



Link Line



an update from **WSN** on **YOUR** Mine Rescue program

Issue #19 December 2012

Under the Research Microscope



***PARDON?** A small micro-recorder under the rim of the hard hat records a conversation between the captain and the briefing officer during this year's Provincial Mine Rescue Competition, as part of a major study by Dr. Mary Waller into communication patterns.*

Communication project latest research effort for mine rescue

▶ **M**ine rescue may be coming out of the obscurity of anonymity under the microscope of scientific research.

A recent keynote presentation to a German conference of psychologists on how Ontario mine rescuers communicate drew a high level of interest, said Dr. Mary Waller, a professor of organization studies and associate director of the Global Mining Management Program at the Schulich School of Business at York University.

The hour-long presentation did not include any data or analysis on the project, but reviewed Dr. Waller's previous research in team dynamics and outlined the process and methodology of the mine rescue team research, she said.

"I told them about the research design and the data being collected," Dr. Waller said. A separate, but extensive question and answer session on the mine rescue research followed, attended by the German media.

The three-year project into communications in dynamic, non-routine situations, is the one of the latest and most high-profile research efforts involving Ontario Mine Rescue.

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Recent Research Projects

2005 – Rescue ventilators (CAREvent) field tested by OMR staff and volunteers.

2005 – Mirarco and Ontario Mine Rescue conduct research into using virtual reality as a decision-making tool during an emergency.

2006 – Laurentian University nursing students conduct fitness tests on competitors at the provincial competition to study heat stress.

2007 – Laurentian University nursing students conduct additional tests on competitors at the provincial competition to study heat stress.

2008 – Mine rescue volunteers undergo heat stress testing with University of Ottawa researchers.

2009 – Drager Safety Inc. and Ontario Mine Rescue volunteers pilot test the FPF 7000, a new hydration face mask for use with the BG4.

2012 – Ontario Mine Rescue staff and volunteers field test new gas monitor/detectors to replace the iTX.

2012 – York University begins three-year project with Ontario Mine Rescue to research communications in dynamic, non-routine situations.

We need you!

If you have comments about the newsletter, or suggestions for future articles, please contact Ken Sitter at WSN, (705) 474-7233 ext. 234, or kensitter@workplacesafetynorth.ca



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Heat stress researchers test limits of exposure guidelines

The heat is on Dr. Glen Kenny and his fellow University of Ottawa researchers studying heat stress.

Over the next six months, Dr. Kenny and his team must complete and submit a dozen or more academic papers on their most recent round of work, funded by the Workplace Safety and Insurance Board, researching heat exposure limits. Those papers should help Dr. Kenny find funding to continue the ground-breaking work and establish more accurate exposure limits.

Two teams of Ontario mine rescue volunteers played a role in Dr. Kenny's earlier research by staging a demonstration exercise at Vale's Garson Mine in 2008. The research team monitored their work level, their internal body temperatures and the environment in which the volunteers performed simulated rescue work.

Current guidelines or exposure limits, like those of the ACGIH (American Conference of Governmental Industrial Hygienists) which are broadly used, do not take into account factors such as age, gender and chronic health disorders that can significantly affect a worker's ability to withstand heat exposure.

"What we're seeing is a marked difference" due to those variables, Dr. Kenny said, of the research which has involved more than 110 subjects. "It is a fairly significant sample size and had a cohort of females."

The participants were monitored in the world's only whole-body direct calorimeter (a device for making extremely accurate measurements about the heat emitted by the human body) to assess how individuals of different age,



gender and state of health respond to increasing levels of heat stress during physical activity performed in the heat.

"It's not a surprise," said Dr. Kenny, that the research shows marked differences in the physiological capacity to dissipate heat during work in the heat based on age, gender and health. "You just can't apply across the board solutions and expect them to treat people equally."

"We really have to re-think these (exposure) limits." And that's what Dr. Kenny and his researchers plan to do once they've secured funding for their next round of research. The current study, "the largest age-related work research in the world," gives the basis for what new exposure limits will be.

"Now that we've seen it, we want to define it," he said, develop new matrices and test those new limits.

Those new limits, Dr. Kenny said, will better identify the risk of heat exposure and allow workers and rescue volunteers to be better prepared.

'Old' volunteers become 'new' MROs

Tim Ebbinghaus and Danny Taillefer are not new to Ontario Mine Rescue but they are OMR's newest mine rescue officer/consultants.

Ebbinghaus worked for 16 years at Canadian Salt Co.'s Ojibway Mine in Windsor, and spent 14 of those years as a mine rescue volunteer with extensive competition experience as team member, team captain and briefing officer.

Taillefer worked for Xstrata Copper in Timmins, most recently as rehab/development supervisor. He has represented Xstrata Copper at four district and three provincial mine rescue competitions.

Ebbinghaus, posted at Thunder Bay Mine Rescue Station, can be reached at (807) 344-8211, while Taillefer, at Timmins Mine Rescue Station, can be reached at (705) 235-4861.



Positive impressions

Ontario Mine Rescue volunteers know how to make a good impression.

And the evidence is in a recent issue of Emercom of Russia's safety magazine.

The magazine features a story on a visit to Sudbury and the Ontario Provincial Mine Rescue Competition at Vale's Copper Cliff South Mine this June by a delegation from Emercom, led by Alexander Sin, head of the Department of Mine Rescue Services, to study OMR's volunteer structure.

The article recounts their visit to Xstrata's Nickel Rim South Mine, the role of Workplace Safety North and Ontario Mine Rescue, and "the culture of safety" encountered throughout their visit.

The story is available in English and Russian on the newsletter page of the OMR website.



Mine rescue project draws interest

Complex setting offers unique opportunity

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The presentation at the conference, principally for industrial and organizational psychologists interested in applied psychology, drew significant interest because what is learned from this project will be applicable to situations in other industries, Dr. Waller said.

“Everyone in the academic community is very excited by it,” said the York professor, who collected the first round of data by audio recording of participating team members as they worked during this year’s provincial competition.

“Ontario Mine Rescue is like the icing on the cake for me. It is the most complex team setting I have ever studied.” Previously Dr. Waller has researched communications and team dynamics in aviation flight crews, nuclear power plant control room crews, military crews, trauma teams, port and harbor operations, and even a terrorism response operation.

Mine rescue research is unique because the teams have a more complex routine to go through under time constraints and in a simulated harsh environment, Dr. Waller said. “They not only need to perform an activity, they also need to get together to problem solve.”

SWITCH PATTERNS

“They switch back and forth in communication patterns between problem-solving versus short staccato action commands,” she explained.

By the time the project is finished in 2014, there will be enough information to research beyond basic team dynamics and communications, and explore the relationship between captains and briefing officers, captains and vice-captains, and other team relationships, Dr. Waller said.

During the June competition, USB key-sized micro-recorders were placed



Dr. Mary Waller attaches a USB key-sized micro-recorder to a hard hat as a mine rescue team prepares to compete in the Provincial Mine Rescue Competition.

under the rim of each participant’s hard hat. The researcher purchased software that synchronizes the recordings to create a master recording for each team, and now the recordings are being reviewed to identify and code the communication – information, commands, questions, affirmations, clarifications, etc.

The results will be analyzed by a computer using a pattern recognition algorithm to identify and analyze the differences in communication patterns between high- and good-performing teams. While one year’s competition is enough data to begin analysis, “We need a larger sample size for finding statistically significant results,” she said.

“When your sample size increases, you have more power, like using a

more powerful microscope. You can see more subtle effects.”

Dr. Waller will collect additional data at the 2013 and 2014 provincial competitions, and tentatively plans to attend next year’s Sudbury and Timmins district competitions to increase the sample size. She expects to have the results from 30 or more teams by the time the data gathering is finished.

In the meantime, Dr. Waller is already booked for two more presentations in 2013, one to an informal gathering of international researchers and a second in October at the International Mines Rescue Bodies conference in Niagara Falls.

“I think people are going to be so fascinated by Ontario Mine Rescue.”



Mine rescuers from the Diavik Diamond Mine in the Northwestern Territories review the situation before resuming action during the 8th International Mines Rescue Competition in the Ukraine last September.

Canadians crack top three at international competition

Canadian mine rescuers from the Diavik Diamond Mine in the Northwest Territories placed third at the 8th International Mines Rescue Competition held in Donetsk, Ukraine in September.

Teams from Australia and the Ukraine finished first and second respectively, while a second Canadian team from BHP Billiton's EKATI Diamond Mine, also in the Northwest Territories, finished sixth. Twenty-six teams from 13 countries, including Russia, China, Poland and India, competed in the biennial event.

The international competition included events in emergency medical care, apparatus technician, engineering analysis, and a two-hour simulated rescue. The rescue involved a team entering a simulated coal mine, exploring, chang-



An EKATI Diamond Mine mine rescuer makes a note during the international competition.

ing ventilation, controlling a fire, documenting the state of the mine, and rescuing an injured miner.

EKATI mine rescuers finished sixth overall, and first in the engineering analysis event that involved calculating the spread of fire and smoke, and travel time underground.

The 9th International Mines Rescue Competition will be held in Bytom and Katowice, cities in the Upper Silesian region of Poland in September 2014.

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About the Mine Rescue Newsletter

The Mine Rescue newsletter is published three times per year by Workplace Safety North (WSN). WSN is funded by workplaces in the province, through the Workplace Safety and Insurance Board.

The information in this publication is accurate to the best of our knowledge. However, the association assumes no responsibility or liability for the accuracy or sufficiency of this information, nor does it endorse any product mentioned herein with the exception of those produced by Workplace Safety North.



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