Making the Links
Environmental Health, Equity & the Law Workshop:
Environmental Health in the Workplace

Hamilton

John Oudyk MSc CIH ROH
Occupational Hygienist
November 2, 2010
Occupational Health Clinics for Ontario Workers (OHCOW)

- an inter-disciplinary occupational health team:
  - occupational physicians
  - occupational health nurses
  - ergonomists
  - occupational hygienists

- funded by WSIB Prevention Services
OHCOW Clinic Services:

1. individual client (clinical)
2. answer questions (work/health related)
3. informational presentations
4. workplace visits
   - requested by co-chairs of JH&SC
5. exposure/health investigations
   - medical/hygiene/ergonomic combined
What OHCOW does:

**Exposure**
- to what
- how much
- how long
- toxicology

**Medical**
- symptoms
- tests results
- physical exam
- diagnosis

**Work Relatedness**
- epidemiological review
- strength of association

**Prevention**
Options:

1) look at the disease – working from the disease backwards to the exposures

- **Exposure**
  - to what
  - how much
  - how long
  - toxicology

- **Medical**
  - diagnosis
  - tests results
  - physical exam
  - treatments

- **Work Relatedness**
  - is the exposure linked?
  - how strong is the link?
Options:

2) look at the exposures – working from the exposure to the disease

1. Exposure
   - to what
   - how much
   - how long
   - toxicology

2. Medical
   - diagnosis
   - tests results
   - physical exam
   - treatments

Work Relatedness
   - is the exposure linked?
   - how strong is the link?
Let’s start with the exposures …

- How do you know which chemicals cause what diseases?
THE SCIENTIFIC COMMUNITY
IS DIVIDED.
SOME SAY THIS STUFF IS
DANGEROUS, SOME SAY
IT ISN'T.
if the scientists are arguing, what can a lay person do?

• there are organizations which gather evidence and decide what causes cancer and what doesn’t

• different organizations have different criteria
  – International Agency for Research on Cancer (IARC)
  – National Toxicology Program (NTP)
IARC* classification of carcinogens

Group 1 – Confirmed carcinogen
Group 2
  2A – Probable carcinogen
  2B – Possible carcinogen
Group 3 – Not classifiable
Group 4 – Probably not carcinogenic

*International Agency for Research on Cancer
Scenario:

- A mechanic using parts cleaner with Varsol for many years has skin cancer and wonders if the Varsol might have caused it?
aspects of determining work-relatedness

**Exposure**
- to what
- how much
- how long
- toxicology

**Medical**
- diagnosis
- tests results
- physical exam
- treatments

**Work Relatedness**
- is the exposure linked?
- how strong is the link?
Options:

1) look at the exposures – working from the exposure to the disease

- Exposure
  - to what
  - how much
  - how long
  - toxicology

- Medical
  - diagnosis
  - tests results
  - physical exam
  - treatments

- Work Relatedness
  - is the exposure linked?
  - how strong is the link?
## Reportable Hazardous Substance(s) or Complex Substance(s):  

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS#</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stoddard solvent</td>
<td>8052-41-3</td>
<td>100%</td>
</tr>
</tbody>
</table>

## Hazardous Constituent(s) Contained in Complex Substance(s):  

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS#</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl Benzene</td>
<td>100-41-4</td>
<td>0.1-0.5%</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>0.1-0.5%</td>
</tr>
<tr>
<td>Nonane</td>
<td>111-84-2</td>
<td>1-5%</td>
</tr>
<tr>
<td>Pseudocumene (1,2,4-Trimethylbenzene)</td>
<td>95-63-6</td>
<td>1-5%</td>
</tr>
<tr>
<td>Xylenes</td>
<td>1330-20-7</td>
<td>0.1-0.9%</td>
</tr>
</tbody>
</table>

search IARC database

International Agency for Research on Cancer (IARC) - Summaries & Evaluations

- International Agency for Research on Cancer (IARC) - Summaries and Evaluations
  - Introduction
  - 1,1,1,2-Tetrachloroethane (IARC Summary & Evaluation, Volume 71, 1999)
  - 1,1,1-Trichloroethane (IARC Summary & Evaluation, Volume 71, 1999)
  - 1,1,2,2-Tetrachloroethane (IARC Summary & Evaluation, Volume 71, 1999)
  - 1,1,2-Trichloroethane (IARC Summary & Evaluation, Volume 52, 1991)

http://www.inchem.org/pages/iarc.html
IARC database results:

**stoddard solvent** (100%)  IARC Group 3

ethylbenzene (0.1-0.5%%%)  IARC Group 2B

naphthalene (0.1-0.5%%%)  IARC Group 2B

xylenes (0.1-0.9%%%)  IARC Group 3
check Haz-Map by agent

http://hazmap.nlm.nih.gov/
Haz-Map results for Stoddard Solvent

Adverse Effects

- **Neurotoxin**: CNS Solvent Syndrome
- **Hepatotoxin**: Hepatotoxin, Secondary
- **Nephrotoxin**: Yes

Diseases

Diseases associated with exposure to this agent:

- **Encephalopathy, chronic solvent**
- **Solvents, acute toxic effect**
does Varsol cause skin cancer?

- mostly a IARC category 3 carcinogen
- has trace amounts of IARC category 2B carcinogens:
  - naphthalene associated with lung cancer in animals
  - ethylbenzene caused lung and kidney cancers in animals
- is this relevant to human skin cancer?
let’s look from the other side:

- start with disease – skin cancer
Options:

2) look at the disease – working from the disease backwards to the exposures

Exposure
- to what
- how much
- how long
- toxicology

Medical
- diagnosis
- tests results
- physical exam
- treatments

Work Relatedness
- is the exposure linked?
- how strong is the link?
Check Haz-Map by disease

http://hazmap.nlm.nih.gov/
<table>
<thead>
<tr>
<th>Disease/Syndrome</th>
<th><strong>Skin cancer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments</td>
<td>The major risk for outdoor workers is exposure to ultraviolet light. Other agents carcinogenic to the skin include: <strong>PAHs</strong> (coal tar, shale oil, or mineral oils); arsenic (pesticide manufacturing; sheep dip; copper, lead or zinc smelting); and ionizing radiation (radiologists); [LaDou, p. 254-7]</td>
</tr>
<tr>
<td>Latency/Incubation</td>
<td>Years</td>
</tr>
<tr>
<td>Related Information in Haz-Map</td>
<td></td>
</tr>
<tr>
<td>Agents</td>
<td>Hazardous agents that cause this disease:</td>
</tr>
<tr>
<td></td>
<td><strong>Arsenic and compounds</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Coal tar pitch volatiles</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Radiation, ionizing</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Shale oils</strong></td>
</tr>
</tbody>
</table>

http://hazmap.nlm.nih.gov/cgi-bin/hazmap_generic?tbl=TblDiseases&id=32
CHE Toxicant and Disease Database

• The CHE Toxicant and Disease Database is a searchable database that summarizes links between chemical contaminants and approximately 180 human diseases or conditions.

• put on the web by the Collaborative on Health and the Environment (CHE)

http://database.healthandenvironment.org/index.cfm
CHE Toxicant and Disease Database

The new CHE Toxicant and Disease Database is a searchable database that summarizes links between chemical contaminants and approximately 180 human diseases or conditions. Diseases and/or toxicants can be viewed by clicking on the diseases below or by utilizing the search engine in the column on the right. For a full description of the database and its limitations, please click here.

For questions or comments about the database, please contact Eleni Sotos at Eleni@HealthandEnvironment.org.

Displaying diseases in alphabetical order.

- Abnormal sperm (morphology, motility, and sperm count)
- Acrystostolysis (vinyl chloride disease)
- Acute hepatocellular injury (Hepatitis)
- Acute tubular necrosis
- ADD/ADHD, hyperactivity
- Adrenal cancer
- Adult-onset Leukemias *
- Alopecia (hair loss)
- ALS (Lou Gehrig’s disease)
<table>
<thead>
<tr>
<th>CHE Toxicant and Disease Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin cancer (non-melanoma)</td>
</tr>
<tr>
<td>Causes [strength of evidence]</td>
</tr>
<tr>
<td>• arsenic+ [Strong]</td>
</tr>
<tr>
<td>• Coal tars+ [Strong]</td>
</tr>
<tr>
<td>• Ionizing radiation+ [Strong]</td>
</tr>
<tr>
<td>• Mineral oils+ [Strong]</td>
</tr>
<tr>
<td>• Shale oils+ [Strong]</td>
</tr>
<tr>
<td>• UV radiation+ [Strong]</td>
</tr>
<tr>
<td>• Aromatic amines [Good]</td>
</tr>
<tr>
<td>• Arsenical pesticides [Good]</td>
</tr>
<tr>
<td>• benz[a]anthracene [Good]</td>
</tr>
<tr>
<td>• benzo(a)pyrene [Good]</td>
</tr>
<tr>
<td>• Creosotes # [Good]</td>
</tr>
<tr>
<td>• dibenz(a,h)anthracene [Good]</td>
</tr>
<tr>
<td>• dimethyl benzanthracene [Good]</td>
</tr>
<tr>
<td>• ethylene oxide [Good]</td>
</tr>
<tr>
<td>• methylcholanthrene [Good]</td>
</tr>
<tr>
<td>• PAHs [Good]</td>
</tr>
<tr>
<td>• Pesticides [Good]</td>
</tr>
<tr>
<td>• acrylamide # [Limited]</td>
</tr>
<tr>
<td>• vinyl chloride [Limited]</td>
</tr>
</tbody>
</table>

Notes

+ - Group 1 human carcinogen. # - Group 2A human carcinogen (IARC). Skin cancer
**Skin cancer (non-melanoma)**

**Causes** [strength of evidence]:

<table>
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<tr>
<th>Cause</th>
<th>Strength of Evidence</th>
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<tbody>
<tr>
<td>arsenic</td>
<td>Strong</td>
</tr>
<tr>
<td>ionizing radiation</td>
<td>Strong</td>
</tr>
<tr>
<td>shale oils</td>
<td>Strong</td>
</tr>
<tr>
<td>aromatic amines</td>
<td>Good</td>
</tr>
<tr>
<td>benz(a)anthracene</td>
<td>Good</td>
</tr>
<tr>
<td>creosotes</td>
<td>Good</td>
</tr>
<tr>
<td>dimethyl benzanthracene</td>
<td>Good</td>
</tr>
<tr>
<td>methylicholanthrene</td>
<td>Good</td>
</tr>
<tr>
<td>pesticides</td>
<td>Good</td>
</tr>
<tr>
<td>acrylamide</td>
<td>Limited</td>
</tr>
<tr>
<td>coal tars</td>
<td>Strong</td>
</tr>
<tr>
<td>mineral oils</td>
<td>Strong</td>
</tr>
<tr>
<td>UV radiation</td>
<td>Strong</td>
</tr>
<tr>
<td>arsenical pesticides</td>
<td>Good</td>
</tr>
<tr>
<td>benzo(a)pyrene</td>
<td>Good</td>
</tr>
<tr>
<td>dibenz(a,h)anthracene</td>
<td>Good</td>
</tr>
<tr>
<td>ethylene oxide</td>
<td>Good</td>
</tr>
<tr>
<td>PAHs</td>
<td>Good</td>
</tr>
<tr>
<td>vinyl chloride</td>
<td>Limited</td>
</tr>
</tbody>
</table>

**Notes:** + - Group 1 human carcinogen, # - Group 2A human carcinogen (IARC), Skin cancer caused by chemical exposure can take 20-50 years to manifest.

**References:**

[http://database.healthandenvironment.org/index.cfm](http://database.healthandenvironment.org/index.cfm)
Some items for follow-up:

- PAH’s – polycyclic aromatic hydrocarbons – could they be in Varsol?
  - Not according to the MSDS

- But what is the Varsol used for?
  - Cleaning dirt off parts – what’s in the dirt?
Is skin cancer related to a mechanic’s exposure to Varsol?

- probably not to clean Varsol, but, ...
- Varsol with soot and dirt from dirty engine parts could contain PAH’s which can cause lung cancer, ...
- next step – review exposure in greater detail
making the link …

• given that:
  – worker has many years (20+) of skin exposure to Varsol of on average 2-3 hours per day of “wet” skin on the hands (latency & significant exposure)
  – Varsol used to clean engine parts which have soot (PAH’s) on them (presence/exposure to carcinogens)
  – skin cancer being related to PAH’s and soot (exposure-disease link)

… therefore, there is evidence to suggest an occupational contribution to the skin cancer
Tools for identifying diseases:

- Body mapping
- Surveys
- Geographical exposure mapping
- Epidemiological mapping
Body mapping:

Types of Information used in Mapping

• Symptoms/conditions (where does it hurt?)
  – First aid reports
  – Health Information
  – Workers who have left the job
  – Absenteeism

• Hazard information
  – Accidents
  – Chemicals, physical hazards, biological
  – Psycho-social hazards
Body mapping:

http://www.hazards.org/diyresearch/images.htm
Body mapping:

http://www.hazards.org/diyresearch/images.htm
Body mapping:

http://www.hazards.org/diyresearch/images.htm
I am committed to participatory research (PR) as an epistemological framework that promotes critical engagement with marginalized communities (of space and practice) in order to open up alternative routes for 'doing' geography. PR methods allow involving local stakeholders from the initial research design to data collection, interpretation, and final recommendations. Over the years, I have used change matrices, village and resource flow mapping, Venn diagrams, focus groups, group drawings, agricultural calendars, ranking, piling, and scoring, visual household budgets, participatory GIS, conceptual mapping (mental models), hazard mapping, vision mapping, body health mapping, environmental theatre, and, most recently, participatory video. Try it!

www.geog.psu.edu/people/tschakert/
What is geomatics?

Geomatics is the discipline of gathering, storing, processing, and delivering geographic information, or spatially referenced information.

http://en.wikipedia.org/wiki/Geomatics
Google Earth:
Google maps:
NPRI data:
Local NPRI reporting sites:
Local NPRI reporting sites:
Local NPRI reporting sites:

Columbian Chemicals Canada ULC - Columbian Chemicals

Pollutant releases, discharges and transfers for recycling involving criteria air contaminants:

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Releases to Air</th>
<th>Releases to Water</th>
<th>Releases to Land</th>
<th>Total Releases</th>
<th>Total Disposal</th>
<th>Transfers to Recycling</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>120-11-7</td>
<td>0</td>
<td></td>
<td>0.005</td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Benzylphenanthrene</td>
<td>98-65-3</td>
<td>0.006</td>
<td>0.006</td>
<td>6.078</td>
<td>6.078</td>
<td>0.006</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Benzo[a]pyrenene</td>
<td>208-01-9</td>
<td>0.002</td>
<td>0.002</td>
<td>7.073</td>
<td>7.073</td>
<td>0.002</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Benzo[b]fluoranthene</td>
<td>50-32-8</td>
<td>0.890</td>
<td>0.890</td>
<td>5.547</td>
<td>5.547</td>
<td>0.890</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Benzo[a]anthracene</td>
<td>205-89-2</td>
<td>0.007</td>
<td>0.007</td>
<td>2.197</td>
<td>2.197</td>
<td>0.007</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Benzo[a]pyrene</td>
<td>205-83-3</td>
<td>0.006</td>
<td>0.006</td>
<td>1.400</td>
<td>1.400</td>
<td>0.006</td>
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<td>kg</td>
</tr>
<tr>
<td>Benzo[ghi]perylene</td>
<td>207-30-9</td>
<td>0.006</td>
<td>0.006</td>
<td>1.358</td>
<td>1.358</td>
<td>0.006</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Carbon disulphide</td>
<td>75-15-0</td>
<td>3.22</td>
<td>3.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Carbon disulphide</td>
<td>463-59-1</td>
<td>0.445</td>
<td>0.445</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>208-42-0</td>
<td>3.123</td>
<td>3.123</td>
<td>64.369</td>
<td>64.369</td>
<td>3.123</td>
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<td>kg</td>
</tr>
<tr>
<td>Hydrogen sulphide</td>
<td>7783-18-4</td>
<td>10.19</td>
<td>10.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Mercury (and its compounds)</td>
<td>NA-10</td>
<td>0.07</td>
<td>0.07</td>
<td>7.6</td>
<td>7.6</td>
<td>0.07</td>
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<td>kg</td>
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<tr>
<td>Naphthalene</td>
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<tr>
<td>Phenanthrene</td>
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<td>0.194</td>
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<td>64.042</td>
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<td></td>
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</tr>
<tr>
<td>Phtene</td>
<td>129-90-0</td>
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<td>3.348</td>
<td>52.545</td>
<td>52.545</td>
<td>3.348</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Sulphuric acid</td>
<td>7681-50-0</td>
<td>1.633</td>
<td>1.633</td>
<td>27.83</td>
<td>27.83</td>
<td>1.633</td>
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<tr>
<td>Total Reduced Sulphur (TRS)</td>
<td>NA-M14</td>
<td>13.06</td>
<td>13.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
</tbody>
</table>

*Note: May not include total releases for certain substances due to the fact that the total releases of an NPRI Part 1A substance were less than one tonne, facilities may choose to report only the total releases of that substance.

**Total Disposal: This column includes 'On-site Disposal', 'Off-site Disposal' and 'Off-site Treatment Prior to Final Disposal'**
### Local NPRI reporting sites:

**Columbian Chemicals Canada ULC - Columbian Chemicals**

**Pollutant releases, disposals and transfers for recycling (excluding criteria air contaminants):**

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Releases to Air</th>
<th>Releases to Water</th>
<th>Releases to Land</th>
<th>Total Releases</th>
<th>Total Disposal</th>
<th>Transfers for Recycling</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracene</td>
<td>120-12-7</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0.025</td>
<td></td>
<td>tonnes</td>
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<tr>
<td>Benzo(a)anthracene</td>
<td>56-55-3</td>
<td>0.006</td>
<td></td>
<td></td>
<td>0.006</td>
<td>6.708</td>
<td></td>
<td>kg</td>
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<tr>
<td>Benzo(a)phenanthrene</td>
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<td>0.002</td>
<td></td>
<td></td>
<td>0.002</td>
<td>7.079</td>
<td></td>
<td>kg</td>
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<td>50-32-8</td>
<td>0.485</td>
<td></td>
<td>0.485</td>
<td>0.485</td>
<td>5.547</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>205-99-2</td>
<td>0.027</td>
<td></td>
<td>0.027</td>
<td>0.027</td>
<td>2.197</td>
<td></td>
<td>kg</td>
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<tr>
<td>Benzo(j)fluoranthene</td>
<td>205-82-3</td>
<td></td>
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<td></td>
<td>0.006</td>
<td>1.408</td>
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<tr>
<td>Benzo(k)fluoranthene</td>
<td>207-08-9</td>
<td>0.006</td>
<td></td>
<td></td>
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<td>1.358</td>
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<td>kg</td>
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<td></td>
<td></td>
<td>tonnes</td>
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<tr>
<td>Fluoranthene</td>
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<td>3.123</td>
<td>3.123</td>
<td>64.389</td>
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<td></td>
<td></td>
<td>10.19</td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
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<td>Mercury (and its compounds)</td>
<td>NA - 10</td>
<td>0.97</td>
<td></td>
<td>0.97</td>
<td>0.97</td>
<td>7.6</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0.05</td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>85-01-8</td>
<td>0.194</td>
<td></td>
<td>0.194</td>
<td>0.194</td>
<td>64.042</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Pyrene</td>
<td>129-00-0</td>
<td>3.348</td>
<td></td>
<td>3.348</td>
<td>3.348</td>
<td>52.545</td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Sulphuric acid</td>
<td>7664-93-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
<tr>
<td>Total Reduced Sulphur (TRS)</td>
<td>NA - M14</td>
<td>13.86</td>
<td></td>
<td></td>
<td>13.86</td>
<td></td>
<td></td>
<td>tonnes</td>
</tr>
</tbody>
</table>
Local NPRI reporting sites:

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Releases to Air (Emissions) in tonnes from:</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>This Facility</td>
<td>All Facilities Reporting to the NPRI</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>630-08-0</td>
<td>236.25</td>
<td>924,318</td>
</tr>
<tr>
<td>Oxides of nitrogen (expressed as NO2)</td>
<td>11104-93-1</td>
<td>1,070.6</td>
<td>765,399</td>
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<tr>
<td>PM - Total Particulate Matter</td>
<td>NA-M08</td>
<td>73</td>
<td>186,958</td>
</tr>
<tr>
<td>PM10 - Particulate Matter less than or equal to 10 Microns</td>
<td>NA-M09</td>
<td>73</td>
<td>104,022</td>
</tr>
<tr>
<td>Sulphur dioxide</td>
<td>7446-09-5</td>
<td>2,454</td>
<td>1,562,168</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOCs)</td>
<td>NA-M17</td>
<td>3.227</td>
<td>245,475</td>
</tr>
</tbody>
</table>
A study of the relationships between Parkinson’s disease and markers of traffic-derived and environmental manganese air pollution in two Canadian cities

Murray M. Finkelstein\textsuperscript{a,}* , Michael Jerrett\textsuperscript{b}

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\textsuperscript{b}University of California, Berkeley, USA

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News

- Dr. Malone gave the first joint MIEH-UN-INWEH public lecture, October 13, 2009

Director's Message

Welcome to the McMaster Institute of Environment & Health (MIEH). Building upon the talent and knowledge at McMaster, the goal of MIEH is to facilitate, promote, and publish environmental health research, and to share our expertise with the broader community. Since our establishment in 1996, we have had a long history of interdisciplinary and innovative research studying the complex relationships between the environment and human health. As you look through our list of research projects and reports, you will see that we tend to define both environment...
Cancer Care Ontario

• “The Ontario Health and Environment Integrated Surveillance (OHEIS) Project aims to improve our understanding of the links between environmental hazards/exposures, health outcomes and risk.

• This will be achieved through the development of a comprehensive, standardized geographic information system (GIS) for the rapid assessment of these relationships at large and small scales of geography.

• If successful, it will enable fast and accurate mapping and risk assessment of cancer in Ontario, resulting in CCO being better able to communicate to other public sector agencies and the public at large the nature of spatial variations in cancer rates and the contributions of environmental and modifiable risk factors.”
... any questions, comments? ...