2018 ACTIVITY REPORT

SCIENCE IN



Institut de recherche Robert-Sauvé en santé et en sécurité du travail

DECLARATION OF DATA RELIABILITY

I declare that I have every reason to believe that the observable facts and measurable data presented in this activity report accurately reflect the situation as at December 31, 2018. This information 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 relating thereto. The indicators retained are developed using reliable and accurate data that allow us to assess the IRSST's production over the course of the year. Recommended by the members of the Institute's Scientific Advisory Board and approved by the Board of Directors, this 2018 activity report faithfully describes the Institute's mission, vision, and principal achievements.

Taris

Marie Larue President and CEO

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THE FIRST YEAR OF

MESSAGE FROM THE PRESIDENT AND CEO

Looking back on our activities in 2018, I see that the year unfolded with great momentum. In addition to initiating the actions set out in its 2018-2022 Five-Year Scientific and Technical Production Plan, the IRSST analyzed and implemented the recommendations made by the external institutional evaluation committee for the 2011-2015 five-year period.

In its report, the committee underscored the Institute's strengths in the area of knowledge dissemination and transfer, as well as its solid international reputation. It also cited its well-structured research and issued recommendations regarding governance and administrative operations.

Recommendations have already been put forward regarding ways to ensure the competitiveness of the IRSST's scholarship and fellowship program and the training of a new generation of scientists in the field of occupational health and safety (OHS) in Québec. Working committees have been set up to explore ways to act on other recommendations.

THE CHALLENGES

Since 2015, we have been witnessing an increase in the number of work-related accidents in Québec, an increase not solely attributable to the growth in the labour force, but to other factors as well. The number of reported occupational diseases is also trending upward and requires our attention. Against this backdrop, the IRSST's mission of contributing, through research, to the prevention of employment injuries and to injured worker rehabilitation therefore remains highly pertinent.

Beyond helping to prevent these injuries, one of the challenges we face is that of supporting decision making about possible causality links between working conditions and the onset of certain occupational diseases. While in the future a number of grey zones will inevitably appear on the scientific level, insurance plans continue to apply absolute criteria for accepting or rejecting claims. Dialogue will undoubtedly follow in order to establish criteria for supporting decision making in this field, and above all, to prevent the onset of such diseases.

In addition to carrying out its five-year plan, the IRSST must respond to critical or urgent requests from the Québec occupational health and safety network, often regarding complex problems. In 2018, for instance, the Institute produced two important reports in this context, one on the development of occupational hearing loss and presbycusis, and the other on the potential link between the occupation of firefighter and the development of certain cancers.

Regarding capital property, for the first time in the IRSST's history, the budget for purchasing equipment dedicated to research was allocated for the full duration of its five-year plan. This will facilitate the execution of long-term projects, such as setting up a new collaborative robotics laboratory.

PREPARING FOR THE FUTURE

To anticipate the emergence of new OHS issues and preserve the Institute's relevance, the IRSST must remain focused on the needs of workplaces and its partners. Its succession plan must equip it to meet this challenge on both the administrative and scientific levels, and to have in place the personnel needed to fulfil its mandates. I am personally very involved in the process of welcoming new managers to our midst, a process facilitated by a knowledge transfer plan resulting from collaboration between an HEC Montréal team and IRSST managers. I would like to take this opportunity to personally thank **Louis Lazure**, a retired senior executive of the IRSST, for his exemplary involvement in this matter and in the Institute's mission.

TARGETING A CRITICAL MASS

Lastly, the IRSST collaborates with a number of other research centres. Its researchers willingly put their heads together with other colleagues from the scientific community to produce more research results for our workplaces, while maintaining the highest neutrality. I would like to underscore this deep conviction that collaborating with other, similar institutions is an absolute necessity for the IRSST, given its size relative to the substantial needs of Québec's population of workers and employers. Collaborating with national and international partners makes it easier for us to achieve a critical mass of research, to obtain evidence-based results faster, and to expand our research to address as many areas as possible.

In closing, my commitment to you is this: every effort will be made and pooled with those of our research and workplace partners to maximize the results of our studies, while we continue to pursue our mission with diligence and enthusiasm.

Marie de

THE AGE OF COLLABORATION

Kannan Krishnan, Chief Scientific Officer

MESSAGE FROM THE CHIEF SCIENTIFIC DIRECTOR

I took up my post as the IRSST's chief scientific officer during the first year of implementation of the Institute's 2018-2022 Five-Year Scientific and Technical Production Plan. This plan maps out the research efforts needed over the next few years in each of our priority research fields.

Coming from the university community, where fundamental research prevails, I was drawn by the IRSST's mission, its applied research, and its solid equal-representation network of social partners (employers and unions). I hope to apply this unique formula to help expand the Institute's scientific reach and influence, as its priorities align with the issues targeted by other research institutes around the world.

The year 2018 laid the groundwork for turning our new five-year plan into concrete action. The rollout of the plan is based largely on a strategy of interdisciplinarity that encourages researchers with varying specialties to become involved in the same project. This approach provides greater insight into the complexity of research subjects in the area of occupational health and safety (OHS) and allows us to obtain more comprehensive results.

THE KEY TOPICS OF 2018

The program on the principles of material handling, a field in which we have invested many years of research, took major strides forward with the publication of two research reports and the beginning of knowledge transfer to workplaces.

In keeping with the spirit of our interdisciplinary strategy, we conducted several other studies as well – notably on the most frequently used pesticides in Québec – in order to identify the prevention needs of companies that engage in intensive spraying of pesticides. We also conducted a state-of-the-art of Industry 4.0 and OHS, which in turn sparked in-depth reflection and helped orient future research activities. In addition, the year was marked by a review of the IRSST's activities in the area of vibration and by the adoption of a new thematic program on suspension seats.

ATTRACTING THE NEXT GENERATION

It is vital that we groom the next generation and maintain a critical mass of OHS researchers if we are to ensure that what we produce continues to embody innovation. Currently, we have three doctoral candidates/aspiring researchers in our ranks, as well as several new human resources in our laboratories.

Apart from our grant and scholarship programs, targeted initiatives support our efforts to attract new researchers. For example, a partnership with REPAR, the Réseau provincial de recherche en adaptation-réadaptation (or provincial adaptation-rehabilitation research network) supports three new teams in the occupational rehabilitation field. Another example is the agreement we renewed this year with the Fonds de recherche du Québec (FRQ), which enables us to award OHS career scholarships. Lastly, there are the Prix ACFAS-IRSST, which recognize the excellent OHS research conducted by young university students, and the IRSST/Ambassadors' Club Joint Award, which supports researchers' efforts to attract international OHS conferences to Montreal.

TACKLING COMPLEXITY TOGETHER

The first year of the five-year plan is now behind us, and I believe we are well on the way to achieving our goals. This plan also encourages adaptation to ever-changing realities. One such reality is the cohabitation of diverse populations in the workplace (aging workers, young workers, increasing numbers of women, and immigrant workers), a point raised at our institutional colloquium in 2018. This complex theme poses challenges in terms of research, but also due to the need to produce tools that will make it easier for practitioners in the workplace to ensure the smooth integration of these various workers. Our interdisciplinary approach takes on its full meaning in this context of diversity.

The motto I have adopted for the years ahead is therefore "synergy and knowledge sharing." It reflects the attitude essential for our research efforts to bear fruit and to further enhance the IRSST's reputation on the national and international stages.

2018 IN NUMBERS

RESEARCH AND EXPERTISE

151 active projects and activities

- **42** projects under development
- 31 projects began
- (18 joint, 7 external, and 6 internal)
- **30** projects completed
- 48 projects in progress

35

external committees included at least one IRSST representative: **9** committees of the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) and its network, **13** national and international standards committees, **13** other local, national, and international committees

128 requests for expertise

92

projects or activities were assisted by a follow-up committee throughout their development and implementation, right through to the dissemination and transfer of the research results.

174 partner organizations,

represented by **362** people, were involved in these committees.

193 external res

external researchers from **26** universities **20** research centres, and **2** college centres for the transfer of technology (CCTTs) formed part of the IRSST's network of scientific collaborators.

OUR LABORATORIES

6

new methods were published as a result of the redistribution of efforts to develop analytical methods. A total of **43,279** environmental, toxicological, and microbiological analyses were also performed in response to our clients' requests.

8,770

hours were devoted to calibrating, maintaining, and repairing direct-reading and sampling instruments, including 81% for the OHS and inspection-prevention network. This represents a similar output to that of the previous year.

DISSEMINATION AND KNOWLEDGE TRANSFER

87 IRSST-produced materials

- 30 research reports, including 24 in French and 6 in English
- 12 guides and technical and awareness-raising tools, including 6 in French,
 5 in English, and 1 in Spanish
- 45 videos (lectures and news reports)

81

26

other presentations given by IRSST personnel or IRSST-funded researchers at scientific conferences or events organized by partners.

63

scientific publications related to projects carried out or funded by the IRSST:

53 peer-reviewed journal articles

- **5** peer-reviewed articles published in conference proceedings
- **5** other publications (book chapters)

28

simplified articles

+ **18** news briefs published in the Actualités column of Prévention au travail, the magazine produced jointly by the CNESST and the IRSST

559,172 sessions on the IRSST's Web sites 59,106 viewings of IRSST-produced videos 735,667 unique downloads of publications posted on the IRSST's Web sites

6,089 subscribers to InfoIRSST, the IRSST's electronic newsletter

15,270 subscribers to the IRSST's various social networks

SCHOLARSHIPS AND FELLOWSHIPS

graduate studies scholarships and postdoctoral fellowships were awarded to master's, doctoral, and post-doctoral candidates whose research programs dealt specifically with the prevention of industrial accidents and occupational diseases or the rehabilitation of affected workers.

RESEARCH

Every year, the IRSST's scientists and the external researchers whose work it funds conduct studies and publish results that contribute to the advancement of knowledge in the area of industrial accident prevention and the rehabilitation of affected workers.

Denys Denis and André Plamondon, researchers

IN 2018, **151 ACTIVITIES AND PROJECTS** WERE ACTIVE. OF THIS NUMBER, **30 WERE COMPLETED**. HERE ARE SOME EXAMPLES OF THE MOST IMPORTANT ACTIVITIES.

PESTICIDES AND AGRICULTURE

Agriculture is an essential sector of the Québec economy, employing many workers who may be exposed to pesticides one day or another, and in some cases, repetitively. For a number of years now, the IRSST has been conducting research on chemical and biological contaminants in the agricultural sector.

- In 2018, the study on the use of personal protective equipment by apple growers bore fruit with the publication titled <u>Prévention</u> <u>de l'exposition cutanée aux pesticides chez les producteurs</u> <u>de pommes et facteurs influençant le port des vêtements de</u> <u>protection</u> [Preventing skin exposure to pesticides among apple growers and factors affecting use of protective clothing]. The principal author, **Danièle Champoux** of the IRSST, points out the frequent occasions when micro-exposure occurs during their activities, as well as the factors facilitating or hindering their use of protective clothing.
- Based on, among other things, the results of a study led by Ludovic Tuduri, an IRSST researcher, the knowledge transfer tool titled <u>Pesticides – Safe practices and personal protective</u> <u>equipment (PPE)</u> was launched in January 2018 at the Colloque des partenaires de la santé et de la sécurité en agriculture organized by the Union des producteurs agricoles (UPA). Responding to a request from Québec's Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), this tool constitutes a first for the Institute as it was published in three languages – French, English, and Spanish – in an effort to reach all populations likely to be affected by the problem of personal protection. Four thousand copies of the document were given to the UPA for distribution at events geared to agricultural advisors and producers.

MANUAL MATERIAL HANDLING AND TRAINING

Available data indicate that approximately 50% of all cases of musculoskeletal disorders (MSDs) accepted by the CNESST are associated with manual material handling, which explains the IRSST's interest in researching this topic. Three reports came out in 2018, attesting to the advances made in this area.

- The title of one of these reports, whose principal author is IRSST researcher **Denys Denis**, summarizes the problem well: <u>Pour quelles raisons la formation aux techniques sécuritaires de manutention ne fonctionne-t-elle pas ?</u> [Ineffectiveness of training for manual material handlers]. It found that the standard training given, which focuses on the "straight back, bent knees" technique, does not appear to achieve its preventive mission. The researcher proposes an alternative solution dubbed the "integrated prevention strategy for manual handling" (IPSMH). This strategy is based on nine action principles inspired by the techniques that material handlers use naturally.
- Building on this progress, in <u>Appropriation et</u> <u>transfert par des formateurs d'une nouvelle</u> <u>approche de prévention en manutention axée</u> <u>sur l'utilisation de principes d'action</u> [OHS practitioner appropriation and teaching of a new prevention approach based on movement principles for manual material handlers], **Denys Denis**' team paints a picture of how this new approach is adopted in the work context. It appears that the IPSMH is appreciated and used, despite persistent gaps associated with the particular nature of each workplace.
- For its part, the team of André Plamondon of the IRSST presented an inertial measurement system validated in both the laboratory and the field, in the publication titled <u>Développement</u> <u>d'un système de mesures et d'un protocole de</u> <u>mesures permettant de quantifier l'exposition</u> <u>physique des manutentionnaires</u> [Measurement system and protocol for quantifying physical exposure of material handlers]. By measuring material handlers' movements and then recreating the movements in 3D, this system quantifies awkward postures and loading on the back.

SAFE INTEGRATION INTO THE WORKPLACE

This theme had two components in 2018: young people's exposure to occupational health and safety (OHS) risks during practicums in work-oriented training paths and the arrival of new workers in the wood product manufacturing sector.

- Youth in Québec are entering the labour market at increasingly young ages and the number of student workers is on the rise, notably those enrolling in the Work-Oriented Training Path (WOTP) program. These students are required to do practicums to develop employability skills under the supervision of teachers who are responsible for ensuring their health and safety in many different work contexts. The Trousse d'outils pour le personnel enseignant superviseur de stage du Parcours de formation axée sur l'emploi [Toolkit for teachers supervising practicums in the work-oriented training path (WOTP) program] published under the direction of Marie Laberge, professor and researcher at Université de Montréal's School of Rehabilitation and at the Research Centre of the Sainte-Justine University Hospital, is specifically designed to help teachers identify the main types of OHS risks for these young people and to choose appropriate practicum situations.
- In the wood product manufacturing sector, the shortage of human resources, workforce turnover, versatility requirement, and occupational health and safety risks make the integration of new workers a significant challenge. To help companies in this sector improve their integration processes, Élise Ledoux, leader of the Institute's Sustainable Prevention and Work Environment

research field, produced the tool titled <u>Intégration</u> <u>sécuritaire des nouveaux</u> <u>travailleurs dans les</u> <u>entreprises de la trans-</u> <u>formation du bois — Outil</u> <u>d'autodiagnostic</u> [Safe integration of new workers in the wood product manufacturing sector — Self-diagnostic tool].

REHABILITATION

Research into occupational rehabilitation helps prevent or reduce the risks of long-term disability in workers who have sustained an occupational injury. The best scientific evidence indicates that it supports their sustainable and safe return to work through the study of individual, organizational, administrative, and healthcare-related factors that facilitate or hinder a smooth process.

- The team of Marie-José Durand, a researcher and professor at Université de Sherbrooke, conducted a study to validate the psychometric properties of the Work Disability Diagnosis Interview (WoDDI). Two versions of the instrument were validated, one adapted to musculoskeletal disorders (MSDs) and the other, to common mental disorders (CMDs). The research work also made it possible to simplify the instrument to make it more user-friendly and less timeconsuming to administer.
- For its part, the team of **Christian Larivière**, an IRSST researcher, carried out a laboratory study of the immediate effects of wearing flexible lumbar support belts. In its report titled <u>Effets</u> *psychologiques et biomécaniques immédiats de deux catégories de ceintures lombaires chez des travailleurs en santé et des travailleurs avec maux de dos* [Immediate psychological and biomechanical effects of lumbar support belts on healthy workers and workers with backache], the team found that the fact of wearing this equipment could reassure workers with backache and that the mechanical effects would clearly make this a safe practice, thus facilitating their return to work or ability to stay at work.

MACHINE SAFETY

Every year, machines used in the workplace cause serious, sometimes fatal, accidents. The research conducted at the IRSST on this topic seeks to offer OHS practitioners in these workplaces tools for better assessing the risks or finding appropriate prevention solutions.

- Most of the accidents associated with the maintenance of mobile equipment in Québec could be avoided if an energy control procedure were applied, such as lockout or some other method. Unfortunately, mobile equipment is rarely taken into account in these procedures. Seeking to fill this gap, the team under IRSST researcher Damien Burley-Vienney produced a document titled Mobile Equipment Energy Control Process (Lockout and Other Methods) to facilitate the development of an energy control procedure for such equipment by workplaces.
 - Barthélemy Aucourt, a research associate, together with Yuvin Chinniah, a full professor at Polytechnique Montréal, and with the IRSST's support, published the document titled <u>Machine</u> <u>Safety and Reduced-Energy Operating Mode</u> – <u>Determining Safe Values</u>, which enables users to choose a reduced-energy value (e.g., speed, pressure) that will ensure safe interventions, regardless of whether a protective device has been removed or neutralized.

BIOLOGICAL HAZARDS RELATED TO WASTE MANAGEMENT

In the fight against climate change, waste collection and management create major OHS issues. The transformation of putrescible organic matter intended for farm fertilization was therefore the focus of a study on the biological and chemical hazards that could impact the health of workers in this sector.

A team led by **Jacques Lavoie** of the IRSST revealed, in the document titled <u>Exposition des travail-</u> <u>leurs aux substances chimiques et aux agents</u> <u>biologiques dans les usines de biométhanisation</u> <u>des matières organiques putrescibles: Évaluation</u> <u>exploratoire</u> [An exploratory assessment of occupational exposure to chemicals and biological agents in biomethanation plants for putrescible organic matter], that these workers face biological, not chemical risks.

MSDs AND HOSPITALS

Nursing staff face a major challenge when they try to implement preventive practices aimed at avoiding musculoskeletal disorders (MSDs). This was one of the key findings of the team headed by **Saliha Ziam**, of Université TÉLUQ, in her IRSST-funded study. The conclusions of this study were reiterated in an article published in the magazine <u>Prévention au travail</u>.

Various strategies were therefore used to publicize the awareness-raising document titled Nursing Staff and Musculoskeletal Disorders

 How to Promote the Application of Preventive Practices in the Workplace among managers, preventionists, and trainers in the healthcare network (e.g., through webinars and the IRSST stand at the annual congress of the Ordre des infirmières et infirmiers du Québec).

IMPLEMENTATION AND SAFE USE OF COLLABORATIVE ROBOTICS

Contrary to the principles of classical robotics, which isolates robots from humans, collaborative robotics (or cobotics) allows human-robot contact under certain conditions. However, when new "collaborative" robots are developed, it is essential to ensure that they pose no danger to worker safety.

As anticipated in the capital budget allocated for research and granted by the Board of Directors for the duration of the five-year plan, Sabrina Jocelyn and her colleagues at the IRSST set up a collaborative robotics laboratory thanks to the purchase of two robots.

In addition to producing the scientific knowledge inherent to carrying out its mission, the IRSST is called upon to play a role as a scientific reference centre and expert for its partners and various occupational health and safety practitioners. Its services are solicited on a regular basis due to the expertise it has acquired over the years and that of its external collaborator network.

cosmos

IN 2018, THE IRSST PUBLISHED TWO MAJOR **REPORTS** RESULTING FROM SUCH REQUESTS FOR ITS EXPERTISE.

Review of the Literature on the Links between Occupational Hearing Loss and Presbyacusis

Authored by **Tony Leroux**, a full professor at the School of Speech Language Pathology and Audiology and vice-dean of Health Sciences at Université de Montréal, the <u>Review of the</u> Literature on the Links between Occupational Hearing Loss and Presbyacusis examined the potential relationship between occupational hearing loss and presbyacusis, or hearing loss

Epidemiological Literature Review on the Risk of Cancer Among Firefighters

Associations were established between the occupation of firefighter and the development of certain cancers. However, there is still insufficient epidemiological data to confirm or refute the association with other cancers. Such was the finding of the Epidemiological Literature Review on the Risk of Cancer Among *Firefighters* carried out by the risk assessment consultant **Paul G. Brantom** et al. This literature review complements that of the International Agency for Research on Cancer (IARC-CIRC)

OUR LABORATORIES

While responding to requests for analyses received from the CNESST and its network, the staff of the IRSST's laboratories also take part every year in research projects that would be unfeasible for the requestor without their contribution and industrial hygiene expertise. The year 2018 was no exception, with the laboratories participating in a dozen or so research projects and scientific activities that required implementing or developing new analytical methods.

Audrey Bernèche-D'Amours, scientific professional

MOREOVER, SEVEN OF THE 26 ACTIVITIES UNDER WAY IN THE LABORATORIES BEGAN IN 2018 AND THREE ACCREDITATIONS WERE RENEWED.

NEW ACTIVITIES

- Updating the GC-MS method for detecting an aldehyde series in ambient air (MA-385).
- Performing a technical assessment and purchasing a MALDI-TOF microbial identification system (Vitek® MS from bioMérieux); this system will automate and accelerate the microbial identification step in the laboratory.
- Characterizing new asbestos fibre samples (up to 80 slides per sample) to increase the bank of real samples needed for the program of recognition that confirms the efficiency of the laboratories' Fibre Counting Quality Control program (CQ Fibres), in which more than 250 fibre counters participate.
- Designing an interface that generates calibration reports for sound level meters with measurements taken from the new Bruel & Kjaer calibration system and from the anechoic chamber.
- Developing a method for analyzing asbestos in soils.
- Replacing the Institute's toxicological instrument inventory, which requires updating the methods for measuring blood lead, carboxyhemoglobin, solvent, and urinary solvent metabolite levels.
- Validating and service updating of the analytical method for amine detection in air (MA-363) following the purchase of new equipment (LC-MS).

RENEWAL OF ACCREDITATIONS

- The IRSST's calibration laboratories were assessed – during the process of renewing their accreditation for the Calibration Laboratory Assessment Service (CLAS) program of the National Research Council of Canada (NRC) – with regard to their current scope and current expansion to include the calibration of flow meters.
- The Institute's laboratory for analyzing asbestos in non-friable materials by means of transmission electron microscopy was also assessed and earned accreditation from the Environmental Laboratory Approval Program (ELAP) of the New York State Department of Health (NYSDOH).
- The Institute's laboratories also prepared for renewal of their accreditations regarding industrial hygiene and environmental microbiology under the American Industrial Hygiene Association – Laboratory Accreditation Programs (AIHA-LAP). The assessment visit is scheduled to take place during the first quarter of 2019.

ACCESSIBILITY

IT changes were made to improve the ClicLab portal used to enter requests for material sampling, instrument loans, and servicing in order to facilitate access for the laboratories' entire clientele. An English version of the portal and various English reports were also produced to improve the service offer.

Sabrina Jocelyn and Damien Burlet-Vienney, researchers

THE NEW GENERATION IN OHS

The IRSST uses every means at its disposal to motivate a competent and creative new generation to opt for a career in OHS. In addition to welcoming students, trainees, and collaborators to its ranks, in 2018, it therefore awarded funds to 26 students through its graduate studies scholarship and postdoctoral fellowship program.

D

THE INSTITUTE AWARDS A NUMBER OF SCHOLARSHIPS IN PARTNERSHIP WITH OTHER ORGANIZATIONS PURSUIN SIMILAR MISSIONS TO ITS OWN. AN AGREEMENT SIGNED IN 2018 THUS LAID THE GROUNDWORK FOR THREE CAREER SCHOLARSHIPS (JUNIOR 1 LEVEL) IN OCCUPATIONAL HEALTH AND SAFETY FOR A FOUR-YEAR PERIOD, TO BE OFFERED JOINTLY WITH THE FONDS DE RECHERCHE DU QUÉBEC (FRQ) IN 2019.

> Institut de recherche Robert-Sauvé en santé et en sécurité du travail

> > The key to your scientific achievement

ENHANCEMENT OF THE IRSST'S SCHOLARSHIP AND FELLOWSHIP PROGRAM

Heeding a recommendation made by the external institutional evaluation committee, in 2018 the IRSST undertook to enhance its Graduate Studies Scholarship and Postdoctoral Fellowship Program to remain competitive with the FRQ program. The annual amount of the awards is now set at \$16,625 for master'slevel students and as much as \$55,000 for postdoctoral work outside Québec. These awards offer up to eight months of paid parental leave and now cover a period of four years instead of three for doctoral work, and three years instead of two for postdoctoral work. (See the list of recipients of IRSST scholarships and fellowships on page 26.)

ACFAS-IRSST AWARDS

Again this year, the IRSST partnered with the Association francophone pour le savoir (ACFAS) to hand out two awards designed to promote the next generation of scientists and underscore the outstanding university results obtained by a specially selected master's student and doctoral student.

Hamza Mbrechi, Kannan Krisnan, Astrid Sanchez-Velasquez -Prix Acfas-IRSST – Santé et sécurité du travail

- The Prix Acfas-IRSST Santé et sécurité du travail – Maîtrise wasawarded to Astrid Velasquez-Sanchez, a student in the master's program in health sciences at Université de Sherbrooke. Her focus is on factors which, in the Québec context, hinder the return to work of aging workers 50 years of age or older who are affected by a common mental disorder.
- The Prix Acfas-IRSST Santé et sécurité du travail – Doctorat went to Hamza Mbareche, a doctoral student in biochemistry, microbiology, and bioinformatics at Université Laval. Mr. Mbareche uses DNA sequencing technologies to identify all fungal and mould strains found in a work environment. His research will help better characterize their effects on workers' health.

MITACS-INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT CANADA COFUNDING

vw.acfa

Thanks to programs that promote partnerships fostering industrial and social innovation in Canada, four IRSST projects obtained Mitacs funding:

 Design of artificial ears for the purpose of studying noise mitigation and the occlusion effect of ear plugs, using MRI imaging.

Principal investigator and internship supervisor: **Olivier Doutres**, École de technologie supérieure (ÉTS)

Work-related traffic accidents: what about pedestrian workers?

Principal investigator and internship supervisor: Marie-Soleil Cloutier, INRS – Centre Urbanisation Culture Société; internship supervisors: François Vachon, Université Laval and Nicolas Saulnier, Polytechnique Montréal

Development of a voice-based method for objective occlusion-effect measurement.
 Principal investigator: Hugues Nélisse, IRSST; internship supervisor: Olivier Doutres, ÉTS

 Development of a range of comfort indices for earplugs to improve hearing protection for workers.

Principal investigator and internship supervisor: **Franck Sgard**, IRSST; internship supervisors: Alain Berry, Jérémie Voix, Olivier Doutres and Philippe-Aubert Gauthier, ÉTS

Franck Sgard, IRSST

THE RECIPIENTS UNDER THE IRSST'S SCHOLARSHIP AND FELLOWSHIP PROGRAM

LEVEL	NAME OF RECIPIENT	TITLE OF PROJECT	
IRSST			
Postdoctoral	Delphine Bosson-Rieutort	Application of methods for analyzing mega data in order to evaluate occupational exposure to multiple chemical contaminants	
Postdoctoral	Antoine Muller	Development of a method for estimating physical exposure indicators based on kinetic variables obtained solely from inertial measurement sensors	
Université de l	Montréal		
Master's	Gabrielle Lebrun	Exploration of the organizational support offered to employees exposed to a potentially traumatic event: the needs of youth protection workers	
Doctoral	Josianne Lamothe	Adapting after a serious act of violence at work: exploration of the effects of victim gender, fear, and support	
Doctoral	Dunia Julienne Ouedraogo	Use of Bayesian statistics to improve interpretation of data on occupational exposure to chemical stressors	
Doctoral	Benjamin Michaud	Optimization of the daily rehearsal schedule of violinists through dynamic modelling of muscle fatigue in order to reduce joint injuries attributable to repetitive work	
Doctoral	Alexis Pinsonnault- Skvarenina	Cochlear synaptopathy in humans: the effects of noise exposure and aging	
Université de S	Sherbrooke		
Master's	Christian Longtin	Supporting the ability of workers with chronic low back pain to stay at work	
Master's	Justine Benoit-Piau	Risk factors for injury: a first step toward helping dancers stay at work	
Master's	Astrid Velasquez-Sanchez	Obstacles in the work environment that influence the return to work of aging workers on sick leave for a common mental disorder	
Doctoral	Laetitia Larouche	Exploratory study of the group affects, cognitions, and behaviours related to occupational violence among firefighters	

LEVEL	NAME OF RECIPIENT	TITLE OF THE PROJECT	
Université du	Québec à Montréal		
Doctoral	Laurent Corthésy-Blondin	Suicidal behaviours in ambulance technicians and paramedics: modelling and recommendations for prevention	
Doctoral	Maxime Fortin	Optimization of cognitive behavioural therapy for treating post-traumatic stress disorder	
Université Lav	val		
Master's	Karine Duquette-Lozeau	Health risks and microbiological quality of recycled manure litter in the dairy industry	
Master's	Andrée-Anne Lavigne	Study of the risks associated with fatigue linked to traffic accidents during surface operations at mining sites	
Master's	Isabelle Poitras	Development of a real-time feedback system for preventing musculoskeletal impairments in workers' upper extremities	
Doctoral	Ulysse Côté-Allard	Non-invasive guidance of a myoelectric hand pros- thesis using a dry electrode bracelet	
Doctoral	Marie-Ève Dubuis	Measurement and control of viral aerosols in workplaces	
Doctoral	Hamza Mbareche	Aeromycology: optimization of harvesting methods and new approach for studying diversity	
Doctoral	Marie-Maxime Robichaud	Coworkers, relational dynamics, and return-to-work process following occupational disability	
Doctoral	Jasmin Vallée-Marcotte	Analysis of the effects of a restricted foot space and the work pace on motor variability and mechanical loading	
Université Mc	Gill		
Master's	Catherine Paré Recipient of the Andrée-Bouchard scholarship	Psychosocial risk factors and comorbidity of mental health problems following work-related accidents	
Doctoral	Jeremy Olson	Automated system for reducing fatigue caused by shift work	
Doctoral	Esther Yakobov	The contribution of feelings of injustice and anger to the risk of high levels of pain and disability following musculoskeletal injury	
Postdoctoral	Ennouri Trikki	Resistance of heterogeneous protective materials to multiple stressors: simultaneous cut and puncture	
Postdoctoral	Zakir Uddin	Identifying the reasons why some patients with work-related back pain react sensitively to physical activity and do not respond to activity-based treatment	

THE HONOUR ROLL

A PRESTIGIOUS PUBLICATION

The Occupational and Public Health Specialty Section (OPHSS) of the Society of Toxicology (SOT) of the United States honoured **Kannan**

Krishnan, director of the IRSST's Scientific Division, with the prestigious *Paper of the Year Award for 2017* for an article he co-authored with his doctoral student **Sandrine F. Chebekoue**. Published in the journal *Toxicological Sciences* (vol. 160, pages 47-56), the article concerns thresholds for toxicological risks related to occupational exposure to organic contaminants.

AN INTERNATIONALLY RENOWNED BOOK

A new edition of the book *Casarett & Doull's Toxicology: The Basic Science of Poisons* came out in 2018. This collective work is recognized worldwide as the gold standard in toxicology matters concerning chemical contaminants. Of its 35 chapters, the seventh – titled "Toxicokinetics" – was written by the IRSST's chief scientific officer, Kannan Krishnan. The IRSST is delighted with the international

prestige and visibility afforded by this contribution to the 9th edition of *Casarett & Doull*, published by McGraw-Hill.

CONTRIBUTIONS APPLAUDED

At the 32nd Congress of the International Commission on Occupational Health (ICOH), the IRSST received an award for its commitment and contribution to this organization's activities. Our president and CEO, Marie Larue accepted the award in person, on behalf of the Institute. This congress is regarded as the largest international event devoted to occupational health and safety research.

The scientific journal Safety Science granted IRSST researcher **Sabrina Jocelyn** a *Certificate of Outstanding Contribution in Reviewing* in recognition of her contribution to the quality of this publication and her ranking among the top ten percentile of reviewers who assessed the largest number of articles in 2017 and 2018.

IRSST – AMBASSADEURS CLUB JOINT AWARD

Jérémie Voix, a professor and researcher at École de technologie supérieure (ÉTS), and Franck Sgard, a researcher at the IRSST and associate professor at the ÉTS and Université de Sherbrooke, are the first recipients of this award. The result of an agreement

between the IRSST and the Palais des congrès de Montréal, this award pays tribute to researchers' efforts to attract an international OHS congress to Montreal. It is the work done by these two IRSST researchers that is responsible for bringing the 26th International Congress on Sound and Vibration (ICSV26) to Montreal in 2019.

Jérémie Voix, professor and researcher, ÉTS, Franck Sgard, researcher, IRSST, Marie Larue, president and CEO, IRSST.

PRESENTATIONS HONOURED

Two scientists from the IRSST came away from the 41st Congress of the Association québécoise pour l'hygiène, la santé et la sécurité du travail (AQHSST) with one of the *Prix 3M* awarded for the best presentations.

Ludovic Tuduri, a researcher at the IRSST, received a scholarship for the quality of his lecture titled *Effect of Cutting Fluids on the Cut and Puncture Resistance of Protective Gloves*. Chantal Gauvin, also from the IRSST, Ennouri Trikki from McGill University, Phuong Nguyen Tri from Université de

Montréal, and Toan Vu Khan from École de technologie supérieure co-authored the presentation. Loïc Wingert, a student at École de technologie supérieure and postdoctoral fellow at the IRSST, was awarded a scholarship for his lecture in the Student category. It concerned a method for estimating, in workplaces, effective density for real-time sampling of ultrafine particles, using an ELPI+. His co-authors

were Yves Cloutier and Ludovic Tuduri from the IRSST, and Stéphane Hallé from École de technologie supérieure.

APPOINTMENTS

COMMITTEE MEMBERS

The IRSST's reputation as a scientific reference and expert in OHS is well established in the research community and workplaces. Various members of the Institute's personnel sit on 35 local, national, or international committees. In 2018, some of its staff members were invited to sit on three new committees.

Charles Gagné Director of the Communications and Knowledge Transfer Division. Member of the International Section of the International Social Security Association (ISSA) on Information for Prevention.

Chantal Gauvin Scientific professional. Member of the mirror committee of the Standards Council of Canada for ISO/TC 94/SC 13 "Protective Clothing."

Marie Larue President and CEO. Member of the national advisory committee of the 22nd World Congress on Safety and Health at Work 2020: A Global Forum for Prevention, to be held in Toronto in October 2020.

RESEARCH ETHICS COMMITTEE

Intent on providing clear guidelines for research projects and activities, the IRSST's Board of Directors nominated members to serve a three-year term on the ethics committee on research involving humans.

Martine Poulin, Coordinator, research ethics committee

HUMAN RESOURCES

The IRSST's most important resource is its personnel, who excel in disciplines such as chemistry, physics, engineering, ergonomics, industrial hygiene, psychology, sociology, anthropology, and demography. As at December 31, 2018, the Institute had 136 people on staff. Over two-thirds were scientific personnel, including 21 researchers, 46 professionals, and 27 technicians.

During the course of the year, the Institute hired 14 new regular employees and 14 other employees to fill temporary needs. Several positions were filled to offset a number of retirements and meet a variety of needs. The Institute also welcomed 23 trainees to its offices and laboratories – namely, bachelor's, master's, and doctoral or postdoctoral students – as well as 16 collaborators, several of whom were venturing into the OHS field for the first time.

Four team leaders were appointed in the Laboratory Division, as recommended by the external institutional evaluation committee.

True to its mission, the Institute endeavours to offer its staff a safe and healthy work environment. Its assessment rate at the CNESST was – again this year – lower than the unit rate charged to organizations operating in the same activity sector.

Also in 2018, the IRSST reported two industrial accidents or occupational diseases, but no first-aid interventions. Its occupational health and safety committee met eight times during the year.

The year 2018 saw the signing of a new collective agreement with Local 2957 of the Canadian Union of Public Employees (CUPE), which represents the Institute's personnel. This three-year work contract will remain in effect until June 8, 2021.

In addition, the IRSST carried out a salary relativity exercise.

RESEARCH PARTNERS

Through partnerships, the IRSST is able to increase its research capacity as well as its influence in scientific communities and the world of work. Partnerships also help expand the Institute's reach and impact on the local, national, and international stages. The parties involved share human, financial, and physical resources, thus gaining means they would not otherwise have had, particularly by drawing on their partners' expertise in areas where necessary resources are either non-existent or inadequate.

In 2018, 37 national or international collaborative agreements bound the IRSST to partners. These agreements are designed to strengthen research capacities and to facilitate the sharing of both expertise and human, physical, and financial resources.

QUÉBEC

- Association francophone pour le savoir (Acfas)
- Centre d'expertise en analyse environnementale du Québec (CEAEQ) of the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC)
- Centre intégré universitaire de santé et de services sociaux (CIUSSS) of the Est-de-l'Île-de-Montréal
- École de technologie supérieure (ÉTS) Laboratoire d'acoustique
- _ Institut de la statistique du Québec
- Fondation Lucie et André Chagnon
- _ Ministère de l'Éducation, du Loisir et du Sport
- Ministère de la Famille
- Fonds de recherche du Québec (FRQ)
- Groupe CTT
- The Montreal Chest Institute of the McGill University Health Centre (MUHC)
- _ IMMUNIT RIMOUSKILAB INC.
- INRS Institut Armand-Frappier

- Réseau provincial de recherche en adaptation-réadaptation (REPAR), thematic network supported by the Fonds de recherche du Québec
 Santé (FRQS)
- Société du Palais des congrès de Montréal
- Concordia University Research platform on particle and gas filtration
- Centre de recherche du Centre hospitalier de l'Université de Montréal (CRCHUM)
- _ Université de Montréal École de santé publique
- _ Université de Montréal Équipe RENARD
- Université de Sherbrooke Chaire de recherche en réadaptation au travail - Fondation J. Armand Bombardier et Pratt & Whitney Canada
- Université de Sherbrooke Laboratoire de biomécanique pour la prévention des troubles musculosquelettiques
- Université de Sherbrooke Chaire de recherche en réadaptation au travail - Fondation J. Armand Bombardier et Pratt & Whitney Canada
- Université du Québec à Montréal (UQAM) Laboratoire d'environnement contrôlé (LEC)

CANADA

- _ AGRIVITA Canada inc., Saskatchewan
- Canadian Institutes of Health Research (CIHR)
- Occupational Cancer Research Centre (OCRC), Ontario
- Employment and Social Development Canada (ESDC)

EUROPE

- Health and Safety Executive (HSE), United Kingdom
- Institut national de recherche et de sécurité (INRS), France
- Institute for Occupational Safety and Health (IFA) of the DGUV, Germany

UNITED STATES

- National Institute of Occupational Safety and Health (NIOSH)
- _ International Isocyanate Institute (III)

ASIA

- _ EGE University, Turkey
- Japan National Institute of Occupational Safety and Health (JNIOSH), Japan
- National Institute of Labor Protection (NILP), Vietnam
- Workplace Safety and Health Institute (WSHI), Singapore

THE FINANCIAL RESULTS

As at December 31, 2018, were:

\$23,826,399
\$2,782,570
\$990,489
\$117,984
\$32,668
\$25,000
\$20,568

TOTAL EXPENDITURES **\$27,325,137**

Internal research	\$7,107,606
Laboratory services	\$6,981,046
External research and grants	\$4,554,323
Finance and administration	\$3,148,796
Scientific support for internal and external research	\$2,532,204
Executive Office	\$1,175,149
Knowledge transfer service	\$1,058,363
Communications and institutional events	\$767,650

GOVERNANCE

BOARD OF DIRECTORS

The Board of Directors is composed of seven representatives each of employers and workers, and a chair. It operates on the principle of equal (labour/management) representation. Appointed by the Québec government, its members manage the Institute's affairs, including its strategic orientations, development framework, and financing.

In 2018, the members of the Board and those of the Executive Committee met eight and nine times respectively.

CHAIR

Manuelle Oudar*

EMPLOYER REPRESENTATIVES

Yves-Thomas Dorval*; France Dupéré; Stéphane Forget; Martine Hébert; Patricia Jean; Norma Kozhaya. One vacant position

WORKER REPRESENTATIVES

Denis Bolduc; Serge Cadieux*; Alain Croteau; Martin L'Abbée; Jean Lacharité. Two vacant positions

IRSST REPRESENTATIVE

Marie Larue

OBSERVER Mélanie Hillinger

APPOINTMENT

Mélanie Hillinger

DEPARTURES

Martine Bélanger; Yves Ouellet; Jean Poirier

* Members of the Executive Committee

SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board (SAB) is a tripartite board composed of four representatives each of employers and workers, and six members of the scientific and technical community. Chaired by the Institute's president and CEO, the SAB formulates opinions on the relevance, priority, and scientific merit of internal and external research projects and activities

The SAB met 10 times in 2018.

CHAIR

Marie Larue

EMPLOYER REPRESENTATIVES

Lionel Bernier; Dominique Malo; Gilles Rousseau; Marie-France Turcotte

WORKER REPRESENTATIVES

Jean Dussault; Denis Mailloux; Ana Maria Seifert. One vacant position

SCIENTIFIC AND TECHNICAL REPRESENTATIVES

Léonard Aucoin; André-Pierre Contandriopoulos Gaétan Lantagne; Benoit Lévesque; Alain Rondeau. One vacant position

OBSERVER Claude Sicard

APPOINTMENTS

André-Pierre Contandriopoulos; Jean Dussault

DEPARTURES

Daniel Demers; Jean-Pierre Devost

ORGANIZATION CHART

THE IRSST: A MONTH-BY-MONTH OVERVIEW

All year long, IRSST personnel organize or participate in numerous events aimed at scientists, partners in the Québec occupational health and safety network, and workplaces. A few examples are provided here.

PASSING OF A PIONEER

It was with great sadness that the Executive Office and staff of the IRSST learned of the passing of Louis Berlinguet, CEO of the Institute from 1985 to 1990. A professor and committed scientist, he played a number of prominent roles in various Québec, Canadian, and international organizations. The IRSST's current president and CEO, Marie Larue, had this to say: Québec "has lost one of its leading scientists, who contributed to the advancement of the sciences. He succeeded in consolidating the Institute's scientific and technical activities during his term at the helm, particularly in the early years right after its founding."

The IRSST organized a scientific event for the purpose of exploring opportunities for developing knowledge about protective equipment and smart clothing. □

EXPERT WORKSHOP ON ELECTRONIC WASTE MANAGEMENT

The leader of the IRSST's Prevention of Chemical and Biological Hazards research field, **Joseph Zayed**, accompanied by **Sabrina Grave**l, a scientific professional at the IRSST, participated in a workshop organized by the Global E-waste Solutions Team at the University of Michigan's School of Public Health. □

ANNUAL COLLOQUIUM OF OCCUPATIONAL HEALTH AND SAFETY PARTNERS IN AGRICULTURE

At this event organized by the Union des producteurs agricoles (UPA), Caroline Jolly, Danièle Champoux, and Ludovic Tuduri of the IRSST presented their most recent awareness-raising documents designed for farmers and any other workers wishing to better understand the information appearing on pesticide labels in order to protect themselves properly.

OCCUPATIONAL EXPOSURE LIMITS: ONTARIO REFERS TO THE IRSST

On its web site, the Ontario Ministry of Labour now — and for the first time — recommends using the IRSST model for calculating exposures to hazardous biological or chemical agents during irregular work shifts: <u>Guide for the adjustment</u> of permissible exposure values (PEVs) for unusual work schedules.

WEAR IT SMART, SYMPOSIUM ON SMART GARMENTS

As a partner of the fourth edition of this Montreal symposium organized by Vestechpro, an apparel research and innovation centre, the IRSST hosted a stand to explain its mission and work to attendees. The IRSST's president and CEO, **Marie Larue**, took the opportunity to describe future trends in OHS at this symposium. \square

VISIT PAID BY RESEARCHERS FROM JAPAN'S UNIVERSITY OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH (UOEH)

This visit was part of a joint initiative by the IRSST and the École de santé publique de l'Université de Montréal (ESPUM) aimed at publicizing Québec's occupational health and safety (OHS) practices. □

FIFTH INTERNATIONAL FISHING INDUSTRY SAFETY & HEALTH CONFERENCE (IFISH)

June

In Newfoundland, work funded by the IRSST with regard to the design of work stations aboard lobster boats and ways to prevent overboard falls was presented at a round table organized by the National Institute for Occupational Safety and Health (NIOSH) with the collaboration of the SafetyNet Centre for OHS Research of Memorial University in St. John's. 🗖

COLLOQUE SANTÉ ET SÉCURITÉ DU TRAVAIL DE L'ESTRIE

IRSST researcher **Damien Burlet-Vienney** presented the Webbased tool CLOSE, which is designed to facilitate risk management for confined-space work. He also presented the conclusions of the report Collaborative Robotics: <u>Assessment of Safety</u> Functions and Feedback from Workers, Users and Integrators in Quebec, whose principal author is Sabrina Jocelyn. 🗆

40^E CONGRÈS DE L'ASSOCIATION QUÉBÉCOISE POUR L'HYGIÈNE, LA SANTÉ ET LA SÉCURITÉ DU TRAVAIL (AQHSST)

The Institute contributed to the success of this annual symposium, held in Saguenay, under the theme 40 ans de prévention – Poursuivons la tradition avec passion!, by presenting lectures and hosting a stand.

ANNUAL MEETING OF THE SHEFFIELD GROUP

Marie Larue, the IRSST's president and CEO, participated in this year's meeting of the directors of the leading OHS research institutes from around the world. Held in Germany, the meeting focused on sharing the institutes' respective work, discussing the scientific issues that lie ahead, and paving the way to possible collaborations.

AN IRSST TOOL CITED IN AN OFFICIAL NEW ZEALAND DOCUMENT

POLICY OF OPEN ACCESS TO SCIENTIFIC LITERATURE

Endorsed by the IRSST's Board of Directors, the updated version of this policy invites the scientists whose work is funded by the Institute to deposit the final version of their manuscripts on the institutional platform <u>PUBLICOM</u>. This repository facilitates and increases visibility for the results of IRSST-funded research work. \square

The 10th edition of the guide Workplace Exposure Standards and Biological Exposure Indices, published by WorkSafe, the main OHS regulatory body in New Zealand, proposed the use of the IRSSTdeveloped web-based model (Utility for the adjustment of TWAs) for calculating the adjusted average exposure value (AAEV) for unusual work schedules.

THE IRSST MET WITH REPRESENTATIVES OF EMPLOYMENT AND SOCIAL DEVELOPMENT CANADA

The IRSST presented its various mandates and activities at this meeting, and discussed points contained in the professional services agreement signed with this government ministry. \square

THE IRSST'S

The IRSST held its annual colloquium at the Palais des congrès de Montréal under the theme Visage changeant de la maind'œuvre – enjeux et impacts sur la SST [the changing face of the labour force – issues and impacts on OHS] with over 200 participants in attendance. PowerPoint presentations of the lectures are available online on the event's Web page. François Hébert, Strategic development Assistant, was the event moderator.

INTERCULTURAL TRAINING IN QUÉBEC

Researcher **Daniel** Côté and scientific professional Jessica Dubé, both from the IRSST, organized a study day on the history of intercultural training in Québec. This day represented part of their participation in the activities of the Laboratoire de recherche en relations interculturelles (LABRRI) of Université de Montréal. Thev welcomed experts from various universities and practice settings at this training event. 🗖

PRODUCTION CATALOGUE

This section lists – for each research field – the projects begun, reports published, videos disseminated, and publications most frequently downloaded during the year. It also lists any of the Institute's or Institute-funded scientific publications during 2018, including journal articles, peer-reviewed articles published in conference proceedings, books, book chapters, and theses.

CHEMICAL AND BIOLOGICAL HAZARD PREVENTION

PROJECTS AND ACTIVITIES BEGUN IN 2018

- 2016-0003 Evaluation of the impact of co-exposure on biomarkers of exposure to pyrethroid insecticides in agricultural workers
- 2017-0038 Women's occupational exposure to chemicals: improving a job exposure matrix to provide gender-differentiated exposure estimates
- 2017-0044 Study aimed at providing better guidance for future evaluation of risks faced by workers exposed to nanoparticles (NPs): are there sex-dependent differences in inflammatory properties of nanoparticles?
- 2017-0047 Evaluation of direct reading instrument and filtration technology performance to improve strategies to control workers' exposure to ozone

RESEARCH REPORTS AND OTHER PUBLICATIONS

- R-994 Preventing Chemical Risks of Pesticide Use Among Québec Apple Growers: Status Report and Measures to Improve Personal Protection
- R-992 Microorganismes dans les fontaines biologiques de dégraissage – Évaluation de l'exposition professionnelle dans les ateliers d'entretien mécanique
- **R-1009** An Assessment of Methods of Sampling and Characterizing Engineered Nanomaterials in the Air and on Surfaces in the Workplace
- **R-1011** Revue de la littérature épidémiologique sur le risque de cancer chez les pompiers
- R-1012 Epidemiological Literature Review on the Risks of Cancer Among Firefighters
- **R-1037** Utilisation des composés organiques volatils microbiens comme biomarqueurs de l'exposition aux moisissures en milieu de travail – Étude de faisabilité
- R-1031 Agents fibrogènes et cancérogènes dans les mines d'or et de fer du Québec – Étude exploratoire
- R-1032 Étude comparative des banques de données de mesures d'exposition IMIS (OSHA) et LIMS (IRSST)
- R-1024 Utilisation des cellules dendritiques en tant que biosenseurs pour la surveillance de la qualité biologique de l'air
- **R-1023** Exposition des travailleurs aux substances chimiques et aux agents biologiques dans les usines de biométhanisation des matières organiques putrescibles Évaluation exploratoire

- R-1019 Développement d'une approche par séquençage de nouvelle génération pour l'étude de la diversité fongique des bioaérosols
- CA-993 Montréal Symposium on Occupational Carcinogens, Stakeholder Report
- **DS-1000** Pesticides Pratiques sécuritaires et équipements de protection individuelle (EPI)
- DS-1004 Pesticides Safe Practices and Personal Protective Equipment (PPE)
- DS-1007 Pesticidas Prácticas seguras y equipos de protección individual (EPI)

PRESENTATIONS, LECTURES, AND REPORTS ON VIDEO FILE

- **CF-240** (January 18, 2018). Participation Groupe de travail ANSES Horaire atypique et cancer
- **CF-241** (January 19, 2018). Exposition des travailleurs québécois à des cancérogènes: industries et groupes professionnels
- **CF-260** (February 14, 2018). Mesure de l'efficacité des gants de protection contre les nanoparticules dans des conditions simulant leur utilisation en milieu de travail
- CF-266 (May 7, 2018). ProtecPo: logiciel pour la présélection de matériaux de protection
- **CF-268** (June 11, 2018). Validation d'un échantillonneur de type CIP10M avec réactif 1,8-diaminonaphthalène (DAN) pour l'évaluation d'isocyanates en milieu de travail
- CF-269 (June 18, 2018). Évaluation de méthodes de prélèvement et de caractérisation de nanomatériaux manufacturés dans l'air et sur des surfaces des milieux de travail
- **CF-274** (October 15, 2018). Évaluation de la biomasse mycologique sur les surfaces des réseaux aérauliques des systèmes de ventilation
- **CF-275** (October 15, 2018). Développement d'une approche par séquençage de nouvelle génération pour l'étude de la diversité fongique des bioaérosols
- **CF-276** (November 14, 2018). Évaluation des bioaérosols et des composés gazeux pendant les compostages agroalimentaire et résidentiel de matières organiques
- **CF-277** (November 14, 2018). Exposition des travailleurs aux substances chimiques et aux contaminants biologiques dans les usines de biométhanisation des matières organiques putrescibles: évaluation exploratoire

MECHANICAL AND PHYSICAL RISK PREVENTION

PROJECTS AND ACTIVITIES BEGUN IN 2018

- 2015-0014 Development of a range of comfort indices for earplugs to improve hearing protection for workers
- 2016-0042 Improving the user-friendliness of construction industry safety harnesses by assessing physical and physiological constraints
- 2016-0043 Confined space risk management study on the use of permanent collective protection measures
- 2017-0010 Study of the applicability of parametric speakers to the development of new back-up alarm concepts
- 2017-0034 Lockout and other energy control methods in the construction industry
- 2018-0008 Field fest of the JNIOSH mini strain pipe meter as a safety alert system during trench work
- 2018-0028 Effect of hearing loss and wearing hearing protectors on the auditory perception and localization of back-up alarms

RESEARCH REPORTS AND OTHER PUBLICATIONS

- R-1033 Cloueuses portatives Développement de méthodes de diagnostic vibratoire et acoustique
- R-1029 Analyse du potentiel d'application des textiles intelligents en santé et en sécurité au travail
- **R-1022** Méthodologie innovante pour la caractérisation des matériaux acoustiques en laboratoire et étude de son applicabilité sur le terrain
- R-1014 Revue de la littérature sur les liens entre la surdité professionnelle et la presbyacousie
- R-1015 Hearing Aid Use in Noisy Workplaces
- R-1027 Review of the Literature on the Links between Occupational Hearing Loss and Presbycusis
- R-1003 Critères d'aménagement sécuritaire et ergonomique des postes de haleur et de support à casiers des homardiers du Québec

- RG-1034 Équipements mobiles Démarche de contrôle des énergies (cadenassage et autres méthodes)
- RG-1040 Mobile Equipment Energy Control Process (Lockout and Other Methods)
- **RG-1002** Sécurité des machines et modes de fonctionnement à énergie réduite – Démarche pour le choix de valeurs sécuritaires
- RG-1026 Machine Safety and Reduced-Energy Operating Mode – Determining Safe Values

PRESENTATIONS, LECTURES, AND REPORTS ON VIDEO FILE

- **CF-250** (February 8, 2018). Robots collaboratifs et SST: risques et opportunités
- **CF-261** (February 22, 2018). Effets des fluides de coupe sur la résistance à la coupure et à la perforation des gants de protection
- **CF-262** (March 13, 2018). Développement d'un outil d'analyse du risque et de catégorisation des interventions en espace clos
- **CF-264** (April 24, 2018). Reproduction d'environnements sonores industriels en vue d'applications aux études d'audibilité des alarmes et autres signaux : preuve de concept
- DS-1025 (May 30, 2018). Alarme de recul Une utilisation optimale
- **CF-265** (June 13, 2018). Performance acoustique des alarmes de recul tonales et large bande en milieu ouvert en vue d'une utilisation optimale
- **CF-272** (September 13, 2018). Robotique collaborative: retour d'expérience des travailleurs, utilisateurs et intégrateurs au Québec
- **CF-273** (September 13, 2018). Suivi, évaluation et révision d'une démarche d'implantation du cadenassage pour les équipements mobiles dans le secteur municipal
- **CF-278** (December 12, 2018). Développement de méthodes de diagnostic vibratoire et acoustique pour les cloueuses portatives pneumatiques

SUSTAINABLE PREVENTION AND WORK ENVIRONMENT

PROJECTS AND ACTIVITIES BEGUN IN 2018

- 2016-0010 Overview of occupational health and safety in Québec's agricultural sector: the case of hog breeders
- 2017-0019 A pedagogical approach based on practical exercises and enhanced feedback for skills improvement in novice handlers
- 2017-0046 Effects of interorganizational knowledge transfer on employer engagement in OHS: workplace accident investigations
- 2017-0048 Identification of situations of skin exposure to pesticides and emergence of preventive practices: combining activity analysis with exposure measurement – the case of apple producers
- 2017-0050 Appropriation and validation of a quantitative method for assessing material handlers' foot movements
- 2018-0007 Finalization and validation of a field approach for predicting back loading based on laboratory data
- 2018-0031 Clarification of the concept of OHS culture based on a literature review and a concept map
- 2018-0036 Validation of a new inertial measurement system
- 2018-0045 Knowledge transfer workshop on new workers and cohabitation in the workplace
- 2018-0054 Exchange network the OHS of immigrant workers

RESEARCH REPORTS AND OTHER PUBLICATIONS

- **R-1020** Appropriation et transfert par des formateurs d'une nouvelle approche de prévention en manutention axée sur l'utilisation de principes d'action
- R-1021 Prévention de l'exposition cutanée aux pesticides chez les producteurs de pommes et facteurs influençant le port des vêtements de protection
- R-1018 Quels sont les facilitateurs du maintien en emploi en santé des travailleurs seniors dans un milieu d'éducation au Québec?
- **R-1013** Pour quelles raisons la formation aux techniques sécuritaires de manutention ne fonctionne-t-elle pas? Revue critique de la littérature
- R-1016 Prise en charge de la SST dans les mines souterraines: témoignages de cadres et de représentants des travailleurs
- R-1006 Measurement of Exposure to Musculoskeletal Risk Factors Among Emergency Medical Technician-Paramedics
- R-1005 Développement d'un système de mesures et d'un protocole de mesures permettant de quantifier l'exposition physique des manutentionnaires
- R-978 Les blessures professionnelles et leurs déterminants – Mieux comprendre le rôle du secteur industriel et de la profession
- **R-998** Comprendre l'influence de la régulation des contraintes temporelles sur l'appropriation des principes généraux de déplacement sécuritaire des bénéficiaires par les recrues préposés aux bénéficiaires
- DI-1010 Intégration sécuritaire des nouveaux travailleurs dans le secteur de transformation du bois
- **DF-1008** Identifier les risques à la santé et à la sécurité du travail – Trousse d'outils pour le personnel enseignant superviseur de stage du Parcours de formation axée sur l'emploi
- **DS-1001** Personnel infirmer et troubles musculosquelettiques: Comment favoriser l'application des pratiques préventives dans les milieux de travail?
- **DS-1017** Nursing Staff and Musculoskeletal Disorders: How to Promote the Application of Preventive Practices in the Workplace

OCCUPATIONAL REHABILITATION

PRESENTATIONS, LECTURES, AND REPORTS ON VIDEO FILE

- **CF-252** (February 7, 2018). Voir l'invisible: l'utilisation d'avatars
- **CS-019** (April 12, 2018). Quantifier l'exposition physique des manutentionnaires
- **CS-020** (April 30, 2018). Favoriser l'application des pratiques préventives des TMS chez le personnel infirmier
- **CS-020** (April 30, 2018). Promoting the application of prevention practices in hospitals
- **CF-267** (June 5, 2018). Les conditions pour une intégration sécuritaire au métier – Un regard sur le secteur minier québécois
- **CF-270** (June 13, 2018). Application des pratiques préventives par les infirmières et infirmiers: la perspective innovante de la capacité d'absorption
- **CF-271** (June 13, 2018). L'influence des rythmes de travail sur l'appropriation et l'application des principes de déplacement sécuritaire des bénéficiaires par les préposés dans les centres d'hébergement du Québec
- **CS-021** (June 21, 2018). Stratégie intégrée de prévention en manutention (SIPM)
- **CF-279** (October 23, 2018). Intégration sécuritaire des nouveaux travailleurs dans les entreprises de transformation du bois

PROJECTS AND ACTIVITIES BEGUN IN 2018

- 2014-0013 Building and maintaining a working alliance in occupational rehabilitation within an intercultural clinical context 2016-0013 Deriving a clinical prediction rule for identifying patients with non-acute low back pain most likely to respond favourably to a lumbar stabilization exercise program Factors that influence a sense of injustice 2017-0024 following a workplace accident 2018-0005 Raising awareness of the importance of applying a response protocol to mitigate the negative effects of critical incidents on rail industry personnel 2018-0049 Work rehabilitation program for orchestra musicians with musculoskeletal injuries resulting from musical performance 2018-0050 A pilot study of pain phenotypes of injured workers with chronic low back pain
 - 2018-0051 Injury risk factors: a first step toward helping dancers stay at work
 - 2018-0053 Situating the intercultural issue in the rehabilitation and return-to-work context

RESEARCH REPORTS AND OTHER PUBLICATIONS

- **R-1028** Étude des qualités psychométriques de l'Outil d'identification de la situation de handicap au travail (OISHT) utilisé auprès de travailleurs ayant un trouble musculosquelettique ou un trouble mental courant
- R-996 Évaluation de différents protocoles de gestion d'incident et de soutien aux employés après un incident grave
- R-997 Effets psychologiques et biomécaniques immédiats de deux catégories de ceintures lombaires chez des travailleurs en santé et des travailleurs avec maux de dos

PRESENTATIONS, LECTURES, AND REPORTS ON VIDEO FILE

- **CF-257** (January 18, 2018). Effets psychologiques et biomécaniques immédiats de deux catégories de ceintures lombaires chez des travailleurs en santé et des travailleurs avec maux de dos
- **CF-256** (January 23, 2018). Déterminants cliniques et neuromécaniques du développement de l'incapacité lombaire chez les travailleurs

SPECIAL PROJECTS

PROJECTS AND ACTIVITIES BEGUN IN 2018

- 2018-0003 Annual occupational health and safety indicators in Québec, 2012–2016
- 2018-0004 A review of methods for evaluating the profitability of employment injury prevention

PRESENTATIONS, LECTURES, AND REPORTS ON VIDEO FILE

- **CF-259** (January 25, 2018). Impact de l'allongement de la période de maturité des données sur les indicateurs de SST
- CF-258 (January 30, 2018). Lésions avec atteinte permanente à l'intégrité physique ou psychique (APIPP) – Analyse du risque au Québec
- CF-248 (February 12, 2018). Mégadonnées: Kit de survie
- **CF-253** (February 13, 2018). Les textiles intelligents au service des travailleurs des études de cas
- **CF-249** (February 19, 2018). Données massives en hygiène du travail exploitation des banques de mesures d'exposition professionnelle
- **CF-242** (February 20, 2018). Révolution 4.0 à l'aube d'une nouvelle SST
- **CF-243** (February 21, 2018). Une révolution technologique à nos portes; nos organisations sont-elles prêtes?
- **CF-246** (February 23, 2018). Immersion 360: un environnement sonore virtuel pour la réadaptation des travailleurs présentant une surdité
- **CF-251** (February 27, 2018). Savoir-faire, défis et opportunités: axe ergonomique et sécurité du nouveau laboratoire Poly-Industries 4.0
- CF-244 (March 6, 2018). Le travail à l'ère digitale: les impacts des technologies perturbatrices sur les acteurs et les institutions
- **CF-245** (March 8, 2018). Innovation technologique et changements organisationnels; quels enjeux pour la santé au travail?
- **CS-022** (November 21, 2018). La SST chez les jeunes travailleurs en quelques chiffres
- **CS-023** (November 21, 2018). La SST chez les travailleurs vieillissants en quelques chiffres
- **CS-024** (November 21, 2018). La SST selon le sexe en quelques chiffres
- **CS-025** (November 21, 2018). La SST chez les travailleurs issus de l'immigration en quelques chiffress

MOST FREQUENTLY DOWNLOADED PUBLICATIONS

IN FRENCH

- RG-552 Sécurité des machines Prévention des phénomènes dangereux d'origine mécanique, protecteurs fixes et distances de sécurité
- DS-1000 Pesticides Pratiques sécuritaires et équipements de protection individuelle (EPI)
- R-624 Donner un sens au travail Promouvoir le bienêtre psychologique
- T-06 Guide d'échantillonnage des contaminants de l'air en milieu de travail

Manuel- Manuel d'ergonomie pratique en 128 points 128-points

- **R-822** Presses à injection de plastique ayant des équipements périphériques – Sécurité lors des interventions de maintenance ou de production
- B-023 Procédure d'intégration professionnelle à l'usage du conseiller en réadaptation (Échelles de restriction)
- **R-543** Sens du travail, santé mentale au travail et engagement organisationnel
- RG-779 Les TMS des membres supérieurs Mieux les comprendre pour mieux les prévenir
- R-319 Guide pratique de protection respiratoire
- **RG-484** Guide de prévention Le travail de manutention et le service à la clientèle dans les magasinsentrepôts
- R-498 Chariots élévateurs et piétons: à chacun sa voie, 2° édition
- **RG-618** Guide pour une démarche stratégique de prévention des problèmes de santé psychologique au travail
- R-449 Conditions de travail, de santé et de sécurité des travailleurs du Québec
- R-668 Étude exploratoire des facteurs de la charge de travail ayant un impact sur la santé et la sécurité : Étude de cas dans le secteur des services

IN ENGLISH

- RG-597 Machine Safety Prevention of Mechanical Hazards, Fixed Guards and Safety Distances
- R-970 Plastic Injection Moulding Machines with Auxiliary Equipment – Safety During Maintenance and Production Interventions
- R-971 Design of Horizontal Lifeline Systems for Fall Protection – Update to Technical Guide
- RG-126- Work-Related Musculoskeletal Disorders (WMSDs) ang – A Better Understanding for More Effective Prevention
- T-15 Sampling Guide for Air Contaminants in the Workplace
- R-787 The Costs of Occupational Injuries A Review of the Literature
- R-955 Development of a Confined Space Risk Analysis and Work Categorization Tool
- R-784 Participatory Training in Manual Handling Theoretical Foundations and Proposed Approach
- RG-773 Guide for Safe Use of Isocyanates An Industrial Hygiene Approach
- R-590 Heavy Vehicles Tire Blowout and Explosion
- **OMRT-en** Work-related Musculoskeletal Disorders Guide and Tools for Modified Work
- **RF-651** Safeguarding of Hydraulic Power Press Brakes
- R-788 Interaction Between Human Resources Management and OHS – Preparing Future Managers

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IRSST

505 De Maisonneuve Blvd. West Montréal, Québec H3A 3C2 Phone: 514 288-1551

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mission and vision

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 network

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, activities, and strategies of the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) and its network;
- _ be used by all its social partners in a spirit of joint collaboration;
- win recognition at the national and international levels; and
- derive maximum benefit from a well-established network of research and development collaborators.

