct a longitudinal study to identify risk factors for low-back pain; however, if the three collaborated, their collective expertise might lead to a novel approach to address back pain prevention. Applied collaborative research is a core philosophy of CROSH and the Centre's collective research expertise is greater than the strength of any individual research program with research outcomes of a given program feeding into another.

The requested infrastructure will outfit M-CROSH for advanced field research and renovate and outfit a campus laboratory (H-CROSH) creating a multidisciplinary research space supporting researchers and the training of students and technicians. The renovated space will include a focus group room and two interview/observation rooms, which can be monitored from a centralized location thus enabling simultaneous observational studies. Together with psychological assessment tools the requested infrastructure will enable the team to estimate the effect of clinically derived variables of personality, cognition, and interpersonal functioning in predicting accidents and lost time injuries among workers and to conduct surveillance, aetiological, and intervention studies. Using person-organization fit theory, worker perceptions of their physical, human and corporate environments will also be measured and linked to epidemiologically-based information related to health and safety, and quality of worklife.

The open concept design of the primary space will allow the research team to replicate work tasks and evaluate muscle activity (EMG equipment), posture (motion analysis equipment), vibration exposure (robotic vibration simulating platform; vibration analysis software and hardware), cognitive workload (QEEG machine), and point of regard (eye-tracking equipment). Research will explore vibration induced injury including seminal work on foot-transmitted vibration injury and penile Raynaud's; musculoskeletal injury prevention including a novel approach to explore the link between emotion and force production; and traumatic injury prevention including development and implementation of an innovated solution to address line-of-sight impairments linked to fatal mobile equipment accidents. A portable sleep analysis system will be used to evaluate sleep and support research examining the link to fatigue, cognitive impairment, injury risk and quality of work-life.

A wet lab will support analysis of biological samples collected in the field with M-CROSH (sputum, blood) supporting research in workplace hazards & reproductive health, and health effects of exposure to airborne chemicals in the workplace. M-CROSH will allow researchers to collect real-time physiological data including core body temperature (Core Body Temperature Measurement Tool), physical exertion (Physioflow), lung function (Microloop Spirometer) airway inflammation, exhaled by-products of

metabolism or inflammation (zNose), and biological samples (sputum, blood and urine) from workers at the worksite. H-CROSH infrastructure will support the analysis of white blood cell composition from sputum samples, and key biological markers in sputum, serum and blood samples that may be used as indicators of health or disease in workers. This equipment will also support the development of a mouse model to test the efficacy of stem-cell therapy to treat vibration induced injury.

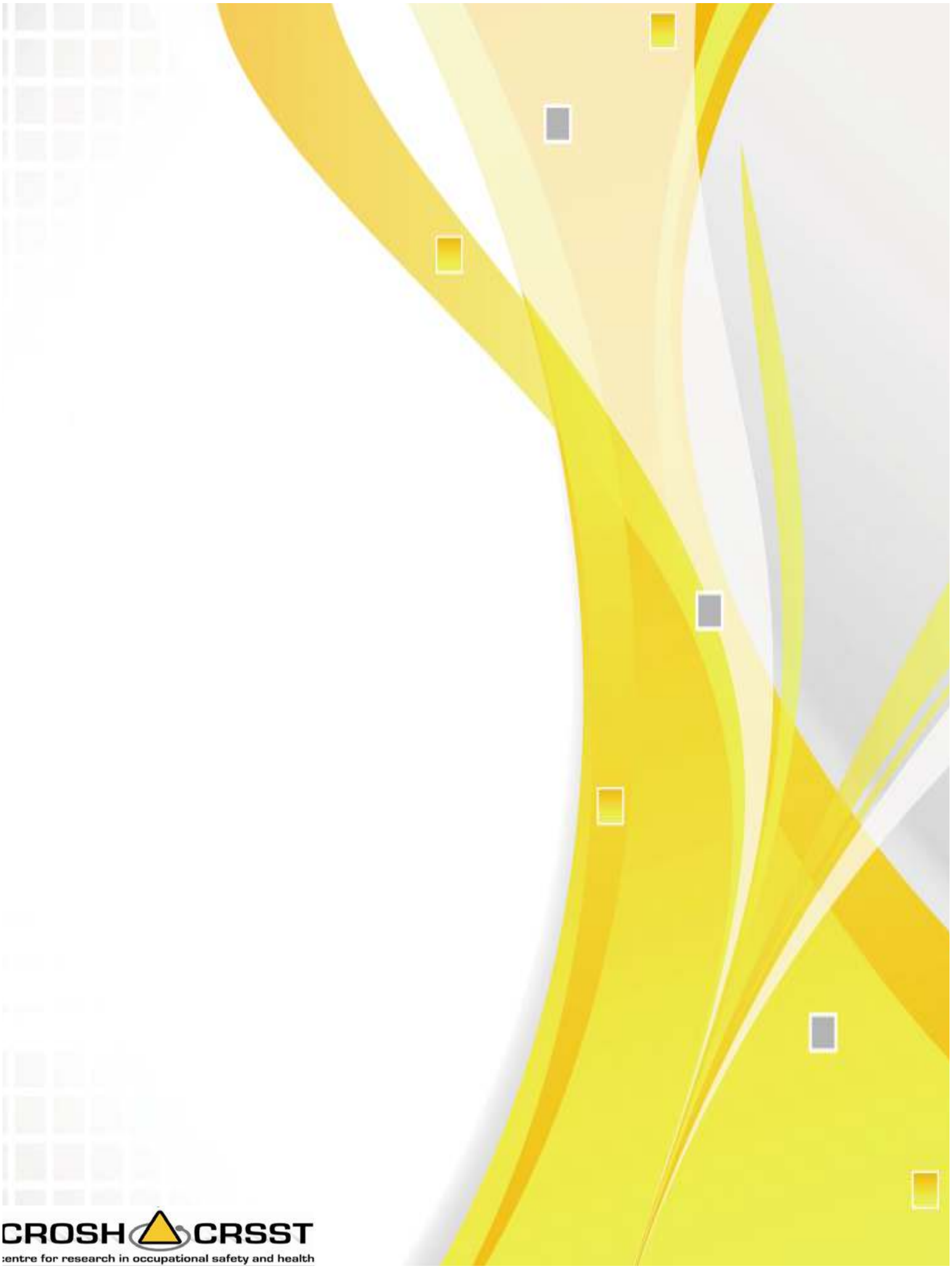
Research supported by the requested infrastructure is directed towards injury prevention and workplace safety with a specific focus on resource-based industries (RBIs). RBIs employ a large portion of the Canadian workforce, particularly in rural and northern Ontario. Occupational injury and disease in these industries (i.e. aggregates, mining, forestry, pulp and paper, energy) has both a human and financial cost. According to Statistics Canada 3.8% of Canadian workers will experience at least one activity-limiting occupational injury or disease; however, in RBI, the rate is almost doubled, 6.7%. Therefore, research directed at mitigating injury and occupational disease in RBI workers will benefit Canada.

CROSH has the capacity to make a major impact on RBIs in the next 5 years, by examining OHS issues such as mobile equipment accidents, vibration induced injury, musculoskeletal disorders, fatigue, workplace stress, and respiratory disease and providing relevant, validated and timely solutions to a multitude of industries. What is learnt in northern Ontario will impact RBIs across the country through CROSH's globally connected industry partners and Advisory Committee, international labour connections, and ties to provincial health and safety associations, as well as through existing and emerging partnerships with research centres across Canada and worldwide. Outcomes of the research will also influence policy and practice through CROSH's presence on international standards committees.

Industry, labour, health and safety associations, as well as governments are engaging CROSH researchers to conduct innovative applied research, exchange knowledge and/or inform policy. Laurentian University has also submitted a 2 million dollar application to the Northern Ontario Heritage Fund (NOHF) to support a research Chair in Occupational Health and Safety with the intent to further engage the community in this important area.

Summary

Together M-CROSH and H-CROSH will support a research approach driven by the needs of industry, labour, health and safety associations, as well as of government. CROSH cannot fulfill its mandate without the requested infrastructure support. The equipment will help retain faculty, and attract graduate students, technicians and faculty to the Centre. Should the NOHF research Chair be awarded, the CFI infrastructure will also play a key role in attracting a world leader in OHS research (and his/her team) to Laurentian University.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