

progress and the latest
research news and
on occupational health
and safety with this 2011
activity report featuring
advances and activities
innovations at the IRSSST

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DECLARATION OF DATA RELIABILITY

The information provided in this activity report falls under my responsibility as president and CEO of the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST). I hereby attest to its accuracy and the reliability of the controls carried out. Recommended by the members of the IRSST's Scientific Advisory Board and approved by its Board of Directors, the 2011 activity report faithfully describes the Institute's mission, vision, and principal achievements. It presents the indicators used to assess the Institute's production and provides accurate and reliable data on the results obtained. I therefore declare that I have every reason to believe that the observable facts and measurable data presented in this report are an accurate reflection of the situation as it stood at December 31, 2011.



Marie Larue
President and CEO
IRSST



MESSAGE FROM THE PRESIDENT AND CEO

We look back on 2011 as a year of innovation and change. Marked by the end of a cycle, that of the Three-Year Scientific and Technical Production Plan, the year 2011 also meant adjusting to a full array of new developments.

From the chairmanship of the Board to the IRSST's organizational structure and project management practices, changes took place.

It was decided that the next scientific and technical production plan would be a five-year rather than three-year plan, which gave rise to broad consultation with our partners. Many people from different stakeholder circles were involved. A second institutional evaluation, carried out by an external committee, occupied a large part of the 2011 calendar. The resulting recommendations led to major decisions, the most important of which involved a major organizational restructuring. Announced in December, the new structure is designed to refocus our energies on the main research issues without neglecting current operations.

contributions of remarkable individuals were highly noteworthy. In addition, Dr. Christine Colin was honoured with France's highest distinction: Chevalière de l'Ordre national (Knight of the national order of merit) of the Légion d'honneur, while Camille Limoges was named a Member of the Order of Canada for his contributions to the development and direction of scientific research. We are proud to have been able to count on the participation of the members of our governing bodies in a vast range of scientific activities and meetings. Their commitment is appreciated by all.

The Institute continued to expand its reach by launching IRSST.TV, a section of the Web site devoted exclusively to videos. Though still in its infancy, this new development offers great potential. The same applies to the review of knowledge on cancers carried out for the Workplace

innovation

During the year, work on a new project management model that aimed to improve our entire research process within a multi-project management context rallied both scientists and management personnel alike. In terms of ensuring the succession, the Institute also made great strides by supporting two of its young chemists, who successfully and quickly completed studies leading to CIH (Certified Industrial Hygienist) certification, thereby reinforcing the Institute's industrial hygiene expertise.

The achievements of the IRSST's research fields received widespread attention. A book on ergonomic interventions was published, apparently the first of its kind in the French-speaking world. The first Québec Survey on Working and Employment Conditions and Occupational Health and Safety (EQCOTESST) report was submitted to the Québec Minister of Labour, Lise Thériault. A state-of-the-art acoustics laboratory that is unrivalled in Montréal opened its doors under the watchful eye of the Board of Directors, whom I wish to thank. I would also like to welcome the new chair of the Board of Directors, Michel Després, and to offer our sincere thanks to Luc Meunier, who left to take up new challenges. I must add that departures and arrivals have all had an impact on the composition of both the Scientific Advisory Board and the Board of Directors. The often-lively debates and stimulating

Health, Safety and Compensation Commission (WHSCC) of Newfoundland and Labrador. This project represents another first, and one that may open the door to other collaborative undertakings outside Québec.

I should like to close with mention of the honours and distinctions garnered in 2011, starting with those awarded by the IRSST at the ADRIQ (Association de la recherche industrielle du Québec) gala, where the Institute handed the Prix Innovation – SST award to Robotics Design for its creation of a modular manipulator arm that helps eliminate risks to workers at the source. Lastly, I wish to offer my sincere thanks to our entire staff for their dedication and commitment, with special congratulations to all those who distinguished themselves in one way or another during this year of change. One thing is certain: both the IRSST's senior management and employees have greater faith than ever in the Institute's mission, which is to contribute, through research, to the prevention of industrial accidents and occupational diseases, and to the rehabilitation of affected workers.



Marie Larue

production

2011 IN NUMBERS

PROJECTS AND ACTIVITIES

162¹

ACTIVE PROJECTS AND ACTIVITIES

29 projects began, including 19 joint, 6 external, and 4 internal
38 projects were completed
95 projects were in progress

193

PARTNER ORGANIZATIONS IN THE NETWORK were involved in active projects

114

NEW REQUESTS FOR EXPERTISE were received

38

EXTERNAL COMMITTEES INCLUDED AT LEAST ONE IRSST REPRESENTATIVE:

12 committees of the CSST and its network, including regulatory committees
8 national and international standards committees
18 other local, national, and international committees

35¹

SCHOLARSHIPS WERE AWARDED, for a total of \$350,000

169²

EXTERNAL RESEARCHERS from 18 universities and 11 research centres form part of the IRSST'S network of collaborators

72,711

ENVIRONMENTAL, TOXICOLOGICAL, AND MICROBIOLOGICAL ANALYSES were performed, of which 77% were for partners in the prevention-inspection network: the CSST, local health and social services network development agencies, and joint sector-based associations. The IRSST Laboratory Services and Expertise Department reported a 14% increase in the number of analyses compared to 2010.

7,657

HOURS WERE DEVOTED TO THE CALIBRATION, MAINTENANCE, AND REPAIR of direct-reading and sampling instruments, with 84% of these hours dedicated to the OHS and prevention-inspection network.

1. Summaries of all the projects funded or carried out by the IRSST and a complete list of all scholarship recipients are available on its Web site at www.irsst.qc.ca

2. Taken from the *Bilan du Plan triennal 2009-2011 de production scientifique et technique (assessment of the 2009-2011 three-year scientific and technical production plan)*, IRSST, February 2012



& outreach

PUBLICATIONS AND COMMUNICATIONS

55

PUBLICATIONS

49 research reports, technical fact sheets, guides, and a book published by the IRSST
3 documents published in collaboration with partners
3 laboratory methods

130

PEER-REVIEWED SCIENTIFIC PUBLICATIONS related to projects carried out or funded by the IRSST:

53 journal articles
70 articles published in conference proceedings
7 other publications, such as book chapters, master's theses, and doctoral dissertations

53

OTHER PRESENTATIONS given by IRSST personnel or IRSST-funded researchers at scientific conferences or events organized by partners

27

SIMPLIFIED ARTICLES in *Prévention au travail*, the magazine published by the CSST and the IRSST

24%

INCREASE IN DOWNLOADS of research reports from the IRSST's Web sites

30%

INCREASE IN TRAFFIC to the IRSST's Web sites

18,178

SUBSCRIBERS TO INFO IRSST, the electronic newsletter





ICAR, the semi-anechoic room of the new, state-of-the-art acoustic laboratory

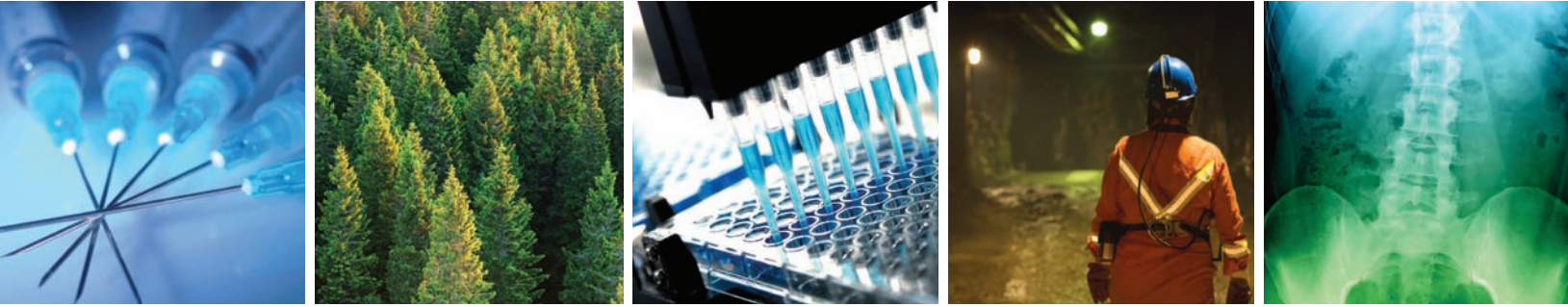
latest news

REMARKABLE NEWS

New knowledge, innovative research, evidence based results, unprecedented books, a new Web site, a unique acoustic laboratory, and promising research avenues.

advances

NEW KNOWLEDGE



The IRSST's scientists, including those whose work it funds, were busy pushing back the frontiers of knowledge. In 2011, their results were published in some 50 research reports, practice guides, laboratory methods, and technical fact sheets, among other formats.

Each project's results contributed in their own way to enriching occupational health and safety (OHS) knowledge. While not all the results constituted spectacular breakthroughs, each piece of new knowledge helped move us forward. That is the very goal we are striving for: making this new knowledge widely available and properly equipping OHS experts and preventionists to make practical use of this evidence-based data.

The IRSST's results are of the highest quality. Validated and evaluated, this new knowledge is ultimately intended to eliminate risks at the source. When this is impossible, the knowledge at least helps reduce the risks. The Institute's scientists also ensure that knowledge serves to support the rehabilitation of workers who have sustained injuries or illnesses and their healthy, safe and sustainable return to work.

The Institute's research is conducted in seven priority fields. Outlined below are the objectives of each field and a few examples of the latest advances in knowledge to which they contributed in 2011. Among these are two research reports that are particularly noteworthy due to their unique nature and the enormous amount of work they required of the authors.

THE NOISE AND VIBRATION FIELD

Research efforts in this field focus mainly on the technical aspects of exposure to industrial noise and to hand-arm and whole-body vibration. They seek to help eliminate, or at least reduce, the risks of adverse effects on the health of exposed workers, such as deafness, hand-arm vibration syndrome or low back pain. Regarding noise, the researchers involved conduct parallel actions on all links in the chain (source, propagation environment, and worker) by proposing metrological tools or simulations to help workplace professionals better diagnose problems and assess sound exposure, implement good noise-reduction solutions, and improve communication in noisy environments in order to prevent occupational injuries. Regarding vibration, the research work entails characterizing the risks associated with the use of portable tools, the operation of industrial machines, and the driving of different categories of vehicles. It also aims to evaluate, select, and design anti-vibration solutions and to further understanding of the human body's behaviour when exposed to a vibration environment.

RESEARCH ORIENTATIONS

NOISE

- Development of noise-exposure measurement strategies
- Assisting in the development of acoustical solutions for noise reduction and control
- Communication in noisy environments

VIBRATION

- Characterization of vibration exposure and vibration environments
- Support tools for the selection and design of less vibrating machines and anti-vibration products (seat, glove, anti-vibration handle)
- Dose-effect relationship and biodynamics of the human body

ACHIEVEMENTS IN 2011

Researchers designed a portable acoustical-intensity mapping system for rapidly and efficiently identifying noise sources and that requires little technical knowledge on the user's part. Other achievements in this research field included the evaluation of the noise and vibrations produced by mining equipment and soil compactors, which ultimately led to the formulation of recommendations for reducing exposure levels among workers operating these types of equipment.

THE PROTECTIVE EQUIPMENT FIELD

Given the difficulty of eliminating hazards at source, the research conducted in this field is intended to advance and apply knowledge whose purpose is to make protective equipment offering increased protection available to workers. The aim of the studies is to provide information and develop evaluation tools that can be used to select the most effective protective equipment or develop new equipment. They also take into account requirements relating to its efficiency, reliability, and context of use in workplaces, while providing increased comfort for the workers using it.

RESEARCH ORIENTATIONS

- Development of test methods and evaluation of protective equipment
- Improvement and design of equipment to ensure better adaptation to the workplace utilization context
- Development of tools for predicting the behaviour of protective equipment
- Studying the human factors related to the use of protective equipment

ACHIEVEMENTS IN 2011

The IRSST published a report on a test method for determining the resistance of protective gloves to medical needle pricks. The absence of standardized test methods has made it difficult to select protective clothing effective against needle pricks, meaning that a growing number of workers are exposed to situations that put them at risk for contracting infections such as Hepatitis B, Hepatitis C, or HIV.

Another published study showed that the three models of prefabricated metal guardrails most used by roofers and installed on-site around flat roofs are safe. They also meet the requirements of the Québec Safety Code for the construction industry this ensuring that roofers have appropriate protection against falls.



EQCOTESST, A NEW STUDY

The formulation of a questionnaire, the compilation and analysis of the responses obtained in a telephone survey of 5,071 individuals, numerous back-and-forths among a group of 11 researchers and as many collaborators from ten different organizations, the drafting of a voluminous 656-page report, of a 270-page appendix including some 50 tables, and of a summary report, a quality process requiring the services of 11 evaluators, and more: this paints in broad strokes a picture of the many steps leading to the September 2011 publication of the report on the first Québec Survey on Working and Employment Conditions and Occupational Health and Safety (EQCOTESST).

Over a period of nearly five years, this project required an enormous amount of work on the part of a team of scientists from the IRSST, the Institut national de santé publique du Québec (INSPQ), and the Institut de la statistique du Québec (ISQ), to fulfill the mandate given to them by Québec's Ministère du Travail, which was to conduct a first-ever population survey of this scope. The EQCOTESST provides a goldmine of information on Québec workers' perceptions of matters such as work/life balance, the organizational environment and physical demands of work, violence at work, workers' overall health, musculoskeletal disorders (MSDs), work-related accidents, and mental health. The researchers innovated by developing new indicators for employment insecurity and precarious employment that will have to be validated in future projects.

THE WORK CONTEXT AND OHS FIELD

In the context of increasingly frequent organizational and technological changes, research work in this field contributes to the sustainable prevention of occupational injuries through better knowledge of the existing dynamics between the work organization and OHS context within enterprises.

RESEARCH ORIENTATIONS

- Effects of work changes and demographic shifts on OHS
- Overall approach to risk evaluation for targeted jobs and sectors
- Management of OHS problems
- Forecast management of ages and organization of work situations
- OHS management in small enterprises
- Integration of OHS into investment and design projects
- Development of OHS management tools

ACHIEVEMENTS IN 2011

One study showed, as never before, the effects of cumulative work activities and constraints on students who hold jobs during the school year. It brought to light the fact that student workers generally experience more fatigue and more persistent or chronic musculoskeletal pain. The situation is of even greater concern for CEGEP students and for those enrolled in Diploma of Vocational Studies (DVS) or adult general education programs. The results further suggest that the occurrence of an initial work-related accident at the beginning of a person's working life increases his or her risk of being involved in another accident later.

THE OCCUPATIONAL REHABILITATION FIELD

The research work in this field seeks to prevent or reduce the risk of long-term disability and to facilitate a safe and sustainable return to work process. The researchers involved study the various individual, organizational, administrative, or health-system-related factors that facilitate or hinder this process, as well as means of intervention targeting the rehabilitation and occupational reintegration of these workers process.

RESEARCH ORIENTATIONS

- Development of instruments for assessing the health of workers who have sustained occupational injuries posing a risk of disability
- Studying individual, clinical, organizational, or administrative determining factors related to a return to work
- Development of intervention models that promote a safe and sustainable return to work
- Evaluation of occupational rehabilitation programs or models
- Development of evidence-based tools to support a return to work

ACHIEVEMENTS IN 2011

A practice guide was developed for occupational therapists to help reduce the variability obtained in work-related assessments. It provides the scientific data needed to assist in decision making regarding such assessments of people with a physical impairment.

In another study, researchers turned in a positive evaluation of the PRÉVICAP rehabilitation program. This program, which managed 571 workers with musculoskeletal disorders (MSDs) between 2001 and 2004, produced better results than traditional management approaches.

THE SAFETY OF INDUSTRIAL TOOLS, MACHINES, AND PROCESSES FIELD

The aim of the research conducted in this field is to contribute to the development and application of knowledge involving methods and tools for assessing and reducing the risks associated with industrial machines. It also focuses on methods for evaluating reliability and designing solutions to eliminate or reduce risks. Ultimately, this knowledge is designed to better equip companies, regulatory agencies, preventionists, and researchers to guide more effectively the actions to be taken to prevent the occupational injuries associated with machines.

RESEARCH ORIENTATIONS

- Machine risk assessment
- Machine risk reduction:
 - by developing methods for integrating safety into design
 - by designing guards or protective devices
- Design, development, and validation of methods of ground control

ACHIEVEMENTS IN 2011

One study provided a portrait of various maintenance interventions performed on multifunctional harvester heads to shed light on the reasons for these interventions and improve forestry worker safety.

The researchers also validated the logic and comprehensiveness of a fault tree associated with the mechanical hazards involved in operating printing presses. In addition, they designed a simple tool for checking the safeguards in place on horizontal plastic injection moulding machines to support companies in the plastics processing industry in their accident prevention efforts.

THE CHEMICAL SUBSTANCES AND BIOLOGICAL AGENTS FIELD

By contributing to the advancement of knowledge and the use of existing knowledge, the research conducted in this field helps improve and maintain the health and well-being of workers exposed to chemical substances and biological agents. Closely linked with the needs of the CSST, its partners, and Québec workplaces, the main aim of this research work is primary prevention (e.g. substitution, ventilation) and the development of adapted tools for use in companies.

RESEARCH ORIENTATIONS

- Development of exposure evaluation strategies and methods
- Contributing to the development and evaluation of technologies, control tools, and personal protective equipment
- Contributing to the advancement of knowledge on indicators for monitoring biological exposure, evaluating and managing health risks, and preventing occupational diseases
- Providing support to the CSST and its network

ACHIEVEMENTS IN 2011

One report presented a new picture of contaminant concentrations in the workplace, based on nearly 360,000 results of environmental analyses conducted in the IRSST's laboratories between 2001 and 2008. Some 56 chemicals posted high concentrations in various industrial sectors. Using the same data, the researchers showed that the number of workers exhibiting at least one very high blood-lead level decreased steadily between 2001 and 2008, reflecting improved control of exposure during that period. However, the study also found that 1,943 test results for lead in air exceeded the new standard of 0.05 mg/m³, while for the blood-lead level tests, more than 2,400 results, or over 14% of the results, exceeded 300 µg/L.

THE MUSCULOSKELETAL DISORDER FIELD

The research efforts made in this field seek to improve understanding of musculoskeletal disorders (tendinitis, bursitis, lumbar strain, carpal tunnel syndrome, backache) and to find effective means of action for reducing their adverse effects on workers' health.

RESEARCH ORIENTATIONS

- Etiology or study of the relationship between exposure to risk factors and the effects on workers' health
- Improvement of ergonomic intervention knowledge and practices
- Development of studies and surveillance tools

ACHIEVEMENTS IN 2011

A multi-disciplinary research project helped shed light on aspects of the mental workload associated with MSDs and psychological health problems in Québec 9-1-1 emergency call centre dispatchers, an occupation that has been little studied to date. This study found that efforts must be made to provide 9-1-1 emergency call centre dispatchers with cognitive and emotional support, as these workers play a vital role in the effectiveness of emergency services interventions.



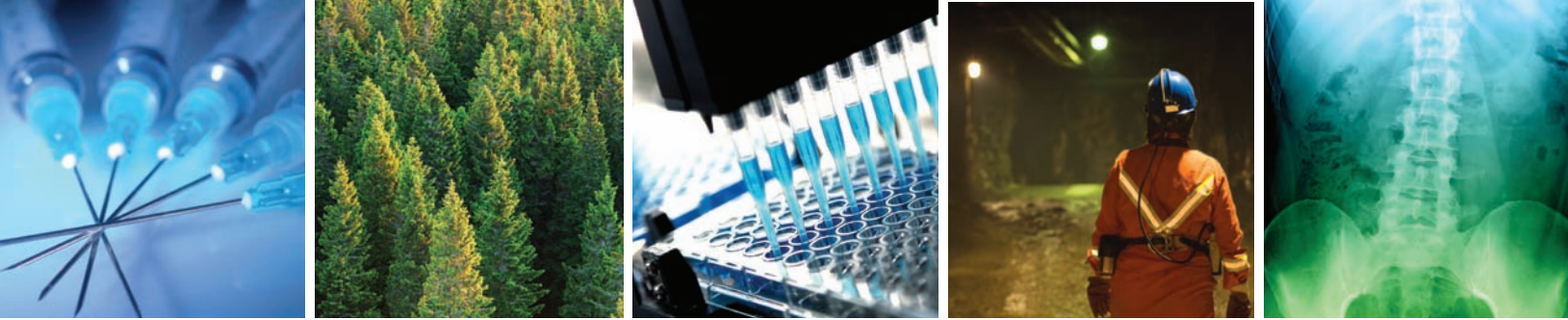
L'INTERVENTION EN ERGONOMIE – THE BOOK

In 2011, Éditions MultiMondes published a reference book that appears to be a first-ever in the French-speaking world and is intended to serve as a guide for training ergonomists and for their professional interventions.

Reflecting the practices of Québec researchers and practitioners, this book is based on 30 years' experience using an action-research approach in this fledgling speciality, whose growing importance is largely promoted by the IRSST's support. At the book launch, the Institute organized a mini-colloquium on ergonomic intervention attended by 120 key stakeholders in the field.

The process of producing this 360-page collective work began in 2006. Six researchers in collaboration with 11 practitioners pooled their knowledge to present a modern vision of ergonomic intervention that would guide teachers, students, and all those seeking a better understanding of ergonomists' work. Not only does it propose concrete tools and models of both people in action and interventions, but it also describes the main steps in an ergonomic intervention and in the assessment of a request for intervention, right through to following up on changes implemented in the workplace.

Its warm reception by the French-speaking community has led the IRSST to undertake to have it translated into English.



NEW PROJECTS

In 2011, the IRSST's research portfolio comprised 162 active projects, including the 29 new ones added during the year. Below is a list of these projects, by research field.

NOISE AND VIBRATION

Use of hearing aids in noisy work environments, Tony Leroux (Université de Montréal) et al.

Reducing fan noise in plants, Patrice Masson (Université de Sherbrooke) et al.

WORK CONTEXT AND OHS

Knowledge transfer activity – Content development to prevent violence between members of a work organization Phase 1, Charles Gagné (IRSST), Nathalie Jauvin (CSSS de la Vieille-Capitale) et al.

Conditions and practices promoting the safe integration of young student-workers into the services industry, Élise Ledoux (IRSST) et al.

PROTECTIVE EQUIPMENT

Protective gloves: resistance of multiple mechanical agents – simultaneous cuts and punctures, Phase 2, Toan Vu-Khanh (École de technologie supérieure) et al.

Effects of industrial contaminants on protective gloves' resistance to cuts, punctures and tears, Phase 2, Patricia Dolez (École de technologie supérieure) et al.

Knowledge transfer activity – Prevention fact sheet on anchoring systems for guardrails on flat roofs for roofers, François Ouellet and André Lan (IRSST)

Study of the aging, degradation and service life of fall protection equipment – Lifelines, André Lan (IRSST) et al.

OCCUPATIONAL REHABILITATION

Development and implementation of a program for shared decision making by occupational therapists and workers with a work disability attributable to a persistent musculoskeletal disorder: the perspective of the key stakeholders in rehabilitation, Marie-France Coutu (Université de Sherbrooke) et al.

Knowledge transfer activity – A guide of practice to return-to-work following a work absence due to a mental health problem, Charles Gagné (IRSST) and Louise St-Arnaud (Université Laval)

Validation of the *Obstacles au retour au travail et sentiment d'efficacité pour les surmontés (ORTESES)* questionnaire with workers who have a musculoskeletal disorder or common mental disorder, Marc Corbière (Université de Sherbrooke) et al.

SAFETY OF INDUSTRIAL TOOLS, MACHINES, AND PROCESSES

Study of machine safety during interventions in reduced speed or force mode, Yuvin Chinniah (École Polytechnique)

Knowledge transfer activity – Updated directory of safety devices in Québec, Marie-France d'Amours and Laurent Giraud (IRSST) et al.

Study of conditions of overboard falls of workers in fishing industries, Jean-Guy Richard (consultant)

Knowledge transfer activity – Utility for preventing accidents caused by in-running nips in the printing industry, Marie-France d'Amours and Laurent Giraud (IRSST) et al.

CHEMICAL SUBSTANCES AND BIOLOGICAL AGENTS

Determinants of construction workers' exposure to silica: Use of a database taken from the literature, Jérôme Lavoué (CHUM Research Centre) et al.

Nanoparticles and inflammation – Phase I: Procedure for evaluating the potential pro-inflammatory effects of nanoparticles, Denis Girard (INRS-Institut Armand-Frappier)

Using bacterial and enzymatic preparations as substitutes for solvents in cleaning and degreasing, Michel Gérin (Université de Montréal) et al.

Development of a tool for the assessment or adaptive evaluation of the human health risks posed by synthetic nanoparticles, Sylvie Nadeau (École de technologie supérieure) et al.

Development of a nanomaterial safety program based on agreement between the industry and the evaluation of health risks: An integrated approach for the safe development of nanomaterials, Claude Émond (Université de Montréal)

Adjustment methods applied to assessments of spot urine concentrations in the biological monitoring of occupational exposure – comparison of different methods and choice of the best approach, Ginette Truchon (IRSST) et al.

Evaluation of bioaerosol exposure during hospital bronchoscopy operations, Jacques Lavoie (IRSST) et al.

Development and application of a method for evaluating pyrethroid exposure in agricultural workers, Michèle Bouchard (Université de Montréal)

Evaluation of worker exposure to swimming pool disinfection by-products in Québec, Robert Tardif (Université de Montréal) et al.

MUSCULOSKELETAL DISORDERS

Estimation of lumbar loading through articular biomechanical models: applications and developments, André Plamondon (IRSST) et al.

Musculoskeletal analysis of the shoulder during handling tasks, Mickael Begon (Université de Montréal) et al.

Knowledge transfer activity – Handling context analysis grid, Louise Sutton, Marie St-Vincent (IRSST) et al.

Knowledge transfer activity – The work of emergency call centre dispatchers in the municipal public safety sector – video, Charles Gagné, Georges Toulouse (IRSST) et al.

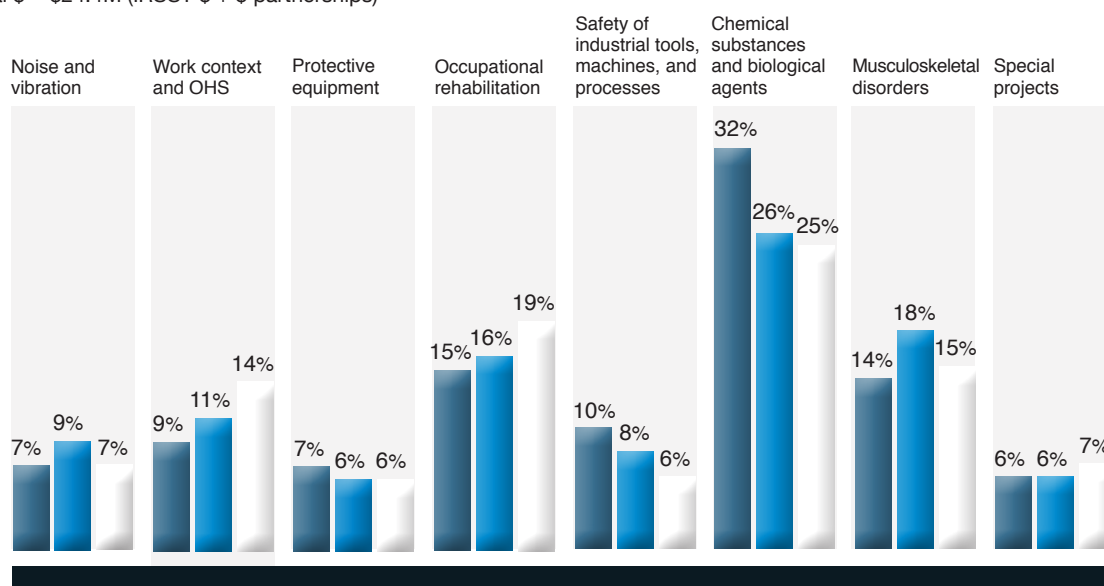
Knowledge transfer activity – ERGO event – Mini-colloquium on ergonomic intervention and launching of the book *L'intervention en ergonomie*, Louise Sutton, Marie St-Vincent (IRSST) et al.

DISTRIBUTION OF RESEARCH PROJECTS AND THE CORRESPONDING BUDGETS (IN \$ AND IN KIND), BY RESEARCH FIELD IN 2011

Number of active projects = 162

IRSST \$ = \$16.8M (internal budget financing and external budget financing)

Total \$ = \$24.4M (IRSST \$ + \$ partnerships)





Michel Arsenault, President of the FTQ, Marie Larue, President and CEO of the IRSST, Yves-Thomas Dorval, President of the Conseil du patronat

A NEW LABORATORY

The Noise and Vibration field gained a state-of-the-art acoustic laboratory. Inaugurated by the members of the IRSST's Board of Directors in March 2011, this unique laboratory, located in Montreal, has been dubbed ICAR, an acronym for the French description (infrastructure commune en acoustique pour la recherche) of this shared acoustic research infrastructure.

It was built on the campus of Montréal's École de technologie supérieure (ÉTS), a partner of this project, which also benefited from a financial contribution from Canada Economic Development. Among other things, ICAR includes a semi-anechoic room connected to a reverberant room, providing all the equipment necessary for studies on the control or elimination of noise for more effective prevention of occupational deafness and of the accident risks related to communicating in noisy work environments.

With this infrastructure, researchers can:

- take measurements to characterize sources of noise in terms of their noise emission levels
- characterize acoustic materials in terms of their sound absorption capacity
- evaluate the performance of hearing protectors
- perform auditory tests on human subjects in a very silent environment
- use the acoustic intensimetric cartography system to characterize a structure's capacity to reduce noise transmission, among other things.

Not only will ICAR meet researchers' needs, but it will also benefit the entire occupational health and safety network, as well as Québec manufacturers involved in partnership projects or requests for expertise. In addition, this project clearly illustrates the solid links between the IRSST and its partner, the ÉTS.



The reverberant room of the ICAR laboratory

knowledge

KNOWLEDGE TRANSFER NEWS

Since its creation five years ago, the Knowledge Transfer and Partner Relations Department has been involved in a process of ongoing reflection aimed at improving its practices.

It draws inspiration from numerous sources by, among other things, attending international and local meetings on knowledge transfer, and listening attentively to clients during projects and research activities. Its many efforts in this regard have paid off. The External Evaluation Committee noted in its report that this department has helped improve our client outreach and above all, ensure that those likely to benefit from the results of the IRSST's research projects are informed thereof.

Made up of social partners, the follow-up committees that lend their field expertise to researchers during the definition, development, and execution of research projects also constitute a winning formula that is met with a high measure of satisfaction, according to the results of a partner consultation process.

A Web site, a safety checklist, a video, and an exchange network are prime examples of the role and concrete achievements of the Knowledge Transfer and Partner Relations Department.



SOLUB

For nearly 20 years, the IRSST has helped fund the work of Université de Montréal researchers who are seeking to identify substitute products for solvents, toxic substances to which over 300,000 Québec workers are exposed on a regular basis. Substitution is a primary prevention method that consists of eliminating the use of a hazardous substance by replacing it with a less hazardous substance or with another process. The IRSST worked with researchers on a knowledge transfer project as part of its ongoing efforts to make its essential knowledge on this topic available to the relevant professionals. One of the results was the Solub Web site, which describes nine steps designed to support OHS professionals who wish to initiate a solvent substitution process by offering them a solution tailored to their needs. Practical tools and relevant resources are suggested for each of the nine steps.



In 2011, the analytical production of the Laboratory Services and Expertise Department jumped by 14%

progress

REMARKABLE PROGRESS

Enhanced communication channels, successful activities, clear lines of authority, efficient research processes, dynamic plans, up-to-date dissemination and expanded outreach.

our priorities

ASSESSMENT OF THE 2009-2011 THREE-YEAR PLAN

The year 2011 coincided with the end of the cycle covered by the 2009-2011 Three-Year Scientific and Technical Production Plan. This document, which was presented in the form of annual action plans, charted the course for main activities of the IRSST's personnel over the past three years. The outcome of a far-reaching partner consultation process and a priority-setting exercise, this three-year plan placed particular emphasis on seven issues related to problems arising from structural, social, and technological changes under way in workplaces.

1 PSYCHOLOGICAL HEALTH IN THE WORKPLACE
Developed by the Scientific Division with a group of experts in the field, the Institute's positioning with regard to psychological health research was announced in 2010 at an IRSST-organized colloquium on innovative approaches to psychological health in the workplace.

In addition, research themes were added in the three research fields where such work is being carried out: Work Context and OHS, Occupational Rehabilitation, and Musculoskeletal Disorders.

2 AGING OF THE LABOUR FORCE
Awareness-raising activities were held with researchers to induce them to pay greater heed to the aging-labour force phenomenon when developing new research projects. These activities led notably to the carrying out of a literature review on changes in physiological parameters likely to influence older workers' exposure to chemical substances, the initiation of a study that takes age into account in the evaluation of paramedic ambulance technicians' exposure to musculoskeletal disorder risk factors, and the launch of a study on conditions for the safe integration of new workers into the mining sector.

In addition to organizing a colloquium on this important aging-labour force issue, the IRSST participated actively in the Community of Researchers on Age, Intergenerational Relationships, and OHS of the Réseau de recherche en SST du Québec (RRSSTQ) and in collaborative undertakings with France's Centre de recherches et d'études sur l'âge et les populations au travail.

3 PREVENTION CULTURE WITHIN SMEs
Special efforts were made to ensure that the specific context found in small and medium-size enterprises (SMEs) regarding OHS would be taken into account in new research projects. This process triggered the launch of three studies: one concerning OHS practices in small enterprises hiring immigrant workers, a second on the production of teaching materials designed for MSD prevention in the automobile services sector, and a third aimed at analyzing OHS policies in SMEs. These projects produced concrete results, including a technical fact sheet on the noise and vibrations produced by tools used in the automobile repair industry, and a scientific activity on the theme of OHS and small businesses.

4 FACTORING OHS INTO THE MINING AND METAL RECYCLING SECTOR
With the work on the safe and competent integration of new workers in the mining sector forging ahead, the Institute published an unprecedented study on the cost of employment injuries in Québec mines. Researchers drew up a profile for the 2005-2007 period and found that the cost of injuries in the mines for one year was \$130 million. The IRSST is also a member of the ISSA International Section on Prevention in the Mining Industry of the International Social Security Association (ISSA-Mines), which promotes access to and the exchange of information with this network. Lastly, possible avenues of research were proposed in a status report on the metal recycling industry and OHS.

5 OCCUPATIONAL CANCERS

Further to an ongoing reflection, consultation, and information-monitoring process on this theme, a document defining an institutional position and exploring possible avenues of research was submitted to the Scientific Division. An epidemiologist was recruited in 2009 to support this occupational cancer research. She was invited by CAREX Canada to sit on its scientific committee on occupational exposure to carcinogenic agents.

During this time, studies aimed at painting an overall picture of exposure to carcinogens in the workplace and at estimating the number of cases of occupational cancers in Québec continued, as did an epidemiological study on the causes of cancer-related deaths of workers in the non-ferrous metal smelting and refining industry. A literature review on the carcinogenicity of trichloroethylene (TCE) was published, and a review of the literature on occupational cancers and shipyard workers was carried out for the Workplace Health, Safety and Compensation Commission (WHSCC) of Newfoundland-Labrador. This study enlightened the Commission about the possible links between the occupational exposure of workers in shipyard-related trades and various types of cancer.

The IRSST met with members of the Commission nationale sur la participation des travailleuses et travailleurs expérimentés de 55 ans ou plus (C55+). The Institute took the opportunity to provide an overview of work-related injuries by age group and highlighted the factors having an impact on older workers' participation in the workforce. It also pointed out that the age question should be tackled bearing in mind that personal development continues throughout a person's working life. For its part, the C55+ is interested in the IRSST's work on the transfer of skills from experienced to new workers.

6 DEVELOPING OHS-RELATED ECONOMIC INDICATORS AND ANALYSES

The work begun on developing OHS-related economic indicators gave rise to two studies. The first involved carrying out a literature review to obtain an overview of the current status of knowledge on the estimation of the direct and indirect costs of occupational injuries. The authors identified, defined, and classified the components of the costs related to occupational injuries and described the different methods that can be used to estimate these costs.

The second study tested the feasibility of developing economic indicators by producing a profile of the costs of occupational injuries in the mining sector. Despite the fact that it would be difficult to carry out such exhaustive surveys for all economic activity sectors, the researchers believed that even by limiting themselves to the only data available, it would still be possible to come up with estimates representative of total injury costs for each economic activity sector. In fact, a study is currently being conducted to explore the possibility of applying one economic indicator for occupational injuries to all industries, allowing these injuries then to be classified in order of importance based on costs.

7 FACTORING IN THE IMPACT OF CLIMATE CHANGE ON OHS

A working group was formed and a study carried out for the purposes of drawing up an overall picture of the possible links between climate change and OHS, developing a strategy for promoting national and international reflection and cooperation, identifying the priority issues, and proposing avenues for future research. The IRSST also collaborated with the World Health Organization in this regard.



Marie Larue, president and CEO, IRSST and Gilles Demers, president, C55+

A NEW FIVE-YEAR PLAN

The Executive Office, the Scientific Division, and the Knowledge Transfer and Partner Relations Department engaged in extensive consultation with stakeholders and partners as groundwork for the Institute's next research and expertise program. As recommended by the External Evaluation Committee, the new plan will span five years rather than three to ensure a better fit with the research cycles.

To this end, the IRSST increased the number of its meetings with its various parties, during which it collected their feedback on very specific research issues, while noting their main concerns and needs in terms of knowledge. This formula promoted more in-depth exchanges that became a major source of inspiration for the development of the 2012-2016 five-year plan.

Hence, the CSST, employer associations (the Fédération des chambres de commerce du Québec, the Canadian Federation of Independent Business, the Association des manufacturiers et exportateurs du Québec, the Conseil du patronat du Québec, the Centre patronal SST, the Association en santé et sécurité de l'industrie de la forêt du Québec, the Québec Mining Association, the Association de la construction du Québec, and the Association des constructeurs d'habitations du Québec), worker associations (the Confédération des syndicats nationaux, the Fédération des travailleurs et travailleuses du Québec, the Centrale des syndicats démocratiques, the Conseil provincial du Québec des métiers de la construction, the Syndicat québécois de la construction, the Union des producteurs agricoles, and most of the joint sector-based associations (municipal affairs, printing and related industries, social affairs, mining, clothing industries, metal and electrical products manufacturing, provincial administration, construction, transportation and storage) all had the opportunity to propose possible avenues of research and to offer their comments about the main research directions suggested by the IRSST.

By focusing on open communication channels and close links with its partners, the Institute thus ensured that this new five-year plan would meet its partners' expectations and address their prevention and occupational rehabilitation concerns.

A NEW INSTITUTIONAL EVALUATION

For the second time in the IRSST's history, the performance and relevance of its activities were evaluated by an external evaluation committee. Chaired by Gilles Dussault, director of the Health Systems Unit at the Institute of Hygiene and Tropical Medicine, Universidade Nova in Portugal, the committee is composed of Paul Demers, director of the Occupational Cancer Research Centre in Ontario, Michel Dumoulin, executive director at the National Research Council of Canada, Jacques Frémont, director of the International Higher Education Support Program of the Open Society Foundations in New York, and Harri Vainio, director general of the Finnish Institute of Occupational Health (FIOH).

After examining an assessment of the 2006-2010 period prepared by the IRSST, the External Evaluation Committee (EEC) carried out its mandate by holding numerous discussions and interviews with members of the Institute's governing bodies and staff, external researchers, and partners.

In the fall of 2011, the ECC submitted its evaluation report, including comments and suggestions. It found that the Institute's mission was still relevant and that its contribution to the health and well-being of Québec workers was "unique." The ECC described the Institute's 2006 launch of a strategic watch department and OHS statistical surveillance service as a major contribution in terms of its capacity to establish research priorities and document needs. It recognized that the IRSST has a highly qualified and committed staff, as well as a broad network of external collaborators. However, the IRSST must take prompt and comprehensive action to ensure the grooming of the next generation of researchers and managers needed as a result of the staff retirements anticipated in the short and medium terms. This finding led to the recommendation to reduce, merge, or drop certain research fields in order to prevent the loss of a critical mass. The EEC also advocated modifying the organizational structure to clarify lines of authority.



A NEW ORGANIZATIONAL STRUCTURE

In response to the comments voiced by the External Evaluation Committee and staff members, the Institute revamped its organizational structure at the end of December 2011.

First, the Research and Expertise Division was reconfigured to establish clearer lines of authority. Its activities and personnel now fall into three departments:

- 1 Chemical and Biological Hazards Prevention
- 2 Mechanical and Physical Risk Prevention
- 3 OHS Problem Prevention and Rehabilitation

While the nature of the first two departments is evident, the third encompasses studies on musculoskeletal disorders, rehabilitation, and any issue that can impact on OHS in the workplace. It includes research topics such as the aging of the workforce, young workers, the arrival of immigrant workers, psychological health, climate change, and the OHS needs associated with the Québec Government's *Plan Nord*, as well as other special projects.

Second, the Scientific Division remains responsible for developing the research program and orientations, and for scientific quality, ethical questions, and scientific watch and statistical surveillance activities. However, the number of research fields under its jurisdiction dropped from seven to four. The Musculoskeletal Disorders and Work Context and OHS fields were merged, as were the Noise and Vibration, Safety of Industrial Tools, Machines, and Processes, and Protective Equipment fields. In this new environment, three research fields are now devoted to questions related to occupational injuries and a fourth exclusively to the rehabilitation and return to work of injured workers:

- 1 Chemical and Biological Hazards Prevention
- 2 Sustainable Prevention and Work Environment
- 3 Mechanical and Physical Risk Prevention
- 4 Occupational Rehabilitation

Third, to strengthen synergy and improve activity coordination, the Communications Division and the Knowledge Transfer and Partner Relations Division were merged to form the Communications and Knowledge Transfer Division. The Laboratory Services and Expertise Department now reports to the Executive Office and has become the Laboratory Division.

The aim of this organizational restructuring was to combine resources in a way that would promote multidisciplinary work and offer researchers an opportunity to tackle problems from a broader, multi-dimensional perspective. The ultimate goal is to allow the Institute to fulfil its mission more effectively and efficiently and to facilitate accountability.

A NEW PROJECT MANAGEMENT MODEL

In April 2011, a steering committee proposed a model for managing research projects and realizing their knowledge transfer potential within a multi-project context. The aim was to improve the organizational efficiency of the IRSST's research activities (deadlines, costs, and deliverables) while maximizing the quality, recognition, and impact of their results.

Built on a foundation of personalized training and support, this important process is designed to adapt project management principles to scientific research realities. The IRSST mandated Jean Nicolas, researcher and professor emeritus at the Université de Sherbrooke, to develop and deliver training sessions on the project management process to the Institute's researchers, professional scientists, and managers, which he did during the course of the year.

This process should ultimately facilitate the planning and conducting of research by encouraging the research teams and managers to work in closer collaboration to identify more effectively the opportunities and problems likely to arise en route, to find solutions, and to take timely action. Eight pilot projects were launched to promote the implementation of such changes. They involved developing a best practices guide for research project management, improving the file-flow and follow-up process, and building project scoreboards.

The gradual implementation of the research project management model is scheduled for 2012.

expertise

LABORATORY SERVICES AND EXPERTISE



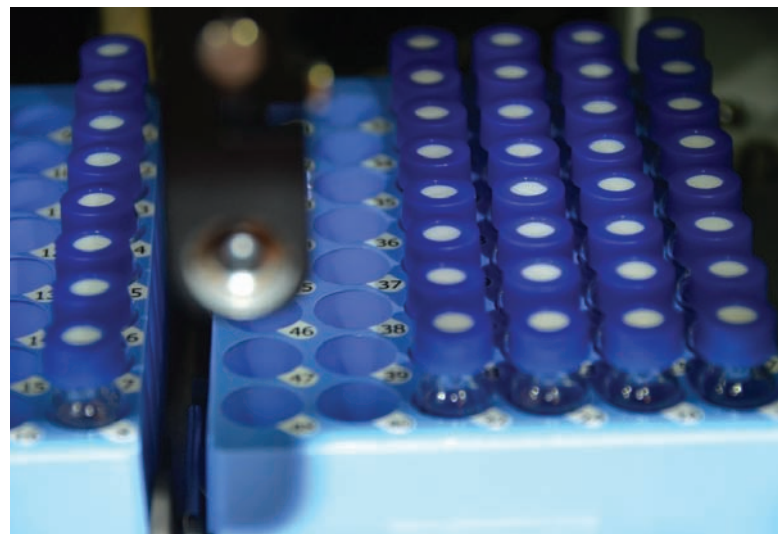
A NEW LABORATORY RECORD

The analytical production of the Laboratory Services and Expertise Department jumped by 14% in 2011, attaining the highest throughput since the division's creation in 1980. The new record is attributable to increased demand for metal and microbiology analyses.

In addition to offering the laboratory services and expertise needed for the activities of the public prevention and occupational health and safety network, the Laboratory Services and Expertise Department contributes to the advancement of knowledge and reinforces the Institute's role as a reference centre.

This year, two of its chemists embarked upon projects to develop analytical methods and broaden the scope of the laboratories' accreditations:

- Broadening the scope of the IRSST's laboratories' accreditation to include analysis of compressed breathing air, Mélanie Huard (IRSST)
- Drafting a method for sampling and analyzing inhalable dusts, Simon Aubin (IRSST)



NEW FORMS OF COMMUNICATION

IRSST.TV

The IRSST added yet another means of communication to its arsenal: video. Since May 2011, Internet users have been able to tune in to IRSST.TV, the section of the Institute's Web site offering content exclusively on video. With each passing month, this new section enriched its line-up with films of researchers' lectures and of colloquia on various OHS-related topics, and short videos in the form of reports on the Institute's participation in various events. IRSST.TV now features more than 60 titles.

The same videos are available on the Institute's YouTube page, which was visited by over 12,000 Internet users in 2011. The IRSST also has a Twitter account and two Facebook pages.

NEW SOFTWARE

The Institute's Web family grew again in 2011 with the release of *ProtecPo*, interactive software for pre-selecting polymer materials used in making personal protective equipment (PPE). Designed jointly by the IRSST and its French counterpart, the Institut national de recherche et de sécurité (INRS-France), for prevention professionals and interested companies, this tool helps in the selection of the best adapted materials for skin protection, mainly against solvents and mixtures of solvents.



VISIBILITY IN THE FIELD

During the course of the year, the Communications Division's personnel helped organize some 15 events, including the institutional colloquium on risk perception and information sharing, attended by 220 people. They were responsible for the Institute's participation in five OHS-related exhibitions and fairs. IRSST cameras were on site in each case to later report on the event on IRSST.TV.



Michel Fortin, head of the CSN's Comité confédéral SST and speaker at the IRSST colloquium

IN FAVOUR OF PRÉVENTION AU TRAVAIL

A survey of *Prévention au travail* subscribers conducted in early summer 2011 confirmed that the vast majority (90%) of them appreciate the form and content of this magazine, copublished with the CSST. The subscribers indicated that they see it as useful in their workplace, and more than half of them use it for training purposes or post it in a common area in their companies. In 2011, the graphic design of *Prévention au travail* was updated to, among other things, allocate more space to research results. The magazine is published four times yearly and distributed free of charge.



MORE TRANSLATION

To meet the needs of English-speaking clients and expand the Institute's worldwide outreach, the Communications Division stepped up its efforts to have more documents translated. This year, in addition to translating seven scientific reports into English, the Division intends to translate the abstracts of its new research reports for posting on its Web site. Currently, some 100 scientific publications are available in English among a thousand downloadable documents.

SUSTAINABLE DEVELOPMENT

As part of the implementation of the IRSST's Sustainable Development Action Plan, the Communications Division published nine news capsules in the Institute's in-house newsletter to raise staff awareness of this issue. The newsletter made the switch from print to electronic format. The Communications Division also updated the Institute's *Politique d'édition des publications* to bring it in sync with the publishing methods associated with the new technologies and the objectives of its action plan. It will therefore be gradually terminating the dissemination of print versions of its research reports and other publications, and instead make them permanently available in electronic format on its Web site, where they can be downloaded and printed free of charge. Efforts also went into highlighting the green shift and stepping up the Institute's environmentally responsible management practices.

WEB SITE TRAFFIC AND DOWNLOADS

The number of visitors to the IRSST's Web sites rose from 650,350 in 2007 to 1,571,293 in 2011. The number of downloads increased from 133,429 in 2007 to 568,549 in 2011.

Bertrand Arsenault Michel Asselin Simon Aubin Ali Bahloul Marie-Claude Barrette Guylaine Beauchamp Yves Beaudet Pierre Beaudoin Sylvie Beaugrand Martin Beauparlant Carole Bellazzi Chantal Bellefeuille René Benoit Gilles Bensimon Marie-France Bisson Carole Blanchard Brigitte Blanchette Paul-Émile Boileau Jacinthe Boisvert Alexandre Boucher Jérôme Boutin Lise Brière Damien Burlet-Vienney Marc-Antoine Busque Marielle Carrier Danièle Champoux Denise Chicoine Esther Cloutier Lynda Cloutier Yves Cloutier Cécile Collinge Charles Cormier Diane Cormier Daniel Côté Marie-France d'Amours Simon Demers Ginette Denicourt Denys Denis Sophie De Serres Dominique Desjardins Chantal Dion Liviu Doroftei Daniel Drolet Pierre Drouin Clémence Duchesne Claudette M. Dufresne Patrice Duguay Michel Dupuis Zélie Fortin Charles Gagné Sébastien Gagné Maryse Gagnon Raynald Gauthier Chantal Gauvin Laurent Giraud Maud Gonella Diane Hamelin-Bourassa François Hébert Benoît Houle Mélanie Huard Sabrina Jocelyn Philippe Juteau France Labrèche Mireille Lacharité Nancy Lacombe Louise Lafontaine Caroline Lalancette Lambert Laliberté Ghislaine Lamarche André Lan Diane Landry Diane Laprès Christian Larivière Pierre Larivière Christian Larue Bernard Lauzon Émilie Lauzon Marie Lauzon Jacques Lavoie Louis Lazure Martin Lebeau Christine Lecours Élise Ledoux Philippe Lemay Jacques Lesage Claude Letourneau Nancy Lionessa Lucie Locas Lucie Madden Denise Mallette Geneviève Marchand Pierre Marcotte Jean-Guy Martel Serge Martel Jean-Claude Martin Hakim Mecheri Jacques Millette Iuliana Nastasia Hugues Nélisse Claude Ostiguy Annie Ouellet Fabienne Ouellet François Ouellet Julie Panneton Gilles Paradis Suzanne Paradis Catheline Pelletier Carole Pépin André Plamondon Daniel Plamondon Josée Poulin Diane Proulx Pascale Prud'homme Louise Racine Karla M. Ramirez Christina Maria Raneburger Lucie René Lucile Richard Brigitte Roberge Josée Routhier Jacques Roy Simon Roy-Lessard Giovanni Ruffolo Philippe Sarazin Abdelhaq Sari Linda Savoie Henri Scory Franck Sgard Christian Sirard Marie St-Vincent Louise Sutton Rodica Tcaciuc Chantal Tellier Marjolaine Thibeault Maura Tomi Georges Toulouse Lise Toupin Ginette Truchon Ludovic Tuduri Denis Turcot Ginette Vadnais Daniel Vergara Joseph Zayed **Thank you for a year of remarkable results.**

individuals

REMARKABLE INDIVIDUALS

Distinctions, honours, enriched resources and certifications.

distinctions

NEW HONOURS AND DISTINCTIONS



CHRISTINE COLIN



LA LÉGION D'HONNEUR

A member of the IRSST's Scientific Advisory Board since 2001, Dr. Christine Colin was decorated with the highest honour given by France: that of Chevalière of the Ordre national de la Légion d'honneur. Dr. Colin, who was born in France, is a tenured professor of public health at the Université de Montréal. She has chaired numerous international scientific boards and received many awards, including the Femmes pionnières award from the Université de Montréal, the Certificate of Merit from the Canadian Public Health Association, the Prix des médecins de cœur et d'action, and the Chevalière insignia of the Ordre national du Québec.

THE ORDER OF CANADA

Mr. Camille Limoges, another member of the IRSST's Scientific Advisory Board, is one of the leading Québec figures to become an Officer of the Order of Canada, which ranks as one of our country's highest civilian honours. The government cited "his contributions to the development and direction of research in Canada as a science and technology historian." He has received numerous other awards as well, notably the Prix Armand-Frappier from the Gouvernement du Québec for his contribution to the development and implementation of Québec's scientific policies.

CAMILLE LIMOGES



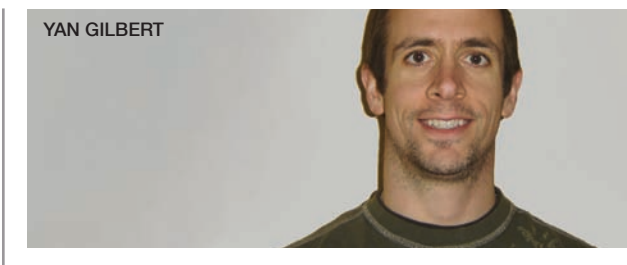
MOST CITED ARTICLE

According to the BioMedLib search engine, the article *Exposure to aerosolized bacteria and fungi among collectors of commercial, mixed residential, recyclable and compostable waste*, written by Jacques Lavoie (IRSST), Christopher Dunkerley, Tom Kosatsky and André Dufresne (Université de Montréal), published in *Science of the Total Environment*, in 2006, remains the most cited article in its field since its publication five years ago. This article is based on the results of two IRSST research projects: *Optimal Layout of Trucks with Articulated Arms for Household Waste Collection* and *Control of Garbage Collectors' Exposure to Bioaerosols*.



BEST ARTICLE IN INDUSTRIAL HYGIENE

An article published in the *Journal of Occupational and Environmental Hygiene* and deriving from IRSST-funded research was awarded the Best Paper Award 2010 by the Michigan Industrial Hygiene Society. Entitled *Metalworking Fluid-related Aerosols in Machining Plants*, the paper was based on the results of a project that evaluated bioaerosol exposure and the effects on the respiratory and skin health of workers exposed to metal-cutting fluids. The authors are Yan Gilbert, Marc Veillette, Anne Mériaux, Yvon Cormier, and Caroline Duchaine of the Centre de recherche de l'Institut universitaire de cardiologie et de pneumologie de Québec (CRIUCPQ), and Jacques Lavoie of the IRSST.



BEST LECTURE

An epidemiologist with the IRSST, France Labrèche, was the recipient of the Prix 3M Canada award given to the authors of the two best lectures delivered at the conference of the Association québécoise pour l'hygiène, la santé et la sécurité du travail (AQHSST). Entitled *Un premier pas vers la prévention des cancers d'origine professionnelle : portrait de l'exposition aux cancérogènes*, this lecture was based on the results of a current study on exposure to carcinogens in the workplace.



BEST STUDENT LECTURE

Joannie Martin, a master's student hosted by the IRSST, was awarded one of two scholarships offered by the Fondation de l'AQHSST for the two best lectures delivered by students at this association's conference held in Trois-Rivières. Her presentation concerned the development of a method for analyzing quartz in different matrices by X-ray diffraction. The results will be published in the journal *Powder Diffraction* of the International Centre for Diffraction Data (ICDD).

ALEXANDRA NOËL



EXCEPTIONAL MERIT AWARD

A doctoral student hosted by the IRSST won distinction at the Environmental Health Research Network symposium, which was held in Montréal. At a poster session, Alexandra Noël received one of two exceptional merit awards for her presentation on the influence of the agglomeration state of titanium dioxide (TiO₂) nanoaerosols on pulmonary toxicity.

BEST ARTICLE IN REHABILITATION

An article authored by IRSST anthropologist Daniel Côté and Marie-France Coutu, researcher and professor at the Université de Sherbrooke, was co-selected as the best article of the year 2011 by the scientific journal *Disability & Rehabilitation*. The article, entitled *A critical review of gender issues in understanding prolonged disability related to musculoskeletal pain: how are they relevant to rehabilitation?* shows that women and men may perceive pain differently and that the rehabilitation process may also differ for them.



CAROLINE BIRON



BEST ARTICLE ON PREVENTION

A scientific article resulting from an IRSST-funded study took the First Place Award in the Best Intervention Competition at the 9th International Conference on Occupational Stress and Health, held in Orlando, Florida. Given jointly by the American Psychological Association, the National Institute for Occupational Safety and Health, and the Society for Occupational Health Psychology, this award recognizes outstanding efforts in the area of organizational interventions aimed at preventing occupational injuries and promoting workplace safety and health. The article *The more the merrier? An observational study of dose-response relations in organizational-level stress interventions* was authored by Caroline Biron, Hans Ivers, Jean-Pierre Brun of the Chair on Occupational Health and Safety Management, Université Laval, and Cary L. Cooper of Lancaster University in the United Kingdom.

PRIX INNOVATION – SST 2011

At the 2011 gala of the Association pour le développement de la recherche et de l'innovation au Québec (ADRIQ), the IRSST awarded its Prix Innovation – SST for 2011 to Charles Khairallah, president of Robotics Design. This award officially recognizes the achievement of a company or organization that innovates in the area of occupational injury and disease prevention. The selection panel chose the Montréal firm Robotics Design for its design of ANATERGOARM TMA-500, a manual ergonomic manipulator arm especially designed for work on hydroelectric turbines. It supports payloads of 500 kg and can manoeuvre easily among obstacles. This arm was created with a clear effort to factor in work-accident prevention right from the design phase. It provides a perfect example of an innovative product whose design helps eliminate dangers to worker health and safety at the source.



Marie Larue, IRSST, Charles Khairallah, Robotics Design and Jean-Louis Legault, ADRIQ

resources

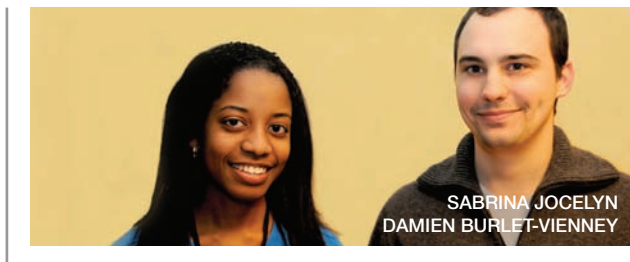
NEW HUMAN RESOURCES

As human capital is of prime importance in the world of knowledge, in 2011 the IRSST expanded its resources by welcoming 11 new employees, including four to regular positions.

As at December 31, 2011, the Institute had a staff of 141, including 115 researchers, professionals, and technicians, apart from its external network of more than 160 researchers at universities, research centres, and private firms. It also opened its doors to 35 trainees, students, scholarship recipients, and collaborators who are involved in research and laboratory work.

SUCCESSION PLAN

The Institute stepped up its efforts to implement a succession plan, notably to meet human resource needs in the Safety of Industrial Tools, Machines and Processes field. Support and coaching were offered to two research assistants who showed interest in becoming researchers in this field. While Damien Bulet-Vienney deftly defended his master's thesis and prepared to begin a doctoral dissertation on the development of a tool for analyzing risks associated with interventions in confined spaces, Sabrina Jocelyn continued her master's studies and enriched her knowledge by doing a two-month internship at the Institut national de recherche et de sécurité (INRS-France) on the safety of control circuits on industrial machines.



To fill the gaps left by staff retirements, the IRSST also trained new personnel in industrial hygiene. After two years of intense preparation, chemists Simon Aubin and Martin Beauparlant successfully completed the American Board of Industrial Hygiene (ABIH) examinations on their first try and obtained their certification. They both earned the certified industrial hygienist (CIH) title.

HEALTH AND SAFETY OF OUR PERSONNEL

The IRSST does more than contribute to the advancement of OHS knowledge through research. It also tries to put this knowledge into practice to help prevent its own staff from sustaining occupational injuries. It has its own health and safety committee that sees to its employees' OHS needs each year. In 2011, the Committee held training sessions on respiratory protection. Thirty-one persons took part in adjustment and use tests on the different pieces of respiratory protection equipment that they are required to use in the performance of their duties.

During the year, ten reports were entered in the incident, first-aid and accident register. Two accidents underwent investigation. Once again, the Institute's assessment rate at the CSST was lower than the unit rate as its track record was better than that of other enterprises classified in the same activity sector.

COMMITTEES

During the year, members of the Board of Directors and the Scientific Advisory Board are appointed or leave their positions. On behalf of all IRSST personnel, the president and CEO wishes to thank outgoing members for their contribution to the institutional life of the IRSST. She also wishes to welcome the newcomers and offer them all the assistance they need to carry out their mandates.

BOARD OF DIRECTORS

The Board of Directors determines the Institute's orientation, development framework, and financing. As a labour/management body, it is composed of the chair, seven representatives of employer associations, and seven worker representatives.

In 2011, the members of the Board of Directors held eight sessions, while those of the Executive Committee met seven times.

CHAIR

Michel Després*

EMPLOYER REPRESENTATIVES

Françoise Bertrand
Yves-Thomas Dorval*
France Dupéré
Martine Hébert
Patricia Jean
Carmel Laflamme
Simon Prévost

WORKER REPRESENTATIVES

Michel Arsenault*
Andrée Bouchard
Claude Faucher
Jean Lacharité
Lucie Levasseur
Yves Ouellet
Daniel Roy

OBSERVER

Suzanne Thérien

IRSST REPRESENTATIVE

Marie Larue

DEPARTURES

Luc Meunier
Roger Valois

APPOINTMENTS

Michel Després
Jean Lacharité

* Members of the Executive Committee



A NEW CHAIR OF THE BOARD

In October, 2011, the Québec Cabinet appointed Michel Després chairman of the Board of Directors and chief executive officer of the Commission de la santé et de la sécurité du travail, making him *ipso facto* the chair of the IRSST's Board of Directors.

With a bachelor's degree in business administration and certification from Université Laval's Collège des administrateurs de sociétés, Mr. Després has a thorough knowledge of the working world and is familiar with the labour/management context. He has held a number of important positions during his professional career, including those of Minister of Labour, Minister of Transport and president and chief executive officer of Québec's Commission des normes du travail (labour standards board). He is also the chair of the Forum des dirigeants des grands organismes publics (forum of heads of major public agencies).

SCIENTIFIC ADVISORY BOARD

A tri-partite advisory body for the president and CEO, the Scientific Advisory Board judges the relevance, priority, and scientific merit of internal and external research programs and projects. This board comprises the Institute's president and CEO, six members of the scientific and technical communities, four worker representatives, and four employer representatives. In 2011, the Scientific Advisory Board met ten times.

CHAIR

Marie Larue

EMPLOYER REPRESENTATIVES

Lionel Bernier
Richard Lapointe
Chantale Lavoie
Alain Neveu

WORKER REPRESENTATIVES

Micheline Boucher
Jean Dussault
Daniel Flynn
Denis Mailloux

MEMBERS OF THE SCIENTIFIC AND TECHNICAL COMMUNITIES

Christine Colin
Pierre Galarneau
Camille Limoges
Alain Rondeau
Yves Rousseau
Céline Saint-Pierre

OBSERVER

Claude Sicard

DEPARTURES

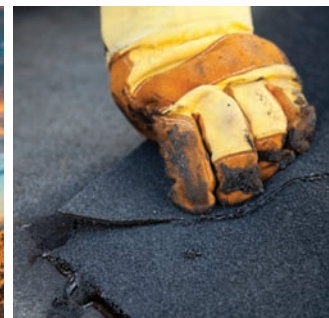
Alain Neveu
Richard Lapointe
Chantale Lavoie
Roger M. Laporte
André Van Neste

APPOINTMENTS

Dominique Malo
Lionel Bernier
Alain Rondeau

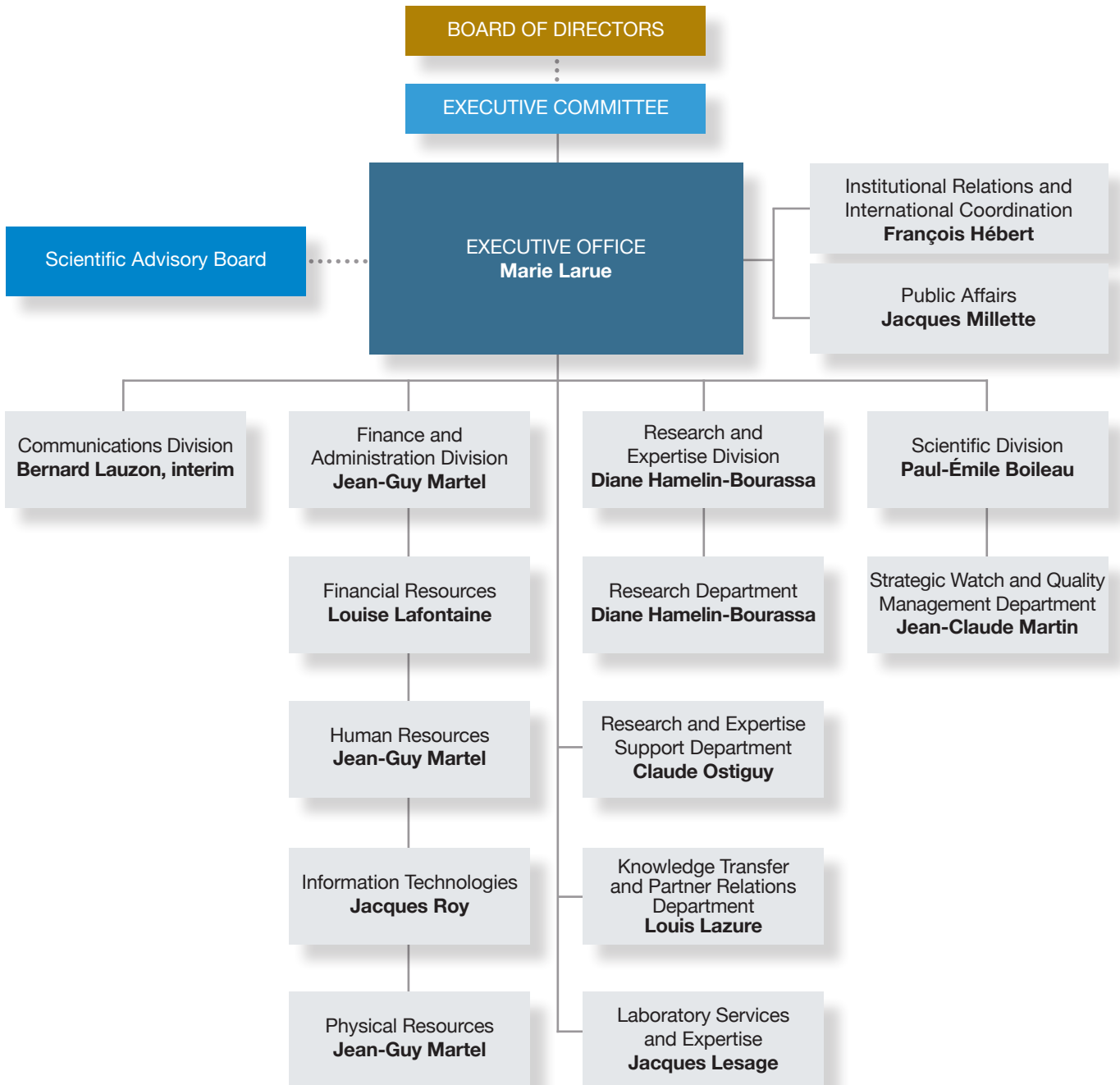
RENEWALS

Daniel Flynn
Christine Colin
Camille Limoges
Micheline Boucher
Jean Dussault



ORGANIZATIONAL CHART

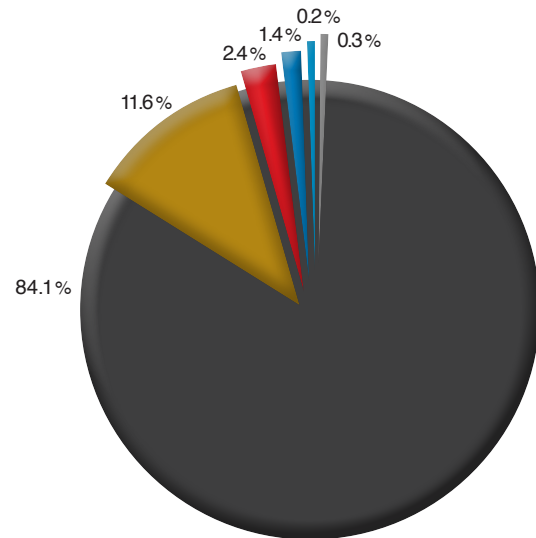
AS AT DECEMBER 31, 2011



FINANCIAL OVERVIEW

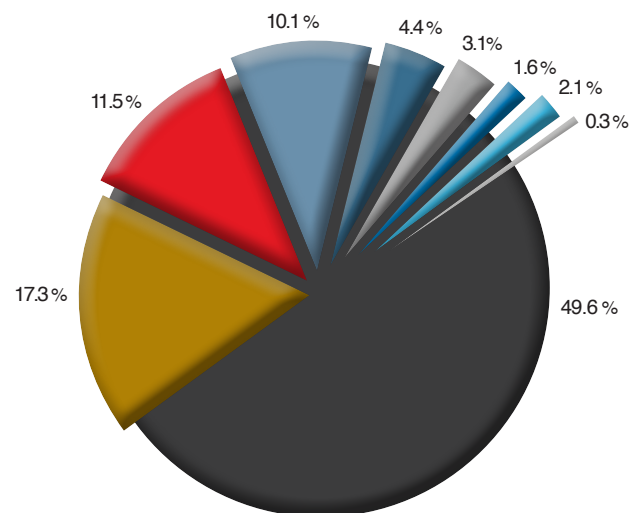
REVENUES: \$23,234,924

84.1 %	CSST
11.6 %	Laboratory services
2.4 %	Special projects
1.4 %	Contracts
0.2 %	Beryllium project
0.3 %	Other
100 %	



EXPENDITURES: \$22,883,699

49.6 %	Internal research
17.3 %	External research
11.5 %	Laboratory services
10.1 %	Finance and administration
4.4 %	Communications
3.1 %	Management
1.6 %	Contracts
2.1 %	Special projects
0.3 %	Beryllium project
100 %	



Publications

NEW PUBLICATIONS

IRSST PUBLICATIONS

BEAUDRY, C., DION, C., GÉRIN, M., PERRAULT, G., BÉGIN, D., LAVOUÉ, J. *Exposition des travailleurs de la construction à la silice cristalline – Bilan et analyse de la littérature*, Études et recherches / Rapport R-692, Montréal, IRSST, 2011, 112 p.

CHINNIH, Y., GAUTHIER, F., LAMBERT, S., MOULET, F. *Analyse expérimentale des outils d'estimation du risque associé aux machines industrielles*, Études et recherches / Rapport R-697, Montréal, IRSST, 2011, 83 p.

CHINNIH, Y., GAUTHIER, F., LAMBERT, S., MOULET, F. *Experimental analysis of tools used for estimating risk associated with industrial machines*, Studies and Research Projects / Report R-684, Montréal, IRSST, 2011, 77 p.

CLOUTIER, E., VAN DAELE, A. *Prévention des risques dans l'aide et les soins à domicile – Expérience croisée de bonnes pratiques organisationnelles au Québec et en région Wallonie-Bruxelles*, Études et recherche / Guide RG-718, Montréal, IRSST, 2011, 26 p.

COUTU, M.-F., DURAND, M.-J., MARCHAND, A., LABRECQUE, M.-É., BERBICHE, D., CADIEUX, G. *Présence et évolution des facteurs de maintien du trouble de l'anxiété généralisée chez des travailleurs en réadaptation pour une douleur persistante d'origine musculo-squelettique*, Études et recherches / Rapport R-699, Montréal, IRSST, 2011, 54 p.

COUTU, M.-F., NASTASIA, I., DURAND, M.-J., CORBIÈRE, M., LOISEL, P., LEMIEUX, P., LABRECQUE, M.-E., PETTIGREW, S. *Une approche systématique d'identification des déterminants de l'incapacité liés au travail et à la santé psychologique dans un secteur ciblé*, Études et recherches / Rapport R-679, Montréal, IRSST, 2011, 105 p.

DENIS, D., BEAUGRAND, S., BOUDREAU, H., LARUE, C. *Stabilité des chariots élévateurs – Élaboration d'un module de formation à l'aide d'une démarche de didactique participative*, Études et recherches / Rapport R-696, Montréal, IRSST, 2011, 84 p.

DENIS, D., LORTIE, M., ST-VINCENT, M., GONELLA, M., PLAMONDON, A., DELISLE, A., TARDIF, J. *Programme de formation participative en manutention manuelle – Fondements théoriques et approche proposée*, Études et recherches / Rapport R-690, Montréal, IRSST, 2011, 172 p.

DENIS, D., ST-VINCENT, M., LORTIE, M., GONELLA, M., DION, M.-H. *Analyse des activités de manutention de journaliers d'une grande municipalité québécoise : un outil pour composer avec le caractère changeant de la manutention*, Études et recherches / Rapport R-704, Montréal, IRSST, 2011, 92 p.

DOLEZ, P., VU-KHANH, T., GAUVIN, C., LARA, J. *Effet des contaminants sur la résistance mécanique des gants de protection – Analyse préliminaire*, Études et recherches / Rapport R-683, Montréal, IRSST, 2011, 47 p.

DUCHAINÉ, C., CORMIER, Y., GILBERT, Y., VEILLETTE, M., LAVOIE, J., MÉRIAUX, A., TOUZEL, C., SASSEVILLE, D., POULIN, Y. *Travailleurs exposés aux fluides de coupe de métaux (FC) – Évaluation de l'exposition aux bioaérosols et effets sur la santé respiratoire et cutanée*, Études et recherches / Rapport R-677, Montréal, IRSST, 2011, 80 p.

FOURNIER, P.-S., MONTREUIL, S., BRUN, J.-P., BILODEAU, C., VILLA, J. *Exploratory Study to Identify Workload Factors that Have an Impact on Health and Safety – A Case Study in the Service Sector*, Studies and Research Projects / Report R-701, Montréal, IRSST, 2011, 69 p.

GAUDREAU, M.-A., SGARD, F., NÉLISSE, H., BOUTIN, J. *Bruit dans cinq piscines intérieures – Mesures des niveaux ambiants et de l'exposition sonore*, Études et recherches / Rapport R-681, Montréal, IRSST, 2011, 38 p.

GAUDREAU, N., DE GUISE, J. A., HAGEMEISTER, N., POITRAS, S. *Analyse cinématique du genou lors de la marche de travailleurs exposés à une surcharge : une étude pilote*, Études et recherches / Rapport R-702, Montréal, IRSST, 2011, 31 p.

GIGUÈRE, M.-C., LARIVIÈRE, P., DION, C., VAN TRA, H. *Détermination du béryllium dans l'air en milieu de travail – Mise au point d'une méthode d'analyse en fluorescence*, Études et recherches / Rapport R-700, Montréal, IRSST, 2011, 59 p.

GIRAUD, L., GAGNÉ, N., AIT-KADI, D., HASTEY, P., KOUTCHOUK, M., TANCHOUX, S., VEZEAU, S. *La sécurité des têtes d'abattage multifonctionnelles*, Études et recherches / Rapport R-698, Montréal, IRSST, 2011, 72 p.

GIRAUD, L., JOCELYN, S., AUCOURT, B., MASSÉ, S., DAIGLE, R. *Intervenir sur les presses à imprimer – Validation d'un arbre de défaillance associé aux risques mécaniques*, Études et recherches / Rapport R-671, Montréal, IRSST, 2011, 97 p.

JOCELYN, S., MASSÉ, S., SIRARD, C. *Horizontal Plastic Injection Molding Machine – Safety Checklists*, Studies and Research Projects / Technical Guide RG-687, Montréal, IRSST, 2011, 13 p.

JOCELYN, S., MASSÉ, S., SIRARD, C. *Presse à injection de plastique horizontale – Grilles de vérification de la sécurité*, Études et recherches / Guide technique RG-670, Montréal, IRSST, 2011, 13 p.

LABERGE, L., LEDOUX, É., THUILIER, C., GAUDREAU, M., MARTIN, J.-S., CLOUTIER, E., AUCLAIR, J., LACHANCE, L., VEILLETTE, S., ROZON, C., GAUDREAU, M., ARBOUR, N., BESCOU, S., AGENAIS, T., HOSTIOU, L. *Santé et sécurité des étudiants qui occupent un emploi durant l'année scolaire – Les effets du cumul d'activités et de contraintes de travail*, Études et recherches / Rapport R-705, Montréal, IRSST, 2011, 147 p.

LAN, A., DAIGLE, R. *Système d'ancrage de garde-corps sur des toits plats pour les couvreurs*, Études et recherches / Rapport R-678, Montréal, IRSST, 2011, 74 p.

LAN, A., DAIGLE, R. *Système d'ancrage de garde-corps sur des toits plats pour les couvreurs – Annexe*, Études et recherches / Annexe RA-678, Montréal, IRSST, 2011, 107 p.

LEBEAU, M., DUGUAY, P. *Les coûts des lésions professionnelles : une revue de littérature*, Études et recherches / Rapport R-676, Montréal, IRSST, 2011, 87 p.

LEBEAU, M., DUGUAY, P., BOUCHER, A. *Estimation des coûts des lésions professionnelles : une étude de faisabilité dans le secteur minier*, Études et recherches / Rapport R-717, Montréal, IRSST, 2011, 90 p.

MARCHAND, A., BOYER, R., NADEAU, C., MARTIN, M. *Facteurs prévisionnels du développement de l'état de stress post-traumatique à la suite d'un événement traumatique chez les policiers : volet prospectif*, Études et recherches / Rapport R-710, Montréal, IRSST, 2011, 86 p.

MARCOTTE, P., OUELLETTE, S., BOUTIN, J., LEBLANC, G. *Évaluation des vibrations et du bruit des équipements miniers*, Études et recherches / Rapport R-682, Montréal, IRSST, 2011, 197 p.

NASTASIA, I., TCACIUC, R., COUTU, M.-F. *Strategies for Preventing Prolonged Disability in Workers Compensated for Work Related Musculoskeletal Disorders – A Systematic and Comprehensive Literature Review*, Studies and Research Projects / Report R-719, Montréal, IRSST, 2011, 146 p.

OSTIGUY, C., CORDEIRO, R., BENSIMON, G., BARIL, M. *Portrait de l'exposition professionnelle au plomb au Québec et niveaux de plombémie de janvier 2001 à décembre 2008*, Études et recherches / Rapport R-713, Montréal, IRSST, 2011, 55 p.

OSTIGUY, C., MORIN, S., BENSIMON, G., BARIL, M. *Résultats des analyses de substances chimiques produites à l'IRSST pour la période 2001-2008*, Études et recherches / Rapport R-712, Montréal, IRSST, 2011, 92 p.

PEARSON, M., L'ESPÉRANCE, A., BOUDREAU, L.-A., SGARD, F., NÉLISSE, H., BOUTIN, J. *Développement d'un système de cartographie d'intensité acoustique et transfert en milieu de travail*, Études et recherches / Rapport R-714, Montréal, IRSST, 2011, 86 p.

RAKHEJA, S., KORDESTANI, A., MARCOTTE, P. *Evaluation of Whole-Body Vibration Exposure of Operators of Soil Compactors*, Studies and Research Projects / Report R-709, Montréal, IRSST, 2011, 72 p.

RIVARD, M., DENIS, J.-L., CONTANDRIOPOULOS, A.-P., ROSSIGNOL, M., BILODEAU, H., STE-MARIE, G., LEDERER, V. *Évaluation de l'implantation et de l'impact du programme PRÉVICAP*, Études et recherches / Rapport R-716, Montréal, IRSST, 2011, 130 p.

ROBERGE, B., AUBIN, S., CLOUTIER, Y. *Caractérisation des poussières dans le secteur des assainissements alimentaires*, Études et recherches / Rapport R-694, Montréal, IRSST, 2011, 58 p.

ROBERGE, B., AUBIN, S., CLOUTIER, Y. *Caractérisation des poussières dans les boulangeries artisanales*, Études et recherches / Rapport R-693, Montréal, IRSST, 2011, 74 p.

ROY, S., DURAND, M.-J., CORRIVEAU, H. *Élaboration d'un guide de pratique sur l'évaluation des capacités reliées au travail pour une clientèle présentant une déficience physique*, Études et recherches / Rapport R-703, Montréal, IRSST, 2011, 92 p.

ROY, S., DURAND, M.-J., CORRIVEAU, H. *L'évaluation des capacités reliées au travail pour une clientèle présentant une déficience physique – Guide de pratique à l'intention des ergothérapeutes*, Études et recherches / Guide technique RG-703, Montréal, IRSST, 2011, 76 p.

SGARD, F., NÉLISSE, H., GAUDREAU, M.-A., BOUTIN, J., VOIX, J., LAVILLE, F. *Étude de la transmission sonore à travers les protecteurs auditifs et application d'une méthode pour évaluer leur efficacité en milieu de travail – Partie 2 : étude préliminaire d'une modélisation par éléments finis*, Études et recherches / Rapport R-680, Montréal, IRSST, 2011, 115 p.

ST-ARNAUD, L., BRIAND, C., CORBIÈRE, M., DURAND, M.-J., BOURBONNAIS, R., SAINT-JEAN, M., PELLETIER, M., DELISLE, S., KEDL, E. *Retour au travail après une absence pour un problème de santé mentale – Conception, implantation et évaluation d'un programme intégré des pratiques de soutien*, Études et recherches / Rapport R-706, Montréal, IRSST, 2011, 121 p.

ST-VINCENT, M., IMBEAU, D., GONELLA, M., CHIASSON, M.-È., LORANGE, M.-A., LASSY, G. *Intégration d'une culture de prévention durable des TMS – Étape 1 – Portrait systémique d'une grande entreprise manufacturière*, Études et recherches / Rapport R-688, Montréal, IRSST, 2011, 100 p.

SULLIVAN, M. J.L., SIMMONDS, M., VELLY, A. *Douleur, dépression, incapacité et résultats de la réadaptation*, Études et recherches / Rapport R-686, Montréal, IRSST, 2011, 42 p.

SULLIVAN, M. J.L., SIMMONDS, M., VELLY, A. *Pain, Depression, Disability and Rehabilitation Outcomes – Revised version*, Studies and Research Projects / Report R-675, Montréal, IRSST, 2011, 44 p.

TOULOUSE, G., ST-ARNAUD, L., DELISLE, A., DUHALDE, D., LÉVESQUE, J., MARCHÉ-PAILLÉ, A., MOORE, M., COMTOIS, A.-S., LARUE, C., PENA SALAZAR, E. *Étude pour intervenir sur la réduction des troubles musculo-squelettiques et de santé psychologique dans les centres d'appels d'urgence 911 de la sécurité publique municipale*, Études et recherches / Rapport R-720, Montréal, IRSST, 2011, 119 p.

TRUCHON, M., POULIOT, M., SCHMOUTH, M.-È. *Étude exploratoire du rôle des systèmes immunitaire et endocrinien dans l'incapacité de longue durée à la suite d'une lombalgie*, Études et recherches / Rapport R-708, Montréal, IRSST, 2011, 60 p.

TRUDEAU, F., LAURENCELLE, L. *La charge de travail et la dépense énergétique de l'éducateur physique*, Études et recherches / Rapport R-695, Montréal, IRSST, 2011, 34 p.

VÉZINA, M., CLOUTIER, E., STOCK, S., LIPPEL, K., FORTIN, É., DELISLE, A., ST-VINCENT, M., FUNES, A., DUGUAY, P., VÉZINA, S., PRUD'HOMME, P. *Québec Survey on Working and Employment Conditions and Occupational Health and Safety (EQCOTESST) – Summary*, Studies and Research Projects / Summary RR-707, Montréal, IRSST, 2011, 49 p.

VÉZINA, M., CLOUTIER, E., STOCK, S., LIPPEL, K., FORTIN, É., DELISLE, A., ST-VINCENT, M., FUNES, A., DUGUAY, P., VÉZINA, S., PRUD'HOMME, P. *Enquête québécoise sur des conditions de travail, d'emploi et de SST (EQCOTESST) – Sommaire*, Études et recherches / Résumé RR-691, Montréal, IRSST, 2011, 50 p.

VÉZINA, M., CLOUTIER, E., STOCK, S., LIPPEL, K., FORTIN, É., DELISLE, A., ST-VINCENT, M., FUNES, A., DUGUAY, P., VÉZINA, S., PRUD'HOMME, P. *Enquête québécoise sur des conditions de travail, d'emploi et de SST (EQCOTESST)*, Études et recherches / Rapport R-691, Montréal, IRSST, 2011, 756 p.

VU-KHANH, T., DOLEZ, P., NGUYEN, C.T., GAUVIN, C., LARA, J. *Résistance des gants à la piqûre par les aiguilles – Mise au point d'une méthode d'essai*, Études et recherches / Rapport R-711, Montréal, IRSST, 2011, 123 p.

VYSKOCIL, A., LEROUX, T., TRUCHON, G., LEMAY, F., GAGNON, F., GENDRON, M., BOUDJERIDA, A., EL-MAJIDI, N., VIAU, C. *Effet des substances chimiques sur l'audition – Interactions avec le bruit*, Études et recherches / Rapport R-685, Montréal, IRSST, 2011, 44 p.

LABORATORY METHODS

LARIVIÈRE, P., BISSON, M.-F., BARRETTE, M.-C., LESAGE, J. *Détermination de métaux dans l'air des lieux de travail par spectrométrie de masse avec plasma à couplage inductif (ICP-MS)*, Méthodes analytiques, Méthode MA-362, Montréal, IRSST, 2011, 22 p.

LARIVIÈRE, P., BISSON, M.-F., BARRETTE, M.-C., LESAGE, J. *Détermination de métaux en workplace air by inductively coupled plasma mass spectrometry (ICP-MS)*, Analytical Methods, Méthode MA-362-en, Montréal, IRSST, 2011, 22 p.

MARCHAND, G., BARRETTE, M.-C., LESAGE, J. *Dénombrement des bactéries et moisissures viables de l'air prélevées sur cassette de polycarbonate*, Méthodes analytiques, Méthode MA-368, Montréal, IRSST, 2011, 13 p.

REPORTS PUBLISHED IN COLLABORATION

ASTE / IRSST. *Chariot élévateur et surfaceuse à glace au propane. Un entretien préventif pour une performance sécuritaire* – 2e édition, Fiche technique RF-627, Montréal, IRSST / Montréal, Association sectorielle transport entreposage, 2011, 16 p.

BOULIANE, P., BEAUGRAND, S., RICHARD, J.-G., VIGNEAULT, S. *Chariots élévateurs et piétons : à chacun sa voie*, 2e édition, Guide d'information R-498, Montréal, IRSST / Montréal, Association sectorielle transport entreposage, 2011, 24 p.

ST-VINCENT, M., VÉZINA, N., BELLEMARE, M., DENIS, D., LEDOUX, É., IMBEAU, D. *L'intervention en ergonomie*, Ouvrage de référence Intervention-ERGO, Montréal, IRSST / Sainte-Foy, Éditions Multi Mondes, 2011, 360 p.

SCIENTIFIC PUBLICATIONS

ARJMAND N., PLAMONDON A., SHIRAZI-ADL A., PARNIANPOUR M., LARIVIÈRE C. *Predictive equations to estimate spinal loads in symmetric lifting tasks*, Journal of Biomechanics, vol. 44, no 1, 2011, p. 84-91.

BÉCOT F. X., JAOUEN L., SGARD F. *Noise control strategies using composite porous materials – simulations and experimental validations on a plate/cavity systems*, Noise Control Engineering Journal, vol. 59, no 5, 2011, p. 464-475.

BIJAOUI A., PILLIÈRE F., GAGNON M., TRUCHON G., BERODE M., DE TORRENTÉ A., SAGER A., HOËT P. *Veille bibliographique sur la surveillance biologique de l'exposition aux produits chimiques en milieu de travail*, Documents pour le médecin du travail, no 125, 2011, p. 37-47.

BLAIS LECOUCRS P., DUCHAINE C., TAILLEFER M., VEILLETTE M., TREMBLAY C., CORMIER Y., MARSOLAIS D. *Immunogenic properties of archaeal species found in bioaerosols*, Plos One, vol. 6, no 8, 2011, p. 1-7.

CHAVEZ M., HAJRA B., STATHOPOULOS T., BAHLOUL A. *Near-field pollutant dispersion in the built environment by CFD and wind tunnel simulations*, Journal of Wind Engineering and Industrial Aerodynamics, vol. 99, no 4, 2011, p. 330-339.

COUTU M.-F., BARIL R., DURAND M.-J., CÔTÉ D., CADIEUX G. *Health and illness representations of workers with a musculoskeletal disorder-related work disability during work rehabilitation: a qualitative study*, Journal of Occupational Rehabilitation, vol. 21, no 4, 2011, p. 591-600.

COUTU M.-F., LÉGARÉ F., DURAND M.-J., CORBIÈRE M., LOISEL P., SATCEY D., BAINBRIDGE L. *Forecasting shared decision making by occupational therapists and workers involved in accidents resulting in persistent musculoskeletal disorders: a study protocol*, Implementation Science, vol. 6, paper no 22, 2011.

DA SILVA R. A., LARIVIÈRE C., PLAMONDON A., ARSENAULT A. B., NADEAU S. *Do pelvic stabilization and lower-limb position affect isometric trunk extension strength?*, Isokinetics and Exercise Science, vol. 19, no 3, 2011, p. 175-179.

DESBIENS J.-F., FILLION L. *Comment les infirmières du Québec perçoivent-elles leur compétence en soins palliatifs et quels sont leurs besoins de formation ?*, Cahiers francophones de soins palliatifs, vol. 11, no 2, 2011, p. 31-42.

DESBIENS J. F., GAGNON J., FILLION L. *Development of a shared theory in palliative care to enhance nursing competence*, Journal of Advanced Nursing, 2011 (December 29), DOI: 10.1111/j.1365-2648.2011.05917.x.

DESBIENS J.-F., FILLION L. *Development of the palliative care nursing self-competence scale*, Journal of Hospice & Palliative Nursing, vol. 13, no 4, 2011, p. 230-241.

DOLEZ P., VINCHES L., WILKINSON K., PLAMONDON P., VU-KHANH T. *Development of a test method for the evaluation of the efficiency of protective gloves against nanoparticles in conditions simulating occupational use*, Journal of Physics: conference Series, vol. 304, no 1, 2011, paper 012066.

DUFRESNE A., MOCANU T., VIAU S., PERRAULT G., DION C. *Efficacy of surface sampling methods for different types of beryllium compounds*, Journal of Environmental Monitoring, vol. 13, no 1, 2011, p. 74-83.

DURAND M.-J., VÉZINA N., BARIL R., LOISEL P., RICHARD M. C., Ngomo S. *Relationship between the margin of manoeuvre and the return to work after a long-term absence due to a musculoskeletal disorder: an exploratory study*, Disability and Rehabilitation, vol. 33, no 13-14, 2011, p. 1245-1252.

EGER T., STEVENSON J. M., GRENIER S., BOILEAU P.-É., SMETS M. P. *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, vol. 30, no 1, 2011, p. 45-62.

EL OUAID Z., SHIRAZI-ADL A., ARJMAND N., PLAMONDON A. *Coupled objective function to study the role of abdominal muscle forces in lifting using the kinematics-driven model*, Computer Methods in Biomechanics and Biomedical Engineering, 2011 (September 21), DOI:10.1080/10255842.2011.607441.

FILLION L. *La pratique en oncologie peut être à la fois source de stress et source de satisfaction*, Psycho-Oncologie, vol. 5, no 2, 2011, p. 71-74.

FILLION L., DESBIENS J.-F., TRUCHON M., DALLAIRE C., ROCH G. *Le stress au travail chez les infirmières en soins palliatifs de fin de vie selon le milieu de pratique*, Psycho-Oncologie, vol. 5, no 2, 2011, p. 127-136.

GAGNON D., ARJMAND N., PLAMONDON A., SHIRAZI-ADL A., LARIVIÈRE C. *An improved multi-joint EMG-assisted optimization approach to estimate joint and muscle forces in a musculoskeletal model of the lumbar spine*, Journal of Biomechanics, vol. 44, no 8, 2011, p. 1521-1529.

GAUTHIER F., GÉLINAS D., MARCOTTE P. *Vibration of portable orbital sanders and its impact on the development of work-related musculoskeletal disorders in the furniture industry*, Computers & Industrial Engineering, 2011 (December 9), <http://dx.doi.org/10.1016/j.cie.2011.11.035>.

HAJRA B., STATHOPOULOS T., BAHLOUL A. *The effect of upstream buildings on near-field pollutant dispersion in the built environment*, Atmospheric Environment, vol. 45, no 28, 2011, p. 4930-4940.

JALLON R., IMBEAU D., DE MARCELLIS-WARIN N. *A process mapping model for calculating indirect costs of workplace accidents*, Journal of Safety Research, vol. 42, no 5, 2011, p. 333-344.

JALLON R., IMBEAU D., DE MARCELLIS-WARIN N. *Development of an indirect-cost calculation model suitable for workplace use*, Journal of Safety Research, vol. 42, no 3, 2011, p. 149-164.

JOHNSON G. D., LALANCETTE C., LINNEMANNA A. K., LEDUC F., BOISSONNEAULT G., KRAWETZ S. A. *The sperm nucleus: chromatin, RNA, and the nuclear matrix*, Reproduction, vol. 141, no 1, 2011, p. 21-36.

JOSEPH C., IMBEAU D., NASTASIA I. *Measurement consistency among observational job analysis methods during an intervention study*, International Journal of Occupational Safety and Ergonomics, vol. 17, no 2, 2011, p. 139-146.

JUREWICZ J. W., BOULOS M. I., BROCHU L., CRÊTE J. P., DIGNARD N., HERAUD D., HUDON F., OSTIGUY C. *Can induction plasma technology be nano-safe, "green and energy efficient?"*, Journal of Physics: Conference Series, vol. 304, no 1, 2011, 6 p.

LABERGE L., LEDOUX É., AUCLAIR J., THUILIER C., GAUDREAU M., GAUDREAU M., VEILLETTE S., PERRON M. *Risk factors for work-related fatigue in students with school-year employment*, Journal of Adolescent Health, vol. 48, no 3, 2011, p. 289-294.

LABERGE M., LEDOUX É. *Occupational health and safety issues affecting young workers: a review of literature*, Work: A Journal of Prevention, Assessment & Rehabilitation, vol. 39, no 3, 2011, p. 215-232.

LABRECQUE M., MALO J. L., ALAOUI K. M., RABHI K. *Medical surveillance programme for diisocyanate exposure*, Occupational and Environmental Medicine, vol. 68, no 4, 2011, p. 302-307.

LACERTE S., MARCHAND A., NADEAU C. *Les facteurs prévisionnels de l'état de stress post-traumatique chez les policiers : état de la question*, Journal international de victimologie, vol. 8, no 3, 2011, p. 208-233.

LACAGÉ P. Y., BILLUART F., OHL X., SKALLI W., TÊTREAU P., DE GUISE J., HAGEMEISTER N. *Analysis of humeral head displacements from sequences of biplanar x-rays: repeatability analysis and preliminary results in healthy subjects*, Computer Methods in Biomechanics and Biomedical Engineering, 2011 (April 18), DOI:10.1080/10255842.2010.522185.

LAMBIN D. I., THIBAUT P., SIMMONDS M., LARIVIÈRE C., SULLIVAN M. J. L. *Repetition-induced activity-related summation of pain in patients with fibromyalgia*, Pain, vol. 152, no 6, 2011, p. 1424-1430.

LAN A., DAIGLE R. *Verification of the strength of the anchor point of a fall arresting and positioning systems for reinforcing steel erectors*, Practice Periodical on Structural Design and Construction, 2011 (November 11), doi:10.1061/(ASCE)SC.1943-5576.0000122.

LARIVIÈRE C., DA SILVA R. A., ARSENAULT B., NADEAU S., PLAMONDON A., VADEBONCOEUR R. *Specificity of a back muscle roman chair exercise in healthy and back pain subjects*, Medicine and Science in Sports and Exercise, vol. 43, no 1, 2011, p. 157-164.

LAVOIE J., MARCHAND G., CLOUTIER Y., LAVOUE J. *Validation of the criteria for initiating the cleaning of heating ventilation and air-conditioning (HVAC) ductwork under real conditions*, Journal of Occupational and Environmental Hygiene, vol. 8, no 8, 2011, p. 467-472.

LÉGARÉ F., STACEY D., FOREST P.-G., COUTU M.-F. *Moving SDM forward in Canada: milestones, public involvement, and barriers that remain*, Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen, vol. 105, no 4, 2011, p. 245-253.

LÉGARÉ F., BEKKER H., DESROCHES S., DROLET R., POLITI M., STACEY D., BORDUAS F., CHEATER F. M., COMUZ J., COUTU M.-F., FERDJAOUI-MOUMJID N., GRIFFITHS F., HÄRTER M., JACQUES A., KRONES T., LABRECQUE M., NEELY C., RODRIGUEZ C., SARGEANT J., SCHUERMAN J., SULLIVAN M. *How can continuing professional development better promote shared decision-making? Perspectives from an international collaboration*, Implementation Science, vol. 6, paper no 68, 2011.

LEMIEUX P., DURAND M.-J., HONG Q. N. *Supervisors' perception of the factors influencing the return to work of workers with common mental disorders*, Journal of Occupational Rehabilitation, vol. 21, no 3, 2011, p. 293-303.

MANDAPURAM S., RAKHEJA S., MARCOTTE P., BOILEAU P.-É. *Analyses of biodynamic responses of seated occupants to uncorrelated fore-aft and vertical whole-body vibration*, Journal of Sound and Vibration, vol. 330, no 16, 2011, p. 4064-4079.

MOSTOFI R., BAHLOUL A., LARA J., WANG B., CLOUTIER Y., HAGHIGHAT F. *Investigation of potential affecting factors on performance of N95 respirator*, Journal of the International Society for Respiratory Protection, vol. 28, no 1, 2011, p. 26-39.

MÜLLER C., SALEHI F., MAZER B., AUDUSSEAU S., BOUCHARD M., ADAM-POUPART A., CHEVALIER G., TRUCHON G., LAMBERT J., ZAYED J. *Immunotoxicity of 3 chemical forms of beryllium following inhalation exposure*, International Journal of Toxicology, vol. 30, no 5, 2011, p. 538-545.

NÉLISSE H., GAUDREAU M.-A., BOUTIN J., VOIX J., LAVILLE F. *Measurement of hearing protection devices performance in the workplace during full-shift working operations*, Annals of Occupational Hygiene, 2011 (October 17), DOI: 10.1093/annhyg/mer087.

PAZOOKI A., RAKHEJA S., CAO D., BOILEAU P.-É. *Ride dynamic evaluations and design optimization of a torso-elastic off-road vehicle suspension*, Vehicle System Dynamics, vol. 49, no 9, 2011, p. 1455-1476.

PEIGNIER I., LEROUX M. H., DE MARCELLIS-WARIN N., TRÉPANIÉ M. *Organizational safety practices of hazardous materials carriers*, International Journal of Transportation Research, vol. 3, no 3, 2011, p. 149-159.

QUIRION F., POIRIER P. *Surface properties and slip resistance of glazed ceramic tiles over-treated, or treated multiple times, with hydrofluoric acid*, Journal of Environmental Health Research, vol. 11, no 1, 2011, p. 17-27.

RENAULT A., JAOUEN L., SGARD F. *Characterization of elastic parameters of acoustical porous materials from beam bending vibrations*, Journal of Sound and Vibration, vol. 330, no 9, 2011, p. 1950-1963.

SANTOS B., LARIVIÈRE C., DELISLE A., PLAMONDON A., IMBEAU D. *Sudden loading perturbation to determine the reflex response of different back muscles: a reliability study*, Muscle & Nerve, vol. 43, no 3, 2011, p. 348-359.

SGARD F., CASTEL F., ATALLA N. *Use of a hybrid adaptive finite element/modal approach to assess the sound absorption of porous materials with meso-heterogeneities*, Applied Acoustics, vol. 72, no 4, 2011, p. 157-168.

TOULOUSE G., ST-ARNAUD L., MARCHÉ-PAILLÉ A., DELISLE A., LÉVESQUE J., COMTOIS A.-S., DUHALDE D. *Les premiers répondants des services d'urgence 911, ces travailleurs de l'ombre*, Revue économique et sociale, vol. 69, no 2, 2011, p. 41-51.

TREMBLAY-BOUDREAU V., VÉZINA N., DENIS D., TOUSIGNANT-LAFLAMME Y. *La formation visant la prise en charge globale des troubles musculo-squelettiques par l'entreprise : une étude exploratoire*, Pistes (Perspectives interdisciplinaires sur le travail et la santé), vol. 13, no 1, 2011, 26 p.

VIALLET G., SGARD F., LAVILLE F. *Comparison of a 3 dimension model versus a 2 dimension-axisymmetric finite element model of an occluded ear canal*, 162nd Meeting of the Acoustical Society of America (162nd: October 31-November 4, 2011, San Diego, USA), Journal of the Acoustical Society of America, vol. 130, no 4, 2011, p. 2518.

VYSKOCIL A., TRUCHON G., LEROUX T., LEMAY F., GENDRON M., LIM S., GAGNON F., VIAU C. *A weight of evidence approach for the assessment of the ototoxic potential of industrial chemicals*, Toxicology and Industrial Health, 2011 (November 7), doi: 0748233711425067.

ZHANG C., HAMMAD A., RODRIGUEZ S. *Crane pose estimation using UWB real-time location system*, Journal of Computing in Civil Engineering, 2011 (October 3), doi:10.1061/(ASCE)CP.1943-5487.0000172.

PEER-REVIEWED ARTICLES PUBLISHED IN CONFERENCE PROCEEDINGS

ADAM-POUPART A., MÜLLER C., SALEHI F., MAZER B., CLOUTIER Y., CHEVALIER G., TRUCHON G., LAMBERT J., LARIVIÈRE P., PAQUETTE V., ZAYED J. *Tissue concentrations and immunological effects in C3H/HeJ mice following an inhalation exposure to two particles size of Be and BeAl*. In Annual Meeting of the Society of Toxicology (50th: March 6-10, 2011, Washington, USA), 2011.

ADAM-POUPART A., LABRÈCHE F., SMARGIASSI A., DUGUAY P., BUSQUE M.-A., GAGNÉ C., ZAYED J. *Impacts of climate change on occupational health and safety* (Poster). In Congrès mondial sur la sécurité et la santé au travail (19e : 11-15 septembre, 2011, Istanbul, Turquie), 2011.

ADEWUSI S., RAKHEJA S., MARCOTTE P. *Analyses of distributed absorbed power responses on the human hand-arm system in the bent- and extended-arm postures*. In Proceedings of the 12th International Conference on Hand-Arm Vibration/Douzième congrès international sur les vibrations mains-bras (12th: June 13-17, 2011, Ottawa, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 2, 2011, p. 50-51.

ALIMONTI L., ATALLA N., BERRY A., SGARD F. *Efficient hybrid FE-TMM modeling of the vibroacoustic response of structures with attached sound packages*. In Symposium on the Acoustics of Poro-Elastic Materials / SAPEM 2011 (3rd: December 14-16, 2011, Ferrera, Italy), 2011.

ARJMAND N., PLAMONDON A., SHIRAZI-ADL A., LARIVIÈRE C. *Predictive equations for spinal loads in symmetric lifting using on a complex biomechanical model* (Poster). In 57 th Annual Meeting of Orthopaedic Research Society (57 th: January 13-16, 2011, Long Beach, USA), 2011.

ATALLA N., SGARD F. *Transmission loss of curved sandwich-composite panels with attached noise control materials*. In 162nd Meeting of the Acoustical Society of America (162nd: October 31-November 4, 2011, San Diego, USA), Journal of the Acoustical Society of America, vol. 130, no 4, 2011, p. 2326.

ATTENDU J. M., NÉLISSE H., BOUDREAU L.-A., PEARSON M. *Study of the compliance of a sound intensity mapping device located in space by computer vision with conventional certified methods for measuring sound power*. In Proceedings of the Acoustics Week in Canada, (October 12-14, 2011, Québec, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 76-77.

- BAHLOUL A., LARA J., CLOUTIER Y., OSTIGUY C., MOSTOFI R., WANG B., HAGHIGHAT F. *Performance des filtres N95 des masques respiratoires à capturer les nanoparticules*. In Journées francophones SF2P : Séparation gaz/particules (2e : 15-16 juin 2011, Nancy, France), 2011.
- BAHLOUL A., CHAVEZ M., HAJRA B., STATHOPOULOS T. *Near field pollutant dispersion around buildings in the urban environment*. In Indoor Air: 12th International Conference on Indoor Air Quality and Climate (12th: June 5-10, 2011, Austin, USA), 2011.
- BIRON C., IVERS H., BRUN J.-P., COOPER C. L. *The more the merrier? A dose-response study of organizational-level interventions*. In Work, Stress, and Health 2011, 9th International Conference on Occupational Stress and Health (9th: May 19-22, 2011, Orlando, USA), 2011.
- BORSKA L., FIALA Z., VYSKOCIL A., LEMAY F., FIALA O., KREMLACEK J., BORSKY T., KRAJAK V. *Estimation of potential interactive effects of chemical mixtures*. In Eurotox 2011: 47th Congress of the European Societies of toxicology (47th: August 28-31, 2011, Paris, France), 2011.
- BOURDEL G., RIEDIKER M., OSTIGUY C., TRIOLET J., TROISFONTAINES P., VERNEZ D., THIERET N. *Développement d'un outil de gestion graduée du risque applicable aux nanoparticules*. In Journées nationales de santé au travail du BTP (31e : 25-27 mai, 2011, Paris, France), 2011.
- BOYER S., SGARD F., LAVILLE F., HAMDI M. A. *Development of an equivalent solid model to predict the vibroacoustic behavior of ear muff cushions*. In Proceedings of the Acoustics Week in Canada, (October 12-14, 2011, Québec, Canada). Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 96-97.
- BRUMMUND M., PETIT Y., SGARD F., LAVILLE F. *Development of a 3D finite element model of the human external ear for simulation of the auditory occlusion effect*. In Proceedings of the Acoustics Week in Canada (October 12-14, 2011, Québec, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 94-95.
- BRUMMUND M., SGARD F., PETIT Y., LAVILLE F. *A simplified axi-symmetric finite element model for the human outer ear to determine the earplug induced auditory occlusion effect*. In 162nd Meeting of the Acoustical Society of America (162nd: October 31-November 4, 2011, San Diego, USA), Journal of the Acoustical Society of America, vol. 130, no 4, 2011, p. 2469.
- BURLET-VIENNEY D., CHINNIAN Y., BOUKAS E.-K., PIZARRO-CHONG A., EL-ABOUDI M. *Conception d'un outil d'observation et de suivi de procédures de cadenassage en milieu industriel*. In 9e Congrès international de génie industriel / CIGI (9e : 12-14 octobre, 2011, Saint-Sauveur, Canada), 2011.
- CHAVEZ M., HAJRA B., STATHOPOULOS T., BAHLOUL A. *Assessment of near-field pollutant dispersion: effect of upstream buildings*. In International Conference on Wind Engineering, (13th: July 10-15, 2011, Amsterdam, The Netherlands), 2011.
- CIBOTARU A., LORTIE M., NASTASIA I. *L'ergonomie face au double enjeu de la sécurité des patients et des professionnels de la santé en pédiatrie*. In L'ergonomie à la croisée des risques : Actes du 46e Congrès de la Société d'ergonomie de langue française / SELF (46e : 14-16 septembre, 2011, Paris, France), Jeffroy, F., Garrigou, A. (éds), 2011.
- COUUT M.-F., LÉGARÉ F., DURAND M.-J., CORBIÈRE M., STACEY D., LOISEL P., BAINBRIDGE L. *Adapting and validating a SDM approach for work rehabilitation programs involving workers with persistent pain due to musculoskeletal disorders*. In International Shared Decision Making Conference / ISDM 2011 (6th: June 19-22, 2011, Maastricht, The Netherlands), 2011.
- COUUT M.-F., DURAND M.-J., MARCHAND A., LABRECQUE M. E., BERBICHE D. *Documenting the presence of generalised anxiety disorder and its maintaining factors in patients in work rehabilitation program for persistent musculoskeletal pain*. In Musculoskeletal Disorders & Chronic Pain Conference (February 10-12, 2011, Los Angeles, USA), 2011.
- DE MARCELLIS-WARIN N., PEIGNIER I., LAPOINTE C. *Identification des partenaires stratégiques des PME au Québec et leur implication dans les activités environnementales*. In Actes du colloque PME en marche vers le développement durable (20-22 octobre, 2011, Montréal, Canada), 2011, p. 398-399 (<http://nbs.net/fr/files/2011/11/Actes-Procédures2011.pdf>).
- DELISLE A., MARCHAND J., CHOQUET D., PLAMONDON A., GAGNON D., LARIVIÈRE C., ROUAT J., MICHAUD F. *Predicting the lumbar movement from trunk kinematics and electromyography: multiple linear regression or artificial neural network?* In International Society of Biomechanics: ISB2011 (23rd: July 3-7, 2011, Brussels, Belgium), 2011, p. 134.
- DESBIENS J.-F., FILLION L. *Multi-dimensionnalité de la mesure de perception de compétence infirmière en soins palliatifs*. In Premier congrès international francophone de la Société française d'accompagnement et de soins palliatifs (1er : 28 juin, 2011, Lyon, France), 2011.
- DESBIENS J.-F., VALOIS P., FENG B., FILLION L. *La modélisation par équations structurelles exploratoire (ESEM) : application d'une nouvelle approche pour déterminer la structure factorielle d'un questionnaire de perception des compétences infirmières en soins palliatifs (PCISP)*. In La recherche en interventions en sciences infirmières, développement, 1er symposium international (1er : 6-8 avril, 2011, Montréal, Canada), 2011.
- DOLEZ P. I., NGUYEN C. T., VU-KHANH T., GAUVIN C., LARA J. *Resistance of protective materials to needle puncture: mechanisms and mechanics*. In International Conference of Engineering Against Fracture (ICEAF II), (2nd : June 22-24: 2011, Mykonos, Greece), 2011, 8 p.
- DOLEZ P. I., AZAIEZ M., VU-KHANH T. *Characterization of the resistance of protective gloves to pointed blades*. In Ninth Symposium on Performance of Protective Clothing and Equipment (9th: June 16-17, 2011, Anaheim, USA), 2011.
- EL MAJIDI N., VYSKOCIL A., THUOT R., BEAUDRY C., CHAREST-TARDIF G., TARDIF R., GAGNON F., SKA B., TURCOT A., VIAU C. *Are peak workplace exposures associated with styrene neurotoxicity?* In Annual Meeting of the Society of Toxicology (50th: March 6-10, Washington, USA), 2011.
- GAGNÉ C., LAZURE L., LEDOUX É., OUELLET S., FOURNIER P.-S. *Knowledge management in the Quebec mining industry: a framework of practice to ensure evidence-based knowledge translation*. In European Conference on Knowledge Management / ECKM11 (12th: September 1-2, 2011, Passau, Germany), 2011.
- GAGNON D., ARJMAND N., PLAMONDON A., SHIRAZI-ADL A., LARIVIÈRE C. *The influence of abdominal oblique modelling on predicted muscle forces and lumbar spine loads*. In International Society of Biomechanics: ISB2011 (23rd: July 3-7, 2011, Brussels, Belgium), 2011.
- GAUVIN C., LARA J. *Study on the needle puncture resistance of protective glove materials*. In Ninth Symposium on Performance of Protective Clothing and Equipment (9th: June 16-17, 2011, Anaheim, USA), 2011.
- GAUVIN C., LARA J., PROULX-CROTEAU S., DOLEZ P. *A new test method to characterize the adherence of protective glove materials*. In Ninth Symposium on Performance of Protective Clothing and Equipment (9th: June 16-17, 2011, Anaheim, USA), 2011.
- GÉLINAS C., FILLION L., ROBITAILLE M.-A., TRUCHON M. *Strategies to improve end-of-life care in the intensive care unit as perceived by nurses* (Poster). In 13th World Congress of Psycho-Oncology (13th: October 16-20, Antalya, Turkey), 2011.
- HAJRA B., CHAVEZ M., STATHOPOULOS T., BAHLOUL A. *Modelling of near-field pollutant dispersion in the built environment: methods and challenges*. In International Workshop on Physical Modeling of Flow Dispersion Phenomena / PHYSMOD2011 (August 22-24, 2011, Hamburg, Germany), 2011.
- HAMMAD A., ZHANG C. *Towards real-time simulation of construction activities considering spatio-temporal resolution requirements for improving safety and productivity*. In Winter Simulation Conference (December 11-14, 2011, Phoenix, USA), 2011.
- HANDRIGAN G. A., PLAMONDON A., SIMONEAU M., TEASDALE N., CORBEIL P. *Body weight affects lifting performance*. In 2nd National Obesity Summit (2nd: April 28-May 1, 2011, Montréal, Canada), 2011.
- HEGG-DELOYE S., BRASSARD P., JAUVIN N., LAROUCHE D., PRAIRIE J., SIMONEAU M., TEASDALE N., POIRIER P., TREMBLAY A., CORBEIL P. *Physiological responses of emergency responders at work: cardiac response and energy balance*. In Canadian Society for Exercise Physiology / CSEP 2011 (October 19-22, 2011, Québec, Canada), 2011.
- LABRÈCHE F., DUGUAY P., OSTIGUY C., BOUCHER A., ROBERGE B., GOYER N., BARIL M. *Carcinogens exposure prevalence as a first step toward preventing occupational cancers: advantages and drawbacks* (Poster). In Conference on Epidemiology in Occupational Health / EPICOH (22nd: September 6-9, 2011, Oxford, UK), 2011.
- LAN A. *Anchoring system for guardrails on flat roofs for roofers*. In National Occupational Injury Research Symposium / NOIRS2011 (5th : October 18-20, 2011, Morgantown, USA), 2011.
- LARIVIÈRE C., GAGNON D., DE OLIVEIRA E., HENRY S. M., DUMAS J.-P. *Ultrasound measures of the lumbar multifidus: effect of task and transducer position on reliability*. In Proceedings of the 16th International World Physical Therapy Congress 2011 / WCPT (165th: June 20-23, 2011, Amsterdam, The Netherlands), 2011.
- LARIVIÈRE C., GAGNON D., DE OLIVEIRA E., HENRY S. M., DUMAS J.-P. *Reliability of ultrasound measures of the abdominals: effect of task and transducer position*. In Proceedings of the 16th International World Physical Therapy Congress 2011 / WCPT (165th: June 20-23, 2011, Amsterdam, The Netherlands), 2011.
- LAROCHE C., GIGUÈRE C., VAILLANCOURT V., LAFERRIÈRE P., NÉLISSE H. *Comparison of tonal, multi-tonal and broadband backup alarms on psychoacoustic measures*. In Congrès annuel de l'Association canadienne d'acoustique (12-14 octobre, 2011, Québec, Canada), 2011.
- LE COCQ C., NÉLISSE H., BOUTIN J., VOIX J., LAVILLE F. *Influence of source location, subjects and HPD size on the sound field around earmuffs*. In Proceedings of the Acoustics Week in Canada, (October 12-14, 2011, Québec, Canada). Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 98-99.

LEDOUX É., MARTIN J.-S., THUILIER C., LABERGE L. *Sleep habits and fatigue among young student workers: the effect of job characteristics*. In 20th International Symposium on Shiftwork and Working Time (20th: June 28-July 1, 2011), 2011, p. 96.

LEMIÈRE C., TREMBLAY C., BOHADANA A., CHABOLLEZ S. *Prognosis of the workers with non-eosinophilic occupational asthma*. In American Thoracic Society 2011 International Conference (May 13-18, 2011, Denver, Colorado), American Journal of Respiratory Critical Care Medicine, vol. 183, 2011, p. A1172.

LEROUX T., VYSKOCIL A., TRUCHON G., LEMAY F., GAGNON F., GENDRON M., BOUDJERIDA A., EL-MAJIDI N., VIAU C. *The weight of evidence approach in the assessment of hearing impairment induced by noise and ototoxic chemicals*. In Proceedings of the 10th International Congress on Noise as a Public Health Problem / IC BEN 2011 (10th: July 24-28, 2011, London, UK), 2011.

LORTIE M., NASTASIA I., GRAVEL S. *Bilan réflexif d'études menées dans des secteurs combinant des problématiques de santé, de sécurité pour le travail et pour le système*. In 46e Congrès de la Société d'ergonomie de langue française / SELF, (46e : 14-16 septembre, 2011, Paris, France), 2011.

MARCOTTE P., OUELLETTE S., BOUTIN J., LEBLANC G. *A low cost wireless acquisition system for multi-channel vibration measurement*. In Proceedings of the Acoustics Week in Canada (October 12-14, 2011, Québec, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 214-215.

MARCOTTE P., OUELLETTE S., BOUTIN J., LEBLANC G. *Système d'acquisition robuste et de faible coût pour mesurer les vibrations dans un environnement sévère*. In Colloque Bruit et vibration au travail (2-4 mars, 2011, Paris, France), 2011, 6 p.

MARCOTTE P., ADEWUSI S., RAKHEJA S. *Development of a low-cost system to evaluate coupling forces on real power tool handles*. In Proceedings of the Twelfth International Conference on Hand-Arm Vibration / Douzième congrès international sur les vibrations mains-bras (12th: June 13-17, 2011, Ottawa, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 2, 2011, p. 36-37.

MARTIN J., BEAUPARLANT M., LESAGE J., VAN TRA H. *Development of an analysis method for quantification of a-Quartz in complex matrices by x-ray diffraction combined with the rietveld method*. In Congrès canadien de chimie et exposition / CSC 2011 (94e : 5-9 juin, 2011, Montréal, Canada), 2011.

NÉLISSE H., LAROCHE C., GIGUÈRE C., BOUTIN J., VAILLANCOURT V., LAFERRIÈRE P. *Comparison of different vehicle backup-alarm types with regards to worker safety*. In Proceedings of the 10th International Congress on Noise as a Public Health Problem / IC BEN 2011 (10th: July 24-28, 2011, London, UK), 2011.

NOËL A., MAGHNI K., CLOUTIER Y., DION C., TARDIF R., TRUCHON G. *Influence of the agglomeration state on in vivo pulmonary inflammation and cytotoxicity of inhaled nano-aerosols of TiO₂*. In Annual Meeting of the Society of Toxicology (50 th: March 6-10, 2011, Washington, USA), 2011.

OSTIGUY C. *De l'évaluation à la communication du risque relié aux nanoparticules en milieu de travail : défis et opportunités*. In Les entretiens Jacques-Cartier 2011 (3 octobre, 2011, Montréal, Canada), 2011.

OSTIGUY C., RIEDIKER M., TRIOLET J., TROISFONTAINES P., VERNEZ D., THIERIET N., BOURDEL G. *Development of a control banding tool adapted to nanomaterials*. In Occupational and Environmental Health: International Symposium on Nanotechnology (5th: August 9-12, 2011, Boston, USA), 2011.

OUELLET S. *Développement des compétences professionnelles et prévention des TMS : apport de l'ergonomie dans le développement d'un outil de formation*. In 46e Congrès de la Société d'ergonomie de langue française / SELF, (46e : 14-16 septembre, 2011, Paris, France), 2011.

PEIGNIER I., DE MARCELLIS-WARIN N. *Risk related to the transportation of hazardous materials: a decision-making tool for selecting a carrier*. In Society for Risk Analysis Annual Meeting / SRA 2011 (December 4-7, 2011, Charleston, USA), 2011.

PEIGNIER I., DE MARCELLIS-WARIN N., TRÉPANIÉRIER M. *Portrait des pratiques organisationnelles de sécurité des transporteurs routiers de matières dangereuses au Québec*. In 9e Congrès international de génie industriel / CI GI 2011 (9e : 12-14 octobre, 2011, Saint-Sauveur, Canada), 2011.

PEIGNIER I., DE MARCELLIS-WARIN N. *Gestion des risques reliés au transport de matières dangereuses au Québec : un outil d'aide à la décision pour le choix des transporteurs*. In 46th Annual Conference of the Canadian Transportation Research Forum / CTRF 2011 (46 th: May 29-June 1, 2011, Gatineau, Canada), 2011.

PLAMONDON A., BELLEFEUILLE S., LARIVIÈRE C., DELISLE A., DENIS D., SALAZAR E., GAGNON D., ST-VINCENT M., NASTASIA I. *Comparison between expert and novice workers in a transfer of boxes from one pallet to another*. In International Society of Biomechanics: ISB2011 (23rd: July 3-7, 2011, Brussels, Belgium), 2011, p. 34.

RIEDIKER M., OSTIGUY C., TRIOLET J., TROISFONTAINES P., VERNEZ D., BOURDEL G., THIERIET N., CADÈNE A., DAGUET I. *Development of a control banding tool adapted to nanomaterials*. In Risks associated to Nanoparticles and Nanomaterials: INRS Occupational Health Research Conference 2011 (April 5-7, 2011, Nancy, France), 2011.

SAUVÉ J.-F., BEAUDRY C., BÉGIN D., DION C., GÉRIN M., LAVOUÉ J. *Statistical modeling of crystalline silica exposure in the construction industry using a database compiled from the literature*. In Conference on Epidemiology in Occupational Health / EPICOH (22nd: September 6-9, 2011, Oxford, UK), 2011.

SOLEIMANI KARIMABAD A., HAGHIGHAT F., BAHLOUL A. *Contaminant distribution and thermal stratification in perimeter zones equipped with UFAD system*. In 12th International Conference on Air Distribution in Rooms: ROOMVENT 2011 (12th: June 19-22, 2011, Trondheim Norway), 2011.

STATHOPOULOS T., CHAVEZ M., BAHLOUL A. *CFD approaches to predicting dilution from exhaust stacks in urban areas*. In ASHRAE Annual Conference (June 25-29, 2011, Montréal Canada), 2011.

ST-VINCENT M. *L'inspection du travail au Québec : parfois un levier pour la prévention des TMS*. In 3e Congrès francophone sur les troubles musculosquelettiques (3e : 24-28 mai, 2011, Grenoble, France), 2011.

TOULOUSE G., ST-ARNAUD L., DUHALDE D., COMTOIS A.-S., DELISLE A. *Approche ergonomique des risques psychosociaux associés aux TMS : l'étude de la charge émotionnelle des préposés au service d'urgence de la sécurité publique*. In 3e Congrès francophone sur les troubles musculosquelettiques, (3e : 24-28 mai, 2011, Grenoble, France), 2011.

TRUCHON M., SCHMOUTH M. E., FILLION L., MOFFET H., NASTASIA I., BÜLTMANN U. *Effect of an early screening and systematic referencing program on long-term disability and the well-being of workers after a case of common lower back pain: study protocol*. In Musculoskeletal Disorders & Chronic Pain Conference: Evidence-based approaches for clinical care, disability prevention and claims management (February 10-12, 2011, Los Angeles, USA), 2011.

TURCOT A., FORTIER M., DUMITERSCU M. D. *Hypothenar hammer syndrome: an underdiagnosed cause in workers exposed to hand-arm vibration*. In Proceedings of the Twelfth International Conference on Hand-Arm Vibration / Douzième congrès international sur les vibrations mains-bras (12th: June 13-17, 2011, Ottawa, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 2, 2011, p. 22-23.

VIALLET G., SGARD F., LAVILLE F. *Development of a simplified axis-symmetric finite element model of the auditory canal occluded by an earplug: variability of the attenuation as a function of the input parameters*. In Proceedings of the Acoustics Week in Canada (October 12-14, 2011, Québec, Canada), Canadian Acoustics / Acoustique canadienne, vol. 39, no 3, 2011, p. 100-101.

VINCHES L., DOLEZ P., VU-KHANH T. *Study of the penetration of TiO₂ nanoparticles through nitrile and butyl rubber protective gloves*. In International Conference on Nanotechnology / ICNFA 2011 (2nd: July 27-29, 2011, Ottawa, Canada), 2011.

ZHANG C., HAMMAD A., BENTAHAR J. *Multi-agent-based approach for real-time collision avoidance and path re-planning on construction sites*. In International Symposium on Automation and Robotics in Construction (28 th: June 29-July 2, 2011, Seoul, Korea), 2011.

MASTER'S THESES AND DOCTORAL DISSERTATIONS

BURLET-VIENNEY D. *Développement de connaissances sur la pratique et les spécificités du cadenassage dans le secteur des affaires municipales*, Mémoire, Montréal, École polytechnique de Montréal, 2011, 152 p.

BOOK CHAPTERS

DURAND M.-J., BRIAND C. *Interventions /programmes de retour au travail destinés aux travailleurs ayant un trouble mental transitoire*. In Du trouble mental à l'incapacité au travail : une perspective transdisciplinaire qui vise à mieux saisir cette problématique et à offrir des pistes d'interventions, Corbière, M., Durand, M.-J. (éds), Québec, Presses de l'Université du Québec, 2011.

GRÉGOIRE M.-C., LEDUC F., BOISSONNEAULT G. *Spermiogenesis in Sperm Genetic Integrity*. In Sperm chromatin: biological and clinical application in male infertility and assisted reproduction, Zini, A., Argawa, A. (éds), Springer, 2011, chapter 21.

LAVOIE J., MOQUIN S., TRUDEL M., LAJOIE A., LAMBERT N., GUERTIN S., VINCENT P. *Grille d'auto-évaluation des risques à la santé et à la sécurité du travail dans les centres de tri de matières recyclables*. In La dynamique du transfert des connaissances. Perspectives centrées sur l'usager, Desmarais, L., Lortie, M. (éds), Québec, Presses de l'Université Laval, 2011, p. 79-95, (Collection Santé et sécurité du travail).

SONGMENE V., KHETTABI R., ZAGHBANI I., KOUAM J., DJEBARA A. *Machining and machinability of aluminum alloys*. In Aluminium Alloys, Theory and Applications, Kvackaj, T. (ed), INTECH, 2011, p. 377-400.

ST-ARNAUD L., BRIAND C., DURAND M.-J., CORBIÈRE M., PELLETIER M., KEDL E. *The best practices for managing return to work following mental health problems at work*. In Occupational Health and Safety, Burke, R. J. Clarke, S., Cooper, C. L. (eds), England, Gower Publishing Ltd, 2011, p. 343-358.

TRÉPANIÉRIER J., DESMARAIS L., GIRAUD L., BÉLANGER J. *Évaluation des impacts du guide de sécurité sur les convoyeurs à courroie : un portrait de son utilisation par les gens du milieu*. In La dynamique du transfert des connaissances. Perspectives centrées sur l'usager, Desmarais, L., Lortie, M. (éds), Québec, Presses de l'Université Laval, 2011, p. 45-74, (Collection Santé et sécurité du travail).

MISSION

To contribute, through research, to the prevention of industrial accidents and occupational diseases, and to the rehabilitation of affected workers.

To disseminate knowledge and serve as a scientific reference centre and expert.

To provide the laboratory services and expertise required to support the public occupational health and safety prevention network.

To fulfill this mission, the IRSST:

Carries out and funds research in its priority fields

Supports the development of research and new knowledge in occupational health and safety, in collaboration with the scientific community

Disseminates and promotes knowledge generated through research, in both the workplace and scientific communities

Plays a leadership and coordination role, anticipates emerging needs and serves as a driving force for occupational health and safety research

Contributes to researcher training in occupational health and safety

Provides laboratory services to the CSST and its network

Contributes to the development of standards and regulations governing occupational health and safety

Responds to ad hoc requests for specific expertise originating from various occupational health and safety stakeholders

VISION

Through its leadership in occupational health and safety research, the IRSST seeks:

To consolidate its role as a reference centre vital to the operations and strategies of the CSST and its network

To be used by all its partners in a spirit of joint collaboration

To win recognition at the national and international levels

To derive maximum benefit from a well-established network of research and development collaborators

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