Green School Option

Sudbury – West

EarthCare

- The Rainbow District School Board is one of the Sudbury partners of Earthcare Sudbury, a unique partnership between the City of Greater Sudbury, and over 90 community agencies, organizations and businesses and hundreds of individuals coming together to focus on enhancing our environment, creating healthier community.
- EarthCare needs to develop a Local Action Plan (LAP) to include healthier indoor air in schools for our children to improve learning, concentration, attendance and do anything we can to put a stop to health effects of indoor air pollutants

Healthy Community

- According to Health Community Strategies, the
- Committed Strengths will bring
  - Commitment from municipal government to enact change
  - Global movement towards increased health and well-being
- Committed Opportunities will bring
  - Inclusion of innovative and unique ideas
  - Realize the full potential of the Healthy community Strategies
- Guiding Principles will
  - Foster an environment that promotes learning
  - Build on the strengths and learn from mistakes
  - Find solutions not treatments

Environmental Planning Strategies

- The municipal government Environmental Planning Strategies is working towards that all future building being constructed in Greater Sudbury will have the LEED certification. Proposed future Green buildings for Sudbury are:
  - Living with Lakes Centre
  - $30million Sports Facility
  - $60million Arts Centre

I vote in favour of Option A

To build a Green School

I vote in favour of Option A

- R.H. Murray Public School and Copper Cliff Public School remain open
- R.H. Murray boundary extended towards the east for new students effective September 2008
- Copper Cliff becomes feeder school for Lively District Secondary School
- Move Grade 7 and 8 students from George Vanier Public School and Jessie Hamilton Public School to Lively District Secondary School (English and French Immersion)
- Combine JK to 6 students from Jessie Hamilton Public School and George Vanier Public School into a new green school (English and French Immersion)
- Use a portion of Lively District Secondary School for non-student use
- Offer Grade 9 to 12 French Immersion at Lively District Secondary School (Lively District Secondary School would offer French Immersion from Grade 7 to 12)

Surplus is not your only problem

Option:
Build 4 Green school

Sudbury – West

All 5 schools are Aging at Dangerous Prohibitive need of repair

- It is not feasible to invest 1.9 million, 3-4 million or 6.7 million to repair an old school.

	Year built	Enrollment 2006-07	Capacity	% capacity	FCI	Cost $ Million
Copper Cliff	1937	213	288	73%	62-critical to repair	3.2 M
George Vanier	1950	346	480	72%	69-prohibitive to repair	4.4 M
Jessie Hamilton	1958	337	302	111%	64 - critical to repair	3.1 M
RH Murray	1956	105	158	66%	72-prohibitive to repair	1.9 M
Lively High School	1956	399	852	47%	40 - critical to repair	6.7 M

Build 4 Green School

- Copper Cliff Public [English]
  - to accommodate Copper Cliff Public growth of new families who want local school in their community, is feeder school to Lively high-school
- RH Murray [English]
  - to accommodate RH Murray growth of +150 new employees when Totten mine opens in Worthington, is feeder school to Lively high school
- George Vanier and Jessie Hamilton [English/FI]
  - to accommodate JK to grade 6 from George Vanier and Jessie Hamilton, is feeder school to Lively high-school
- Lively High School [English/FI]
  - to accommodate high-school students and 7/8 from George Vanier and Jessie Hamilton

Why Build 4 Green Schools in Sudbury -West?

- US research identified commonly reported building-related health symptoms involving schools since 1999. US investigate the Indoor Air Quality (IAQ), ventilation, and building-related health problems in US elementary schools, a field that is of increasing interest to the research community, educators and school facilities managers, and the public at large.
- Experts generally agree that healthy indoor school environments are a necessity if a high standard of education is to be expected. There is a clear indication that classroom ventilation is typically inadequate.

J. M. Daisey, W. J. Angell, M. G. Apte (2003) Indoor air quality, ventilation and health symptoms in schools: an analysis of existing information Indoor Air

Why Build 4 Green Schools in Sudbury -West?

- Researchers reported total volatile organic compounds, formaldehyde and microbiological including allergens in deposited dust, fungi, and bacteria in classrooms at levels sufficient to affect sensitive occupants. Asthma and 'sick building syndrome' symptoms are commonly reported.
- Causal relationships between health symptoms and exposures to specific pollutants suggest that such symptoms in schools are related to exposures to
  - formaldehyde
  - nitrogen dioxide NO2
  - high levels of carbon dioxide CO2
  - molds and microbial, and allergens

J. M. Daisey, W. J. Angell, M. G. Apte (2003) Indoor air quality, ventilation and health symptoms in schools: an analysis of existing information Indoor Air

Why Build 4 Green Schools in Sudbury -West?

- Persuasive evidence links higher indoor concentrations of nitrogen dioxide NO2 to reduced school attendance suggestive evidence links low ventilation rates to reduced performance.
- Also, much evidence links poor indoor environmental quality IEQ (for example low ventilation rate, excess moisture, or formaldehyde) with adverse health effects in children and adults, document dampness problems and inadequate ventilation is common in schools.

M. J. Mendell, G. A. Heath (2005) Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature Indoor Air

Why Build 4 Green Schools in Sudbury -West?

- Overall, evidence suggests that poor indoor environmental quality IEQ in schools is common and adversely influences the performance and attendance of students, primarily through health effects from indoor pollutants.
- Immediate actions are warranted in schools to prevent dampness problems, inadequate ventilation, and excess indoor exposures.

M. J. Mendell, G. A. Heath (2005) Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature Indoor Air

Why Build 4 Green Schools in Sudbury -West

- Great things are happening in Greater Sudbury.
- Ensure the new green schools reflects the Greater Sudbury plans $30 million investment to build Sports Facility, $60 million investment to build new Arts Center and the new state-of the-art $363 million project for the new Sudbury Regional hospital boosting the new pathology unit. Provincial government promised with 90% funding for the new hospital.
- Vale INCO invested $4 million re-greening project to rid of the slag piles dominating Gatchell and the West End will be under a carpet of green grass to prove the large mining company can be a good neighbour.
- With nickel prices increasing the time to invest is now ... According to city councilors for 2008 budget.

What does this mean?

A clear definition of sick building syndrome and indoor air pollution

What is ‘sick building syndrome’?

- Sick building syndrome (SBS) is a combination of over 50 possible illness associated with the contributing factors often relate to the design of the built environment.

Sick Building Syndrome http://en.wikipedia.org/wiki/Sick_building_syndrome

Causes of ‘sick building syndrome’

- Indoor air pollution (high temperatures and humidity increases formaldehyde + nitrogen dioxide emit, dust, pollen, allergen, high levels of carbon dioxide and natural radon from entry cracks in basements)
- Toxic mold
- Artificial fragrance
- Poor or inappropriate lighting - including absence of or only limited access to natural sunlight (formaldehyde from lighting and fuel sources, nitrogen dioxide)
- Poor heating or ventilation (increases poor air quality)
- Microbial or mite contamination of HVAC systems (indication of condensation on windows)
- Bad acoustics (mechanical vibration)
- Poorly designed furnishings, furniture and equipment- e.g. computer monitors, photocopiers (formaldehyde and nitrogen dioxide fumes emitted)
- Poor ergonomics (concerning humans - design of objects, systems and environment for human use)
- Chemical contamination (gases, combustion fuels, electronic appliances (photocopiers emit formaldehyde + nitrogen dioxide), household cleaners)
- Biological contamination (molds, allergen, antigens, bacterial, feces)

Facts about indoor air pollution US and Canadian statistics

- According to Canadian Lung Association 90% of Canadians spend most of their time indoors contributing to 1900 deaths per year from radon lung cancer.
- According to US EPA estimates air pollution is responsible for 12,000 premature mortalities, 15,000 heart attacks, 754,000 emergency room visits by children with asthma, and 8,900 respiratory-related hospital admissions each year.
- US EPA Asthma afflicts 14 million school days missed each year.

Canadian Lung Association http://www.lung.ca/protect-protegez/pollution-pollution/indoor-interieur/index_e.php
Air Pollution http://en.wikipedia.org/wiki/Air_pollution
Effectiveness of Emergency Department Asthma Management Strategies on Return Visits in Children: A Population-Based Study http://pediatrics.aappublications.org/cgi/content/full/120/6/e1402

Facts about indoor air pollution US and Canadian statistics

- US EPA studies show that 1 in 5 of 110,000 schools reported unsatisfactory indoor air quality, and 1 in 4 schools reported ventilation as unsatisfactory. Students are at greater risk because of the hours spent in school facilities and because children are especially susceptible to pollutants.
- US EPA studies prove poor indoor air quality IAQ can impact the comfort and health of students and staff relating to affect concentration, attendance, and student performance. In addition, if schools fail to respond promptly to poor indoor air quality IAQ, students are at increased risk of short-term health problems, such as fatigue and nausea, as well as long-term problems like asthma.
- According to the 1984 World Health Organization 30% of new and remodelled buildings worldwide may be linked to symptoms of 'sick building syndrome'. Most of the sick building syndrome is related to poor indoor air quality.

Indoor Air Quality http://www.epa.gov/iaq/index.html
Sick building syndrome http://en.wikipedia.org/wiki/Sick_building_syndrome

Facts about Asthma
Canadian statistics

- According to ICES and Asthma Society of Canada
- One in 5 children (630,000) has asthma

To T, Dell S, Dick P, Cicutto L, Harris J, Tassoudji M, Duong-Hua M. (2004) ICES Report: Report on the Burden of Asthma. Institute for Clinical Evaluative Studies. (ICES)
Asthma Society of Canada
http://www.asthma.ca/adults/Asthma_Society_2007_Special_Information_Supplement.pdf

Facts about Asthma
Canadian statistics

- According to ICES the average 6 year olds have the risk of developing asthma before age 40 is one in 4 chance in boys and one in 3 chance in girls.

Exhibit 2.1 Risk (percentage) of developing asthma before the age of 40 years, from a given age, in Ontario

Age (years)	Birth	School age	Early adolescence	Late adolescence	Early adulthood	Adulthood	
	0	6	12	18	24	30	36
Overall risk* (%)	41.2	25.9	20.0	16.0	12.3	8.2	3.5
Male (%)	42.3	23.4	16.4	12.8	10.1	6.7	2.7
Female (%)	40.2	28.1	23.3	19.0	14.5	9.6	4.1

*The risk of developing asthma is calculated based on age- and sex-specific asthma incidence and mortality rates for Ontario in 2001, and on life tables based on 1995–1997 all-cause mortality rates.

To T, Gershon A, Tassoudji M, Guan J, Wang C, Estrabillo E, Cicutto L. (2006) ICES Report: *Report on the Burden of Asthma in Ontario.* Institute for Clinical Evaluative Studies. (ICES)

Facts about Asthma
Canadian statistics

- As a result, there are likely to be several children in each classroom with asthma.

To T, Dell S, Dick P, Cicutto L, Harris J, Tassoudji M, Duong-Hua M. (2004) ICES Report: Report on the Burden of Asthma. Institute for Clinical Evaluative Studies. (ICES)

Facts about Asthma
Canadian statistics

- According to Asthma Society of Canada more than 3 million Canadians have asthma – one of the highest national rates in the world. Each year more than 500 adults and 20 children in Canada die from asthma. Asthma is the number #1 reason Canadian children visit the emergency rooms. More than 60% of Canadians with asthma do not have it under good control. More than half of the people with asthma tolerate their symptoms because they do not realize their condition can be better controlled. On average Canadians with asthma miss 34 workdays per year.

Asthma Society of Canada
http://www.asthma.ca/adults/Asthma_Society_2007_Special_Information_Supplement.pdf

Relationship between pollutant, moisture and ventilation in sick building syndrome

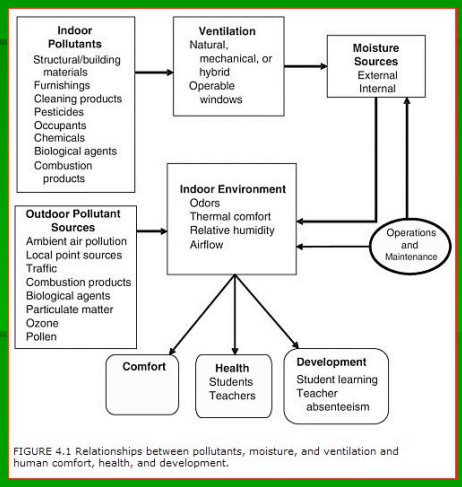


FIGURE 4.1 Relationships between pollutants, moisture, and ventilation and human comfort, health, and development.

Green Schools: Attributes for Health and Learning (2006)
http://books.nap.edu/openbook.php?record_id=11756&page=56

What is Formaldehyde?

- Low formaldehyde concentrations (<0.05 ppm) can increased risks for allergen sensitivities, chronic irritation, and cancer.
- Formaldehyde is used to make other chemicals, building materials, and household products. It is chemical compounds called volatile organic compounds or "VOCs". The term volatile means that the compounds vaporize, that is, become a gas, at normal room temperatures.

Formaldehyde http://en.wikipedia.org/wiki/Formaldehyde

J. M. Daisey, W. J. Angell, M. G. Apte (2003) Indoor air quality, ventilation and health symptoms in schools: an analysis of existing information Indoor Air

What is Formaldehyde?

- According to Consumer Product Commission (1997) formaldehyde is widely industrial chemical used to make building materials, and household products that can found in schools
- You can find building material without formaldehyde.

Consumer Product Commission (1997) http://www.cpsc.gov/CPSCPUB/PUBS/725.html

Why is Low Level Formaldehyde Test Kit needed for Schools?

- According to Air Quality Sciences AQS Individual volatile organic compounds may be well below odor thresholds or known toxic levels,
- But when they join up with other chemicals in complex mixtures,
- These chemicals may cause health problems not seen at higher levels.

Air Quality Sciences Offers a Powerful Tool for Combating Indoor Air Chemicals in Schools http://findarticles.com/p/articles/mi_pwwi/is_200601/ai_n15974545

Why is Low Level Formaldehyde Test Kit needed for Schools?

- Most indoor air standards are written for commercial office buildings, but a typical school can have up to four times as many people as an office building with the same amount of floor space -- and most of these people are children who are still growing and developing.
- Children also breathe in more air in proportion to their body size than adults, which puts them at higher risk for accumulating large enough exposures to volatile organic compounds and other industrial chemicals over time to cause serious health and developmental problems.

Air Quality Sciences Offers a Powerful Tool for Combating Indoor Air Chemicals in Schools http://findarticles.com/p/articles/mi_pwwi/is_200601/ai_n15974545

What is Low Level Formaldehyde Test Kit for School?

- According to Air Quality Sciences AQS airborne formaldehyde, a carcinogen, still remains a chemical of great concern in schools.
- The GREENGUARD Certification for Children & Schools standard is the first standard that addresses the threat of exposure to low levels of formaldehyde and is available free of charge on the GEI website, www.greenguard.org. Information visit website at www.aqs.com and click on the "Test Kit" tab.

Black M. (2006) Air Quality Sciences Offers a Powerful Tool for Combating Indoor Air Chemicals in Schools. January 2006 http://findarticles.com/p/articles/mi_pwwi/is_200601/ai_n15974545

What is Nitrogen Dioxide?

- According to EPA the two most prevalent oxides of nitrogen are nitrogen dioxide (NO2) and nitric oxide (NO). Both are toxic gases with nitrogen dioxide being a highly reactive oxidant and corrosive. The primary sources indoors are combustion processes, such as unvented combustion and electronic appliances that are found in schools, for example photocopier.

EPA Indoor Air Quality Nitrogen Dioxide http://www.epa.gov/iaq/no2.html
S. K. Brown (1999) Assessment of Pollutant Emissions from Dry-Process Photocopiers Indoor Air 9 http://www.blackwell-synergy.com/doi/abs/10.1111/j.1600-0668.1999.00005.x

Photocopiers emits VOCs

- Photocopiers have been investigated to find Volatile organic compound (VOC) emissions to occur at a constant rate dependent on copy speed. Increases in volatile organic compound emission rates per copy due to increases in chamber temperature (e.g. - a 20% increase in volatile organic compound from increasing temperature from 23°C to 32°C) or changing from single- to double-sided operation (40% increase). Respiration particle emissions occurred under copier-idle mode (probably from residues in the machine) as well as with copying. Small emissions of nitrogen dioxide, ozone and formaldehyde were observed.

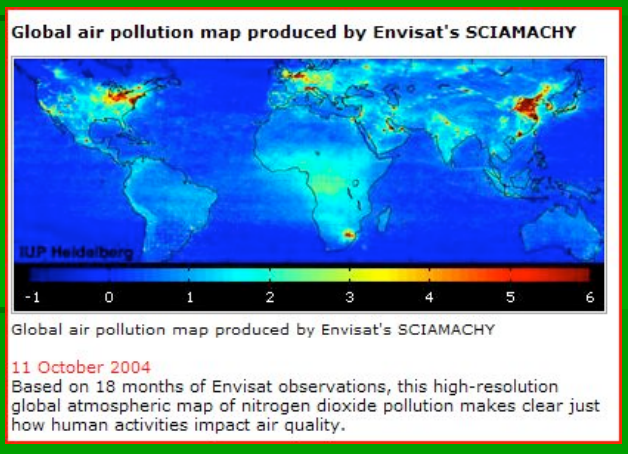
S. K. Brown (1999) Assessment of Pollutant Emissions from Dry-Process Photocopiers Indoor Air 9 http://www.blackwell-synergy.com/doi/abs/10.1111/j.1600-0668.1999.00005.x

What is Nitrogen Dioxide?

- Nitrogen dioxide is toxic by inhalation. Symptoms of poisoning (lung edema) tend to appear several hours after one has inhaled a low but potentially fatal dose. Also, low concentrations (4 ppm) will cause lack of feeling to the nose, thus creating a potential for overexposure.
- According to European Space Agency Nitrogen dioxide (NO_2) is a mainly man-made gas, excess exposure to cause lung damage and respiratory problems. It also plays an important role in atmospheric chemistry, because it leads to the production of ozone.

Nitrogen Dioxide http://en.wikipedia.org/wiki/Nitrogen_dioxide
European Space Agency http://www.esa.int/esaEO/SEM340NKPZD_index_0.html

Global Visual View Nitrogen Dioxide



European Space Agency http://en.wikipedia.org/wiki/Nitrogen_dioxide

What is High Levels of Carbon Dioxide?

- Humans are the main indoor source of carbon dioxide emitted by humans metabolism and respiration.
- Breathing is stimulated by higher carbon dioxide levels. As a result, breathing low-pressure air or a gas mixture with reduced oxygen may lead to loss of consciousness.
- Carbon dioxide content in fresh air varies between 300 to 600ppm, depending on the location. A person's exhaled breath is approximately 450ppm carbon dioxide.
- In indoor spaces occupied by people the carbon dioxide concentration will reach higher levels. To eliminate most Indoor Air Quality complaints, total indoor Carbon dioxide ppm levels CDPL must be reduced to below 600ppm.

Carbon Dioxide http://en.wikipedia.org/wiki/Carbon_dioxide

What is High Levels of Carbon Dioxide?

- Reported poor ventilation and high levels of carbon dioxide CO2 data strongly indicate that ventilation is inadequate in many classrooms, leading to health symptoms
- US evidence suggests that indoor environmental quality (IEQ) adversely influences the performance and attendance of students, primarily through health effects from indoor pollutants.

M. J. Mendell, G. A. Heath (2005) Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature Indoor Air

Building Ventilation Standard

- According EPA Building ventilation standards 15 cubic feet per minute (cfm) of outside air for each building occupant and 20 cubic feet per minute (cfm) for each building occupants in offices, gymnasium and play floors.
-

Ventilation and Air Quality in Offices http://www.epa.gov/iaq/pubs/ventilat.html

Ontario Anti-Smog Action Plan 2015

- According to The Ontario Medical Association, The implementation of the Ontario Anti-Smog Action Plan was originally targeted to 2015. The government recently announced that it would seek to achieve these goals by 2010. It should be noted that the program is voluntary and the goals may or may not be achieved. Full achievement of its targets would save Ontario annually in avoided health damages about 290 premature deaths, 2000 hospital admissions and 7,700 emergency room visits. As well, the number of minor illness cases would drop by about 6 million.

The Illness Costs of Air Pollution (ICAP) is a report commissioned by the Ontario Medical Association (OMA), The Illness Costs of Air Pollution in Ontario (2007) http://www.oma.org/phealth/icap.htm

Ontario Anti-Smog Action Plan 2015

- But after full implementation of the smog plan in 2015, Ontario would still experience in the order of 2,500 premature deaths, 13,000 hospital admissions, 18,500 emergency room visits and 46 million minor illness cases per year, which would be attributable to air pollution.

The Illness Costs of Air Pollution (ICAP) is a report commissioned by the Ontario Medical Association (OMA), The Illness Costs of Air Pollution in Ontario (2007) http://www.oma.org/phealth/icap.htm

Conclusions...

- Environmental testing is urgent in all schools since our children are at high risk to exposure to
  - formaldehyde volatile organic compounds (HVOC)
  - NO2
  - high levels of CO2
  - poor ventilation
  - molds and microbial, and allergens

Conclusions…

- Asthma prevalence diagnosed by doctor and risk of developing Asthma is increasing in school-age children and the rate increases in adolescent
- We can not ignore the effects of indoor air quality in our schools is doing to our children

Conclusions…

- According to researchers the best time to perform environmental study is performed during the months of
  - August -September before and after new fiscal year begins
  - April [allergy season]
  - May-June [when hot weather arrives]

We want the best for our children

The Green School option

Evidence-Based Research

Special Thanks and Acknowledgement

- Conversation and special thanks and acknowledgements
- Health Canada
- CHMC
- Ontario Lung Association
- Canadian Lung Association
- http://www.lung.ca/protect-protegez/pollution-pollution/indoor-interieur/index_e.php
- Sudbury District Health Unit
  - Kasie Rautiainen, Reg. N., BScN, PHN 522-9200, ext. 362 Asthma program in schools
- Institute for Clinical Evaluative Studies (ICES)
  - Jun Guan, Senior Analyst
- Nation Research Council Canada
  - Girish Patel PhD Microbiology and leader in Biological Sciences
- Institute for Clinical Evaluative Studies (ICES)
  - To T, Gershon A, Tassoudji M, Guan J, Wang C, Estrabillo E, Cicutto L. (2006) Report on the Burden of Asthma in Ontario
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Special Thanks and Acknowledgement

- Public Health Agency of Canada,
  - Respiratory Disease in Canada (2001) new study coming out in Fall 2007
- 1984 World Health Organization
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  - Special Information (2007) http://www.asthma.ca/adults/Asthma_Society_2007_Special_Information_Supplement.pdf
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  - http://www.asthma.ca/adults/Asthma_Society_2007_Special_Information_Supplement.pdf

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- Formaldehyde
  - Air Quality Sciences Offers a Powerful Tool for Combating Indoor Air Chemicals in Schools http://findarticles.com/p/articles/mi_pwwi/is_200601/ai_n15974545
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  - http://en.wikipedia.org/wiki/Formaldehyde
  - Consumer Product Safety Commission. An Update On Formaldehyde: 1997 Revision http://www.cpsc.gov/CPSCPUB/PUBS/725.html
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    - Contact: Kelley Gullison Email Contact www.aqs.com

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  - EPA Indoor Air Quality Nitrogen Dioxide http://www.epa.gov/iaq/no2.html
  - European Space Agency http://en.wikipedia.org/wiki/Nitrogen_dioxide
  - S. K. Brown (1999) Assessment of Pollutant Emissions from Dry-Process Photocopiers Indoor Air 9 http://www.blackwell-synergy.com/doi/abs/10.1111/j.1600-0668.1999.00005.x
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  - Air Quality Sciences Offers a Powerful Tool for Combating Indoor Air Chemicals in Schools http://findarticles.com/p/articles/mi_pwwi/is_200601/ai_n15974545
  - Air Pollution http://en.wikipedia.org/wiki/Air_pollution

Special Thanks and Acknowledgement

- Greater Sudbury
  - (Sudbury Star, June 15, 2007) Sudbury Regional Hospital's Northeastern Regional Forensic Pathology Unit was officially opened in a new, larger location and was named a centre of excellence in Ontario. Staff conduct about 250 post-mortems a year there. http://thesudburystar.com/PrintArticle.aspx?e=834686
  - (Northern Life, Date Published | Jun. 19, 2007) New forensic pathology unit in Sudbury. http://www.northernlife.ca/News/LocalNews/2007/06-18-07-forensic.asp?NLStory=06-18-07-forensic
  - (Northern Life, Date Published | Jun. 21, 2007 Hospital borrows final $10 million for construction. http://www.northernlife.ca/News/LocalNews/2007/06-19-07-borrow.asp?NLStory=06-19-07-borrow