9:30 am – 10:15 am

Exhaust Re-entrainment and Air Quality Issues in Laboratory Design
John J. Alberico, M.Sc., CCEP, Principal, RWDI

Laboratories are specifically designed with ventilation systems that protect users and prevent experimental research from being compromised. Once air from the laboratory is vented to the outside, it still can be harmful if the exhaust systems are poorly designed, resulting in contaminated air being re-entrained back into the building ("short-circuiting"), defeating the benefits of a well designed ventilation system. Or, adverse impacts can occur on the surrounding environment particularly for laboratories located on campuses, or in suburban or urban areas. Furthermore, poorly placed air intakes for the laboratory can result in emissions from the surrounding environment infiltrating the laboratory and affecting the users and experiments.

This workshop will discuss exhaust stack re-entrainment and dispersion, and on-site and off-site impacts for a wide range of laboratory exhausts including contaminant and/or odour emissions from fume hoods, specialty hoods, vivaria, emergency generators, boilers, cooling towers, and diesel vehicles using nearby roadways and loading areas.

Another aspect that is important with laboratories of concern is reducing energy costs by lowering discharge rates from laboratory exhausts during periods of low building usage, while maintaining safety by maintaining adequate dispersion to minimize re-entrainment and off-site impacts.

An overview of the analytical tools used to evaluate exhaust impacts and reduced laboratory exhaust flows, and develop mitigation measures will be provided. These tools include design reviews based on past experience, numerical modelling techniques, and wind-tunnel and scale modelling. Typical problems and mitigative solutions will be presented through examining selected projects that RWDI has recently completed along with visual demonstrations.

10:45 am – 11:30 am

Evaluating Methods to Reduce Energy Costs Associated with Laboratory Exhaust Systems
Brad C. Cochran, P.E., Sr. Associate, CPP Wind Engineering Consultants

A typical laboratory consumes up to 10 times the energy / ft2 of an office building. Due to the requirements for high air change rates of 100% fresh air, the ventilation system consumes up to 80% of the energy. Energy savings strategies often overlook the exhaust system, even though it accounts for the other 40% of the ventilation system's energy consumption.

Historically exhaust system operate at full load conditions 24 hours a day, 365 days a year. Using state-of-the-art engineering techniques, exhaust ventilation systems can now optimize energy consumption by applying VAV technology to the exhaust side.

11:30 am – 12:15 pm

Attacking Exhaust Fan Energy Use Using Demand Based Control
Gordon P. Sharp, Chairman, Aircuity, Inc.

Laboratories often employ VAV lab controls to vary lab fume hood flows and more recently vary lab room air change rates based on room contaminant sensing. However, most laboratory exhaust fans are operated at constant volume flows that are in excess of the lab's actual exhaust flow in order to prevent exhaust re-entrainment. This presentation answers the question of how this significant consumption of energy can be cut by about 50%. A Demand Based Control approach will be described that uses multiplexed sensing of exhaust plenum contaminants to reduce exhaust fan exit velocities when the exhaust air is "clean".

1:30 pm – 2:15 pm

Reducing Laboratory Ventilation Air Safely
Glenn Schuyler P. Eng., Principal, RWDI

Laboratory ventilation air is a major energy user. Attempts to reduce it have raised concerns over safety within the labs. The multiple requirements of ventilation air to provide fresh air to occupants, reduce general contaminant levels, and provide a level of safety in the event of an accident, complicate the process for setting appropriate ventilation rates. This workshop will propose a process of decoupling these requirements through the use of local contaminant controls. The results of CFD modelling of a typical laboratory space will be used to demonstrate the effectiveness of local contaminant control compared to increased ventilation.

2:15 pm – 3:00 pm

Demand-Based Programs for Achieving Safe, Energy Efficient and Sustainable Laboratories Buildings
Thomas C. Smith, Exposure Control Technologies, Inc.

At costs that often exceed $10 per square feet, laboratory buildings have some of the highest operating costs of any building type. Laboratory ventilations systems comprised of chemical fume hoods, biological safety cabinets and other exposure control devices are necessary to protect personnel from exposure and exhaust potentially hazardous materials generated during research activities. However, operation of the laboratory ventilation systems can account for more than 60% of the utility costs. Demand based programs such as the Laboratory Ventilation Optimization Project (LVOP) have helped reduce energy use while improving laboratory safety in numerous research facilities.

This presentation will describe the process of establishing appropriate safety constraints, identifying and prioritizing energy reduction opportunities, and implementing a LVOP to achieve safe and sustainable laboratory buildings.

3:30 pm – 4:15 pm

Energy Monitoring/Recommissioning
Alan Jenke P.Eng., Convergint Technologies

Energy use in buildings has for the last 20 years been audited based on weather, square footage occupancy and type of facility. This method has in the past developed energy reduction strategies and retrofits resulting in energy reduction. However, over time energy creep occurs which will eventually get the building back to a similar profile to pre-audit conditions.

With the tools and talent available today in real time energy evaluation the auditing method can be eliminated and a program of data gathering, evaluation, and strategy development can be implemented. This will then allow a commissioning of existing systems to begin and identification of poor performing equipment can be identified. This can then be evaluated against a capital cost model to determine payback and performance.

The real time energy evaluation will then continue to gather data and constantly determine that the commissioning base is correct and identify any system degradation in real time, not when energy costs exceed budgeted expectations. There are also tools to complete reports for aggregation, exceptions, load duration, relative contribution, cost contribution, what if analyzer, bill reconciliation, etc. The use of non proprietary open protocols is used to accomplish this allowing web access and data sharing and the use of multiple and best in class technologies for field devices.

The systems then provides a traceable, predictive and constantly up-to-date baseline of the energy consumption of the facility systems being monitored

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4:15 pm – 5:00 pm

CANMET-Materials Technology Laboratory's New Home
Mark Hennessey, Manager, Real Property Acquisitions and Disposals, Natural Resources Canada

A unique private, public partnership venture, this is the first "P3" LEEDs Platinum real property project proudly advanced by McMaster University and Natural Resources Canada. Expanding beyond a real estate solution, this facility located in Hamilton Ontario will be a showcase for environmental leadership. This new 15,066 rm² special purpose facility is under construction and anticipated to be complete and occupied by the spring of 2010. Presentation overview will define the design challenges, project process - governance and accountabilities, financing, construction management and long-term occupancy agreements.