# Human Health Risk Assessment (HHRA)

## Appendix: Public Comments and Responses

Members of the public were invited to comment on the HHRA Technical Report from May 19, 2008 to November 1, 2008. As an important part of the public record of the study, all comments and responses have been collected as an appendix to the final HHRA Report. All persons and groups who provided comments have also received their replies individually.

To be included in the formal public comment process, individuals providing comments were requested to include a name, address, phone number and email address. Questions and comments were to relate directly to the contents of the HHRA report, and were to be submitted in writing, by mail, fax, email, or by using the Online Comment Form on the Sudbury Soils Study website.

A total of 40 formal public comment submissions were received during the comment period. Note that all comments have been reproduced here exactly as received. The SARA Group and the Technical Committee would like to thank all members of the public who took the time and effort to send in their comments and, in doing so, have contributed to the larger community discussion of the report.

The Technical Committee, with the assistance of the SARA Group, has prepared responses to all comments received. Technical Committee study partners for the Sudbury Soils Study include the Sudbury & District Health Unit, the Ontario Ministry of Environment, the City of Greater Sudbury, Health Canada First Nations & Inuit Health, Vale Inco, and Xstrata Nickel.

Residents with general inquiries concerning the Sudbury Soils Study can continue to use the toll-free number (1-866-315-0228) or email address (questions@sudburysoilsstudy.com) to get individual answers to their questions. Note that these questions will not be included as part of the public record.

### How to contact us:


**BY MAIL:** The SARA Group
512 Woolwich St., Suite 2
Guelph, ON N1H 3X7
**BY PHONE**: 1-866-315-0228
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**BY EMAIL:** questions@sudburysoilsstudy.com

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 1
**Submission Date:** May 22, 2008
**Name:** Naomi Grant
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I would like to submit several comments in regard to the results of this study:

1) The methodology models an average exposure for residents. I would suggest the next step would be to look for predictable 'hot-spots' that residents may encounter in every day life. Some examples would be: near slag piles; areas where slag is used in drive-ways/school yards etc; orange water run-off.

   Another big hot spot would be sediments in lakes (and to a lesser extent, waterways), especially Kelly Lake. Although not necessarily immediate sources of exposure, any disturbance of these sediments could lead to potentially high exposures. Given increased human activity around Kelly Lake (and others), it seems important to assess this future risk, to guide behaviour and settlement patterns accordingly, and come up with a long term solution.

2) During random sampling, some properties were found to have higher lead levels than considered acceptable. A logical next step would be to test all surrounding properties so that if residents need to take precautionary steps, they are aware of any risks.

3) Different types of soils leach metals at very different rates. If this was not already done, this should be taken into account in setting the expected exposure for a given concentration.

4) The conclusion has been stated that the history of mining and smelting has been shown to have a negligible risk for human health. Before coming to this conclusion, the limits of this study need to be recognized, and further studies need to be done to fill the gaps. Specifically:

   - This study focused on exposures from soil. The number of sites for air samples was not as extensive, and perhaps would need to be more comprehensive, including possible hotspots such as residential areas near slag piles, railroad yards, etc. In addition, when considering the model female toddler, exposure through direct handling of slag, and climbing on blackened rocks should be added.

- This study focussed on heavy metals. Sulfur dioxide, non-metal particulants, and non-metal sulfur complexes are noticeably present in the air as a result of smelting activities, and are risk factors for respiratory effects, and perhaps other health risks. These need to be assessed.

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## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

1) The standard risk assessment approach for evaluating potential risk to communities is to establish an upper bound average concentration to which individuals within the community may be exposed on a daily basis. While an individual may be exposed to metals from a "hot spot" on a given day for a certain period of time (and these concentrations are included in the overall database used to generate the upper bound average estimate), an individual will not spend all their time at this location (*i.e.*, 24 hours per day, 7 days per week, 52 weeks per year). It is more appropriate to evaluate an upper bound estimate of the average soil concentration for a given chemical of concern to predict an individual's long-term exposure.

   Exposure to sediments in Kelly Lake was not included in the assessment as residents generally have little to no contact with deeper sediments. Beach sand was analyzed by the Ontario Ministry of the Environment and found to contain very low metal levels. However, your comment is noted and metal concentrations should be taken into consideration if lake sediments are to be disturbed.

2) Please note that the residential sampling program was designed and carried out by the Ontario Ministry of the Environment (MOE). As a community study, the results concluded that the sample size identified the representative risk and that other residential properties would statistically be within the same ranges as found during the study. This supports the conclusion that there is likely no more predicted risk to other properties than was indentified by the study and that no further sampling is required.

3) Metal leaching from soils into drinking water sources was evaluated in the assessment through data collected for the chemicals of concern in private wells and for each of the potable water sources in the Greater Sudbury Area.

4) A very detailed discussion of the uncertainties and data gaps in the current assessment is provided in Chapter 7 of the HHRA. To respond to the specific uncertainties you raised, the air monitoring network was quite extensive, and specifically attempted to target potentially impacted areas (i.e., near slag/tailing piles, close to facility stacks, etc.). While there is a potential for a toddler to be handling slag, it is unlikely that this would be a highly frequent occurrence. Furthermore, potential dermal exposures contribute an extremely small percentage of the overall risk (largely due to the poor absorption of these metals from the rocks/slag through the skin). The only potential concern would be if the toddler were licking or consuming fragments of the slag (even then, very little of the

metals would likely disassociate from the slag). Again, it is not expected that this would be a frequent event.

Sulfur dioxide, non-metal particulates, and non-metal sulfur complexes were beyond the scope of the Sudbury Soils Study. Emissions of sulphur compounds and particulates by the mining companies are currently managed through MOE control orders and relevant federal and provincial legislation.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 2
**Submission Date:** May 28, 2008
**Name:** Helen Lacko
**City:**
**Affiliation:**

### Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

To Whom It May Concern:

I attended the Soils Study - thank you - it was informative - my question:

Of the homes that were tested i.e. Copper Cliff that held above the normal amounts of lead in their soil testing - were the surrounding areas tested as well? - it only makes sense that if one home has soil with a higher concentration of lead; the neighbouring homes would be affected as well.

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### Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

As part of the original soil survey conducted by the Ontario Ministry of the Environment during 2001, 10% of the homes in the Greater Sudbury Area (GSA) were randomly sampled. The Sudbury Soils Study was initiated to conduct a more detailed evaluation of potential human health risks to residents throughout the GSA and exposure to metals, including lead, was taken into account on a community basis. The original soil sampling is statistically representative of the entire community. Therefore, there is not more predicted risk to other properties than was indentified by the original sampling program and no further soil sampling is required.

However, any individual with further concerns regarding their individual property can contact the Sudbury Soils Study toll free telephone number for further information at 1- 866- 315-0228.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 3
**Submission Date:** May 29, 2008
**Name:** Monique Beaudoin
**City:**
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Given the complex nature of this report, it is difficult for the average citizen to provide public input in so short a time. Furthermore, during the summer months, many Sudburians are not available, as they travel out of town to cottages or on vacation. The deadline for public input should be moved back by at least another three months to provide people time to fully grasp the technical language of the report, and to comment on it.

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## Response:

Thank you for your comment.

The time period for review of the Sudbury human health risk assessment was extended by an additional three months in response to this and other comments received from the public.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 4
**Submission Date:** July 8, 2008
**Name:** Brennain Lloyd
**City:** Sudbury, ON
**Affiliation:** Northwatch

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Please update the web site to reflect the extended review period. As of this morning, the web site is still stating that comments must be submitted in writing before 11:59 pm on July 31, 2008.

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## Response:

Completed

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 5
**Submission Date:** June 25, 2008
**Name:** Homer Sequin
**City:**
**Affiliation:** Northwatch

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Dear Sudbury Soils Study Group:

The following are my comments and recommendations relative to the Human Health Risk Assessment part of your recently-released report.

Please consider them additional to my verbal comments made at one of your public meetings .

1. I recommend, strongly, that the Study be continued or a new urgent one be undertaken which utilizes a new improved model incorporating the principal listed below.

2. The new study should utilize the dozens of prior studies of S02and heavy metal fallout in the Sudbury area, along with the current study in order to determine the true health risks to the current Sudbury-area population. It must evaluate past exposures, as well as future exposures.

3. The study should also examine the highest risk group of residents which is the current and past living employees of Vale Inco (including prior names), as well as Xstrata (including prior names) plus frequent on-site contractor employees. The study should determine whether this group's on-site exposures coupled with off-site exposures puts them at health risk .

4. The extended or new study should function without Vale Inco or Xstrata representatives being on the decision-making technical committee, since they are in a serious conflict-of interest position to be, in effect , investigating themselves.

5. The business of the extended or new study should be conducted in open sessions with media and public spectators welcome on a first-come basis.

6. The proposed study should be conducted on the basis of majority decision making, which is truly the democratic way.

7. I also strongly recommend that the extended or new study seriously and fairly evaluate the true heavy metals risk to Sudbury-area resident s by recognizing that exposures to more than one heavy metal requires evaluation and recognition that the true risks are increased in such circumstances requiring a lowering of the amount of exposure to each heavy metal.

8. I also recommend a much more comprehensive evaluation of lead exposures.

a) To this end, I recommend the lead criteria to be used as a safe level be the same as the Ontario government's guidelines of 200 ppm.

b) In addition, detailed lead soil sampling must be undertaken in Copper Cliff, Coniston, Falconbridge, and Sudbury Centre , particularly in the west end in order to ascertain the true picture of lead contamination in the study area.

9. I also strongly recommend that human hair and blood sampling be conducted on willing residents of the hot spots referred to in 8 b) above and in any other areas of concern. These tests will determine, without guessing, the true uptake into the body of the various elements of concern; thereby, giving us a true picture of the real human health risks.

10. In conclusion, I recommend, in the strongest voice possible, that the study recommend a professional clean-up paid for by Vale Inco and Xstrata of all areas of concern, starting with school yards and playgrounds.

Respectfully submitted by,
Homer Seguin

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## Response:

Thank you very much for your comments and continued interest in the Sudbury Soils Study.

1) Responses are provided below to each comment using the same numbering system in the original submission.

2) Historical emissions of $SO_2$ and metals were extensively researched and are documented in detail in Chapter 3, Volume I of the Sudbury Soils Study. The data clearly show that emissions have been reduced by over 90-95% in the past 30-40 years. Therefore, inhalation exposure to these emissions has also declined, but it is not possible to estimate with any degree of certainty what the actual exposure concentrations were 40 years ago, for air, water, food, dust or any of the other exposure pathways taken into consideration in the HHRA. The risk assessment can only address known, current, exposure conditions.

   See also reply to comment # 9 below.

3) The Sudbury Soils Study was intended to examine potential health risks to the community in general. The employees of both Vale Inco and Xstrata Nickel have Joint (management and union representatives) Occupational Health Committees (JOHC), which are part of their Collective Bargaining Agreement and have research budgets. These committees were established in 1970s, for the purpose of developing a better understanding of the working environment through independent industrial health surveys and research in connection with potential occupational illnesses and disease.

Vale Inco will continue to do such work in conjunction with the Steelworkers under the JOHC framework. With respect to retired workers, those who worked in high-risk areas, for example the Copper Cliff Sinter Plant, continue to be offered ongoing medical surveillance through the Vale Inco Occupational Medicine Department. For active workers, medical services including biological monitoring for nickel, lead, and arsenic are available which assesses on-site exposure. Similarly, Xstrata Nickel conducts equivalent surveillance programs in its workplaces.

4) There are many checks and balances in the process that prevent any one group from influencing the science or the results. The companies are the proponents, have a great deal of knowledge about their process and impacts to the community and the environment and have a right to be at the table. A number of measures and procedures were implemented to ensure that a transparent and scientifically rigorous study was conducted. This included the establishment of a Public Advisory Committee, involvement of an Independent Process Observer to consider the interests of the community; consultation with an independent Scientific Advisor; and, review of the entire HHRA by an Independent Expert Review Panel.

Both the Steelworkers and the Local CAW were invited to participate in the study process as observers. This meant representatives from both unions were invited to attend Technical Committee meetings, meetings of the Public Advisory Committee and other meetings associated with the study.

4) There are no plans for new or additional studies by this Technical Committee.

5) There are no plans for new or additional studies by this Technical Committee.

6) The potential health effects associated with exposure to more than one metal was discussed in the HHRA, Chapter 6.4.

7) Exposure to lead in the study area was extensively researched as part of this study as described in Chapter 3, 4 and 5 of Volume II of the Sudbury Soils Study, the Human Health Risk Assessment.

8a) The recommended soil risk management level for lead in soil in Sudbury is 400 ppm (parts per million), based on the results of the HHRA. The Ontario Ministry of Environment (MOE) sets generic standards for total lead exposure to provide a conservative level of health protection across the entire province. As part of this study, we measured the concentrations of lead in media to which people are exposed in Sudbury such as air, water, food, dust, local fish and meat. These measurements allowed the study team to make specific calculations, and conclude that a level of 400 ppm lead in soil is protective of human health in Sudbury. In many older, urban communities in Canada, it is common to see lead levels of 1,000 parts per million or greater. Since exposure to lead from soil in Sudbury represents less than 10 per cent of total exposure, removing soil is not an effective measure to reduce risk.

8b) The soil sampling conducted by the Ontario Ministry of the Environment in 2001 is considered statistically representative of all properties in the communities of interest and, therefore, provides an appropriate picture of lead levels in the communities for a study of this nature. Any individual who continues to have concerns about individual exposure to lead or any of the other COC can contact the toll free number at the Sudbury Soils Study: 1- 866-315-0228.

8) The Human Health Risk Assessment predicted no health threats that would justify the need for bio-monitoring. Individuals with health concerns regarding chemical exposures should consult with a health professional. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe has stated that she supports the results of the HHRA. She was involved in the study for several years and she has a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area.

Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a Human Health study is not warranted at this time.

9) The results of the HHRA do not indicate the need for widespread “clean up” in the study area. School yards and playgrounds were all analyzed as part of the soils study and found to contain very low levels of all the Chemicals of Concern. Therefore, no clean up of these areas is justified.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 6
**Submission Date:** July 30, 2008
**Name:** Tanya Anne Ball
**City:**
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I am concerned as a parent of a young toddler growing up, living and raising my son in the Greater Sudbury area about the mining impacts to human health. Recently, the results released in the Sudbury Soil Study were released which I have many concerns about and am still not convinced about the safety of the environment we live in with over 100 years mining activity and it's end products, including mineral dusts, tailings, slag and it's leach out into our water streams, soil and air, and impacting our health.

Back in the mid 90s there were a lot of articles and community groups talking about mining contaminants and how they interact with our health. Young parents discussed their children's futures, dreaming and hoping for the best possible future for their young ones. In that, wanting to participate in feeling a sense of empowerment by actually being a part of doing something about their futures as a community and doing so together. The last example we see of this here of this in Sudbury were the liming projects done in the 1970s which included community members from all over the Sudbury Area liming soil in areas throughout the city. Signage trade markers still visible left on the sides of public roads and neighborhoods around the greater city areas, marking the re-greened land reclamation project sites. With the amount of waste coming out of the mining industry per year, I feel communities should be involved in more of these re-greening project per year, land areas and mass matching the amount of waste that has been released with the materials and time to citizens paid for by the company to participate in such yearly projects.

I have been noticing more frequently in the past several years in the media, a sweep of interest by residents of industrial mining towns nationally who personally feel responsibility as community members in ensuring these major billion dollar industrial corporations take responsibility for what they are taking out of the land, and the impacts of the waste materials left are causing to our environments and health as well as wanting to feel a sense of empowerment and inclusion by given the possibility of opportunities to participate in putting things back with community at the expense of the companies.

To wage the cost of pollutants pumping out into the air, out through crushed or burnt rock and tailings, leaching out and down through the water streams, into our soil, food and natural everyday living environments we touch and breathe and into the health effects of local residents and workers of the

mining industry here in Greater Sudbury, I would think anyone should be given at the very least, the option of community participation in a one day a year paid remediation project day which should be included as a plan by the Risk Management Planning Team as well as involving local community members in creating new standards, regulations, policies and decision making on what's acceptable to us and for our community by the people that live here in regular open to the pubic meetings and workshops surrounding our environmental concerns.

Citizens of Greater Sudbury have *the rights to know* what is safe and healthy for all of us to live in and sustain a healthy life and community in delivered test results from data that is realistic to a real world in simple text, answering *all* of the questions concerned citizens have had for decades.

I would like to be assured the company *pay for* and *clean up* as much as they are *responsible* for since it is the cost of our families lives at risk and the health of many that have questioned the relation of many unanswered causes for health issues in suffering in the past. The Risk management plan could be the prevention of many people's health concerns and the prevention leaving behind an environmental disasters for our children and much more valuable than the profits of any industry.

I feel it is important not to portion blame but to state our questions and concerns and work together to fill many citizens concerns, as many of which were the basis of the reason why the study was formulated as it's main purpose from the beginning stages as well as ensuring the public's safety. I do realize the study is calculated predictions, predicted risks, ifs, a theoretical construct, without real testing for it's conclusions in a relevant born out of terms realistic world and feel further tests, (below), that were not included be done for actualized realistic results.

One of my main concerns about the study is the 20 metals which were tested at 400 parts per million: Let's look at a comparison of other communities soil testing regulations:
4 metals were centered at cause for concern exceeding the Sara group's model's predictions in 9 tests of 128, as what would be safe at the rates tested for human exposure not within concerning parameters for precautionary measures to be taken in the model's guidelines. At what parts per million have other communities been tested? Ie: Timmins, Port Colborne and other mining communities? Although the entire results of the soil study for Greater Sudbury areas given to the public were based on a Model categorizing result numbers to fall under low risk, moderate, or high risk; the results for the entire study came from a base of tests at 400 parts per million, (PPM), whereas other mining communities have been tested at much lower numbers, 150 to 200ppm as a standard guideline for what amount of metals in our soil is acceptable to interact with humans and the impacts that pose onto our health. How did the Sara Group come to test at the measurement of 400ppm? As well what would the test results for *all 20 metals* look like on the Sara Group's scale in the low to high risk categories if these metals were all tested at 200 PPM? Also what does the Federal and Provincial testing guidelines/standards/regulations look like as compared to the measurements taken by the Sudbury Soil Study's? Who made these benchmarks for testing in the Greater Sudbury?

With Radon levels found higher here than anywhere in Ontario, I'm wondering why I haven't seen tests including this toxic metal in the study? With Radon Gas at 11.5 working unitz, this is a huge human health issue that cannot be overlooked in the coming risk assessment and plan. Also a major concern is

the relation of this radon with the other minerals found in Greater Sudbury. Has there been tests done to show the reaction of the high radon levels found in Sudbury with the 20 metals included in the Sudbury Soil Study and tests for health risks on humans? And tests with especiation to determine with most impacts human health? I feel these tests should be included in the Sudbury Soil Study.

If 56% of our exposure to arsenic is from consuming from the market basket, I would like to see looking at this, finding out more and fixing this major human health problem included as a part of what are we going to do about it in the Risk Management Plan as well. Also 5-9% of the contaminants were found in local wild game and blueberries. That is definitely a lot of people who effected who should not be overlooked, be taken seriously and included as as a major item on the agenda in the Risk Management Plan.

I was told at the public release of the study, the most likely to come in contact with highest rate of exposure to these metal contaminants, the toxic leftover residue floating through the air, picked up from the soles of our shoes, dug up with our hands, in our yards, sandboxes or gardens, are our children, dermally, ages 18mos. to 5years of age. I was also told at the Sudbury Soil Study Release at Inco Cavern, Science North, to to prevent dermal exposure and avoid contact with high levels of metals from our local environment coming into our homes to wear gloves, keep our living environments sterile, free from dust, wash our hand vigorously and continuously sanitizing the living environment. Living with a two and a half year old in an extremely well kept, sanitary home, I feel keeping any child from exploring their natural environments is unacceptable. Whereas in the outdoors of our yards, parks, playgrounds and schoolyards, metals can be found at as little as 5- 10 cm, which is the height of and in reach for bucket and shovel sandcastle building and gardening and is difficult to avoid with any child. Publicly labeling 'safe' in unsafe environments is unacceptable as well as the state of many who live in these contaminated living conditions. These areas should be dug up, cleaned up and new clean fill put back by the company and it's dollars.

I am also concerned about physical and mental health problems, including behavioral problems in children from regular exposure of these metals and for adults throughout and over a lifespan from high incidence of mental health, retardation, lung and kidney disease, respiratory problems and cancers throughout Greater Sudbury and also feel this should these continuous concerns be on the Risk Management's plan's top agenda in planning for more testing through blood testing, body burden testing and an epidemiology report be done.

With not a single blood test, Body Burden Testing or Epidemiology Report on local residence and recently deceased citizens of Sudbury who spent their lifespans in different areas throughout the City of Greater Sudbury, this should be a mandatory necessary agenda item on the Risk Management's efforts in building a plan for our futures, and re-evaluate what tests still need to be realistically done to work in a realistic world.

Another major concern is the delivery of the results to the public with common blame to where the metals are coming from and why we “may” see higher levels. Lead Piping in old housing is a prime example but most probably not the answer to the main source of exposure to local citizens in mining towns. Many houses were build on land that was at some point a roasting beds or filled by tailings and other mining waste, now corroding our metal piping. Who is taking liability/ responsibility for this? Will the company

pay for the major expenses families endure on their properties due to the mining waste left there? Who is taking care of and paying for digging up and replacing the 5% of properties that were tested who's properties have lost their market value from the high metal contaminant overloads from the 2001 testing?

Slag and Tailings:

A few months ago I played with my son in the back yard of a friend's house in the West End/ Gatchell Area. He, the toddler, ran down the street in excitement to see the view of a barren black lack ahead, just across the road, company property, Big Nickel Mine Road. At the end of the road was a water sewer, underneath, attaching the two sides of the road together a stream. On our side seeped out a thick yellowy orange sludge. And down the ditch through the stream any metals laying in the path from old building sites or rail beds, were heavily corroded. Soon after I started to notice the closer I was to a smelter the more corroded and rusted out the environment surrounding me I was within. (ex: looking at water towers corrosion in different neighborhoods and the location/proximity to the smelter). I wondered what it would do to my skin and bones and and although mystified by the play structure aside, I realized it wasn't a safe area for kids. A week later I investigated parallel to where I stood the week before, along the shores of the other side of the road. I found myself in the entrance to an orange and black barren landscapes without any traces of organic growth from the earth right across the street from the playground and my friend's neighborhood. The rocks I picked up with my bare hands were completely rusted out and the large orange chunks crushed to dust without much force. I thought about slag and how safe it was, where we use it and how much of it we have here in Sudbury and soon found out on Earth day from the company's seedling gifts table that it wasn't a good idea for kids to play with it nor touch it especially after long exposure to water since it releases acidic material. Seeing that my driveway and foundation of my house is built on it, this wouldn't be a healthy play environment either since it rains. This also explained the orange rail beds and the leach off of acid rain drainage from those down to the streets and water streams around the rail beds. I would think this would also pose a threat to our health and should be included to propose banning the use of slag in residential areas as building and filling material into the Risk Management Plan.

I then thought about land and the boundaries we separate ourselves with whether fences and ownership to property and their legal implications to human and even cultural territorial land, their battles, claims, crown, surface rights and exploration, and wondered why any of us allow all of this human quandary for the exchange of money, health and our lives.

The black barren landscapes that cover the stretches of land across which separates Greater Sudbury's Spread out communities, is owned by the company. I was told at the public Soil Study Release in Copper Cliff that I should not be concerned with these masses of waste and contaminations to the earth since it is behind a fence and that company fence means we as citizens should not be concerned about what happens behind it or on any of their properties. I was also told the re-greened walls beside the public access roads were not to hide what lies behind, but to absorb the dust that rises from the trucks on the slag dirt roads into the air to lessen inhalant and dermal exposures. I am concerned about these fences and what they symbolize and signify to the industrial mining leaders of these companies. I think if Greater Sudbury is to be seen as a green leader, another approach in looking at things may be starting at the planet itself as a whole, all of it's matter and the implications, cause and effect we, starting here in Greater

Sudbury with the industries occupying, have including the industrial leaders and largest polluters have on it with or without our fences and ownerships to land, which also should be included in the Risk Management Plan when planning on what to include to sustain a healthy environment for our community.

I feel the above concerns on primary tests and data should not be overlooked before the next clean bill of health goes out to the public, nor any data written to settle the public who were not given adequate time (just over 2 months), or expertise to read through and attempt to understand and reply to the extensive scientific material the study contains from an over 6 year extensive and complicated study.

I feel it is up to the general public and the Risk Management Team to come up with an action plan to suit the needs, answer questions and concerns to the public and take immediate action in taking care of our environments and health.

This is an extensive and expensive Risk Assessment which has taken many years to develop, test and release which should have convinced me at it's cost, that finding these realistic answers for the cost of our family's health and safety is greater than that of a company's wealth. I would like for the mining companies to take responsibility, pay for and take care of replacing the soil from all tests including the families properties that exceeded safe levels.

I understand that while calculating such dense scientific data and trying to meet and the needs and answering the public must have been a stressful task, much time and effort went into the study and thank all of the people who dedicated so much time to it.

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### Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

When discussing which metals were evaluated in the current assessment, it is important to understand the process by which the SARA Group selected chemicals of concern (COC) for the assessment. The Technical Committee for the Sudbury Soils Study established three criteria to guide this “screening” process. To be evaluated as part of the current HHRA, a chemical had to meet each of the three criteria. These criteria were:

1. The concentration of the chemical in soil exceeded the soil quality guidelines established for residential soils by the Ontario Ministry of the Environment;
2. The chemical was known to be emitted by mining companies as part of their industrial processes; and,
3. The chemical was present throughout the Study Area.

The most important of these three criteria was the comparison to MOE soil quality guidelines. These guidelines were established as conservative benchmarks to quickly evaluate whether concentrations of a particular chemical may pose a risk to human or ecological species under certain circumstances. These

guidelines are generic in nature, and do not take into account any site-specific conditions. The purpose of the current risk assessment was to take into account site-specific conditions, as well as local data (such as vegetable garden produce, drinking water, air quality, wild berries, fish, game, *etc*.), to establish a Sudbury-specific soil quality guideline.

Each of the chemicals has a different soil quality guideline established by the Ontario Ministry of the Environment. For example, the soil quality guideline for lead established by the MOE is 200 ppm. One would only compare concentrations of lead in soil to this guideline. It is not an appropriate comparison guideline for other chemicals. Using site-specific data as well as information in the scientific literature, the SARA Group conducted a detailed evaluation of the potential risk of lead exposures in Sudbury, and based on a weight of evidence approach, established a Sudbury-specific soil quality guideline for lead of 400 ppm.

While the SARA Group provided an information scale, derived from the scientific literature, to provide readers with a method to evaluate potential risks in easy to understand terms, this scale was not used in any way within the assessment to add or remove chemicals from the list of those under consideration.

In the case of radon, it is a naturally occurring substance, and is not released as an emission from the mining companies' facilities. As such, radon was not selected as a COC for evaluation in the current assessment.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury &District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0
and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

The Ministry of the Environment supports the study. Ministry scientists and experts participated fully in the study process and have a duty to protect the public interest.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 7
**Submission Date:** October 23, 2008
**Name:** Jan Browning-Connor
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I have been a resident of Sudbury, living on Lake Ramsey for over 40 years. I have seen many changes in this City. I have also been in business here for that long. I see the Smoke Stack from my home and have called on many occasions to report excessive omissions. I know that our colon cancer rate is higher here than any other city in Canada. I have watched many trees on my property die because of leaf disscolouration. Not to mention a serious throat burning experience when the sulphur comes down. I really believe that the soil here is adversely affected by the many inversions of smoke that I watch coming over the City. I certainly wash very thoroughly everything that is grown here that is edible. I am apposed to the granting of further licence to up these omissions.

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## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

You are welcome to continue to call the Ontario Ministry of the Environment whenever you have concerns about emissions from Vale Inco's Smelter Complex. District staff do follow up with the company on every complaint received which often results in emissions reductions for that day and improvements to local air quality. For your information, Mr. Ron Paolin at the Sudbury District Office handles Vale Inco air issues, and he can be reached at 705 564-3212.

The results of the 2001 soil sampling program do show that local soils have elevated levels of metals as a result of historical smelter emissions. It was this information that lead to the Sudbury Soils Study Human Health and Ecological risk assessments. The results of the Human Health Risk Assessment indicate that here are potential risks to the public from lead in soil in some areas and for nickel in air in some communities, noting that, as the consultant and the Medical Officer of Health have indicated, neither present any need for immediate concern. The HHRA also assessed that there were no unacceptable risks for the remaining four chemicals of concern: arsenic, cobalt, copper and selenium.

One of the findings of the HHRA is that consuming local produce does not present unacceptable health risks to residents. This finding is supported by the Medical Officer of Health and the Ministry of the Environment. Your habit of thoroughly washing garden produce and peeling vegetables before cooking is considered good practice for any home gardener.

Vale Inco has made application to the MOE for an alternative standard for their nickel emissions. This does not mean they are increasing their emissions. You may comment on Vale Inco's application by providing comments through the Environmental Bill of Rights registry. The registry number for their proposal is 010-5356. Please note that the comment period ends April 10, 2009.

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled *A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area* http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf reports colorectal cancer incidence rates in SDHU area as higher (65 per 100,000 population) than both north eastern Ontario (58 per 100,000 population) and Ontario rates (51 per 100,000 population). Additional information on causative factors for colorectal cancer area available at http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/colorectal-eng.php and http://www.cancercare.on.ca/documents/Insight_Colorectal.pdf.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 8
**Submission Date:** October 23, 2008
**Name:** Anne Watelet
**City:** Sudbury ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I would like to know what the health risk is for a person who does jogging outside on a daily basis in Sudbury Center (west), in relation with air contaminated with nickel dust.

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## Response:

Thank you very much for your question and interest in the Sudbury Soils Study.

The conclusion in the human health risk assessment (HHRA) regarding elevated health risk due to airborne nickel in the western portion of Sudbury was based on long-term exposure to maximum measured air concentrations. This represents a "worst case" scenario aimed at being very protective of human health. Ongoing exposure to these upper end concentrations on a daily basis could result in potential health concern in sensitive individuals. However, it is unlikely that a person would be exposed to these concentrations on a continuous basis. Overall, minimal risk was predicted for exposure to nickel concentrations in air in the western portion of Sudbury Centre. The benefits of an active lifestyle, including regular jogging, are encouraged and continue to be promoted in all areas of the city of Sudbury by the Sudbury & District Health Unit.

The source of higher airborne nickel concentrations in the western portion of Sudbury was identified as fugitive dust emissions from the Vale Inco Copper Cliff operation. Based on the results of the Sudbury HHRA Vale Inco has taken steps to reduce ambient air concentrations of nickel in the area surrounding this facility. Therefore, nickel concentrations in local ambient air should be lower in the future.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 9
**Submission Date:** October 25, 2008
**Name:** Dana Clark
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I was truly concerned with the results of the Sudbury soils study. I think that Vale Inco needs to start cleaning up. I understand that Inco has done a great job in reducing its impact on the environment, however they need to do more. First off they need to be able to meet the upcoming emissions standards for Nickel in 2010, if they cannot they should be taxed or fined by the municipality until they can reach the standards.

I understand how important it is to have this industry in our town but at the same time no one has a right to harm children with toxins.

As someone who has studied Natural Medicine and Health I know the damage that can be done from heavy metals and I am sure that the average person in Sudbury realizes this also. I do not want my future children exposed to this mess nor do I want anyone else's children exposed to this mess.

My husband and I have been looking into buying a home and we have recently had certain areas of the city removed from out list of options. When the realtor asked why, I told her because of the results of the soil study done in Sudbury and that I did not want to risk my health or the health of my future children by living in the areas most effected. Houses are already way over priced in this city why would I want to purchase one sitting on contaminated land. I truly hope that this will be considered when they price homes and property taxes in the future.

I also fee that an epidemiological study should be done and if it is not done then the Sudbury District Health Unit in my opinion in not acting in an objective fashion. By not standing up for the rights to a healthy environment for children and those susceptible to heavy metals, these doctors are in fact in violation of their Hippocratic Oath and this should be taken seriously.

## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury &District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf, provides up to date information on local cancer rates.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 10
**Submission Date:** October 25, 2008
**Name:** Howie Mende
**City:**
**Affiliation:**

**Comment regarding the Sudbury Soils Study Human Health Risk Assessment:**

Hello,

Its Saturday morning, and I'm a bit dazed from my modern busy lifestyle, but here goes an attempt at intelligent thought (a hard one for me ha!).

I often wonder about comments posted to these types of forums. Do they help? Do they simply show the spectrum (extreme greed and communistic ways of thinking?)

Being trained in physics, I see so much momentum behind human beings making money in order to make a living first, and unfortunately greedily gorging on the resources we have on earth. Just as with all things conservation of energy will hold true most likely. The momentum that greed is (in my opinion, the only major issue that human beings have on earth...all other problems are directly related to it) will take many generations to fizzle out, but it can only done when our population as a whole realizes how simple life is. In my opinion, its like everything else we see around us: its about growth. Not growth in material possessions: this is where I fear we are lost, its about growth physically, mentally and emotionally (some might say spiritually as well).

I know why human beings can't seem to help themselves from buying material possessions that get dumped into landfills, burn fossil fuels with their huge SUV's, motorboats and atv's....its called addiction; and this will lead to crisis if kept unchecked (and I would think does on a regular basis on the smaller individual family scale). Forget about the toll all this commotion continuously have on earth, I'm not concerned about earth, or nature....it/he/she knows how to heal itself if pushed too far. I want to sway all us human beings to rejoin Earths ways, that which we are all apart of, so we can continue to be a part it/her/him (however you wish to refer to this planet).

I've lived in Sudbury most of my life and I've seen so much unhealthiness in my community that always seemed to have a direct relation to our little mining world. Rampant addictions, many so very rich, unconnected to the rest of the community, the very poor and downtrodden, again so disconnected. Its amazing how much the very rich and poor have in common in that way.

Now I have young children, one here, one on the way and I live in the west end. Should I be getting the heck away from here? (after looking at the soil study report)

We need to remember that our actions on how we deal with environmental issues has potential to lead the way around the world. Lets do it right, for our children, and for others to see. Even if that means we make a bit less money in the near future.

Again, not sure if this is anything new or it will help, but I sure will hope, for my and my childrens sake. This letter is not proof read, as the boy calls for my attention now.....back into my busy modern life....with only a moment to reflect.....

Hope we can do it better, and the healthiest way, for ourselves, our families, our community and the rest of the world,

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## Response:

Thank you for taking the time to submit comments on the Sudbury Soils Study.

The risk identified in the Human Health risk assessment is considered minimal for Lead and Nickel for those living in Sudbury, and that includes the West end of the city. In other words, this study determined that it is just as “healthy” to live in Sudbury as in other centers in Canada. Many of the issues you have identified deal with personal lifestyle and personal decisions.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 11
**Submission Date:** October 25, 2008
**Name:** Tanya Anne Ball
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

The Sudbury Soil study is entirely based on predictions, not realistic testing which, at the high percentage of population with too many coincidal diagnosis of chronic and fatal disease in our community. I feel further testing is crucial for the community to have realistic facts, figures, data and conclusions tested realistically at realistic measurements. I am demanding the following tests are crucial for inclusion of the Sudbury Soil Study's Human Health Risk Assessment, ensuring the health of all residents in the Greater City of Sudbury and the health of our children's futures, including; body burden testing, blood sampling, hair follicle and skin sampling, and an epidemiology report. These tests are vital in assessing and determining real results and conclusions that may be linked between our exposure to the high levels of metal concentrates found in our environment to the high percentages of people diagnosed with chronic illnesses. I feel these are reasonable demands for determining whether residents of the Greater Sudbury Area are at risk.

Many residents living in the greater Sudbury Area have traveled afar to do these tests with specialist resulting with legitimate paperwork showing their bodies are contaminated with high levels of the many of the metals found in our soil, many of which are are poisoned with these metals . The families of people diagnosed with MS, ME, respiratory diseases, HDHC, Cancers, and many other diseases forms of neurological disabilities face expensive medical expenses. I also feel the families living in the Greater Sudbury Area who's legitimate documentation by doctors and scientific expertise showing their bodies are definitely poisoned by these metals be reimbursed for their expensive testing and medical expenses.

The Sudbury Soil Study tests were measured at 400ppm, resulting the release of the HHRA report to the public showing these four metals to fit in the low risk category of the Sara Group's high to low risk scale. The MOE standards and other communities test at 200ppm. Soil testing for all metals need to be remeasured at 200 ppm and included into the Sudbury Soil Study's Risk Assessments. The Sara Group created a scale in three parts, high, medium and low risk, to show their predicted levels of risks at tests measurements based at 400ppm. Of all the 20 metals found in Sudbury, 16 were dismissed based on those measurement's results. Again, All of the 20 metals need to be included into the Sudbury Soil Study at a measurement or 200ppm and be reintroduced to the low to high risk scale the Sara Group has created to the public once these reasonable measurements, results and conclusions have been made.

Radon is found to be have the highest levels in Ontatio throughout the Greater Sudbury Area and was also dismissed along with many other metals in this study. Radon needs to be included for testing at 200 ppm in the Human Health Risk Assessment.

The evaluation of synergistic interactions of all metals found in our soil also have not been assessed and need to be included in the Sudbury Soil Study's Assessments.

Especiation also need to be included in the Sudbury Soil Study's Assessments. All of these tests need to be realistically tested at 200ppm for acceptable measurements in the evaluation of human health risks posed on Sudburians.

I demand past and present workers and the soil in all of their working conditions on all company property be included in the Sudbury Soil Study's Assements to ensure their safety and risks posed to their health. These workers have higher exposure rates working directly with the metals on a daily basis and are more likely to have risks posed to their health. They cannot be dismissed in this Human Health Risk Assessment which has been paid for by their employers, although dismissed them. I also recommend the MOE and MOL step up and ensure these people are included in all stages of the further recommended testing as well.

The areas that have been tested including the families properties which have found high contaminations must be dug up, and replaced, taking care of those families and ensuring their safety.

The companies, Vale Inco and Xtrata must take responsibility of 100% of the cleanup for their leftovers that show high levels of metals based at 200ppm measurements and pose threat to health of Greater Sudbury Area Residents. This includes all areas where loally grown food is produced.

I also recommend that no applications for alternative standards and regulations by Vale Inco or Xtrata for increasing production and producing more emissions be approved until these tests have been made and both companies meet and maintain the existing standards and regulations put in place for our safety and protection.

Furthermore, I fully support the recommendations in the Environmental Defense report attached and feel all of Dr. Kapil Khatter's findings, results, conclusions, and recommendations be included into the Sudbury Soils Study's Assessments.

***(Environmental Defence report submitted with comment)***

## Response:

Thank you for your detailed comments and continued interest in the Sudbury Soils Study. Responses to your comments or questions are provided below in the order they appeared in your submission.

The Sudbury human health risk assessment is based on extensive analysis of samples of soil, food, water, air and dust in the Sudbury area to get an accurate measure of a person's exposure to metal in the environment. Based on the results of the HHRA wide-scale biological monitoring or a human health study is not warranted. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations.

We are not familiar with the nature of the tests or results of testing referred to in paragraph two of your submission. Individuals with specific health concerns should see their family physician.

When discussing which metals were evaluated in the current assessment, it is important to understand the process by which the SARA Group selected chemicals of concern (COC) for the assessment. The Technical Committee for the Sudbury Soils Study established three criteria to guide this "screening" process. To be evaluated as part of the current HHRA, a chemical had to meet each of the three criteria. These criteria were:

1. The concentration of the chemical in soil exceeded the soil quality guidelines established for residential soils by the Ontario Ministry of the Environment;
2. The chemical was known to be emitted by mining companies as part of their industrial processes; and,
3. The chemical was present throughout the Study Area.

The most important of these three criteria was the comparison to MOE soil quality guidelines. These guidelines were established as conservative benchmarks to quickly evaluate whether concentrations of a particular chemical may pose a risk to human or ecological species under certain circumstances. These guidelines are generic in nature, and do not take into account any site-specific conditions. The purpose of the current risk assessment was to take into account site-specific conditions, as well as local data (such as vegetable garden produce, drinking water, air quality, wild berries, fish, game, *etc*.), to establish a Sudbury-specific soil quality guideline.

Each of the chemicals has a different soil quality guideline established by the Ontario Ministry of the Environment. For example, the soil quality guideline for lead established by the MOE is 200 ppm. One would only compare concentrations of lead in soil to this guideline. It is not an appropriate comparison

guideline for other chemicals. Using site-specific data as well as information in the scientific literature, the SARA Group conducted a detailed evaluation of the potential risk of lead exposures in Sudbury, and based on a weight of evidence approach, established a Sudbury-specific soil quality guideline for lead of 400 ppm.

While the SARA Group provided an information scale, derived from the scientific literature, to provide readers with a method to evaluate potential risks in easy to understand terms, this scale was not used in any way within the assessment to add or remove chemicals from the list of those under consideration.

In the case of radon, it is a naturally occurring substance, and is not released as an emission from the mining companies' facilities. As such, radon was not selected as a COC for evaluation in the current assessment.

The HHRA also closely examined the potential for interactive effects between the metals (see Chapter 6.4 of the HHRA). No interaction information identified for any of the COC was considered adequate at this time for quantitative or even qualitative incorporation into the HHRA. However, despite the uncertainties involved with this approach, given the generous uncertainty factors built into the development of each of these COC-specific toxicological reference values, it was concluded that it was highly unlikely that potential risks were underestimated in the assessment.

As you are well aware, occupational exposure was not included in this study. Worker and occupational exposure are covered within the companies by the Joint Occupational Health Committees. Any current worker has medical services available that includes biological monitoring for nickel, lead and arsenic if they wish to assess on-site exposure. The Technical Committee and study authors remain confident that the Sudbury HHRA set new standards within Sudbury by examining, for the first time, exposure of residents to several metals that are referred to as the Chemicals of Concern (COC) namely arsenic, cobalt, copper, nickel, lead and selenium.

Vale Inco has made application to the MOE for an alternative standard for their nickel emissions. This does not mean they are increasing their emissions. You may comment on Vale Inco's application by providing comments through the Environmental Bill of Rights registry. The registry number for their proposal is 010-5356. Please note that the comment period ends April 10, 2009.

Please also see our response to the Environmental Defense report (Comment 40) which is appended for your review.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 12
**Submission Date:** October 25, 2008
**Name:** Sam Shahsahabi
**City:** Sudbury, ON
**Affiliation:**

### Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Hello,

I have read the Sudbury Human Risk Assessment Briefing prepared by Environmental Defence. I moved to Sudbury three years ago and upon arriving my skin irritation started; normal remedies dose not work I am very certain that it is related to the soil and the particle dust in Sudbury. With the new direction that our economy is taking and the tendency of using locally grown food I am very concern that our community would suffer greatly from lack of proper food, as our land and air are both extremely polluted.

Please look into the details published

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### Response:

Thank you for your comments and interest in the Sudbury Soils Study.

Concentrations of metals in both vegetables and fruits grown in both home gardens, as well as professional farms, were evaluated as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat any fruits and vegetables grown in Sudbury. The consumption of locally grown produce is supported by many local groups and initiatives as part of a healthy lifestyle. The practice of thoroughly washing garden produce and peeling vegetables before eating is considered good practice for any home gardener.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 13
**Submission Date:** October 26, 2008
**Name:** Clayton Drake
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Terrific progress has been made in transforming the landscape of the Greater Sudbury Area in recent times with respect to re-greening efforts. While we can be proud of these achievements, it is clear that now is no time to declare Sudbury's cleanup as anywhere near complete.

It is the responsibility of Sudbury's mining industry to ensure that it's emissions and tailings are as low in toxicity as possible, and to inplement long-term remediation strategies of areas adversely affected by mining byproducts.

No Sudbury resident can afford to view the results of this report with a vague disinterest. We are all (especially employees of the Sudbury-area mining industry) affected by the toxins in our environment.

There is no rationale for unnacceptable levels of pollution except laziness and apathy. Very strong arguments can be made on both moral and economic grounds that support the reduction of pollution to the lowest reasonable levels as soon as possible, and to aggressively pursue remediation efforts.

Safety has become a primary concern for most mining companies, even finding its way into their mission statements. If the Sudbury mining industry is truly concerned about safety, it will tackle the concerns presented in this study with unflappable vigour. No safety issue presents as much of a continuous risk to our wellbeing.

The Sudbury mining industry should not wait until environmental regulations force them to make changes to their operations. It must take a leadership role on these issues. To do otherwise is blatantly cynical and counterproductive to ensuring the future profitability of our mining industry.

## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

Vale Inco and Xstrata Nickel voluntarily accepted to conduct the Sudbury Soils Study, a comprehensive investigation of the potential human and ecological health risks associated with their operations. When the study began in 2001, both companies were, and continue to be, committed to addressing the risks found in the risk assessment(s). The companies take the responsibility for public safety very seriously and recognize that sustainable mining operations in this community depend on continual environmental performance improvements.

We encourage you to review the companies' Human Health 'Risk Management Report', available online at sudburysoilsstudy.com and at local Greater Sudbury libraries. This report outlines the steps that the companies are undertaking to address the results of the Human Health Risk Assessment. We also encourage you to take part in the soon-to-be released Ecological Risk Assessment (ERA) to learn what ecological risks exist in the Sudbury area and how the companies intend to address the ERA results.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 14
**Submission Date:** October 26, 2008
**Name:** David Lebrun
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I am writing in response to the Soils Study. Learning that vegetables grown in my own backyard can and/or will contain higher levels of toxins than store-bought food is profoundly unsettling. The study's exclusion of past and present mining employees, and the synergistic reactions between the pollutants discovered in our community is foolish to an outlandish degree.

I urge Dr. Kapil Khatter's study and recommendations to be taken into consideration in the Sudbury Soils Study's Assessments.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

Concentrations of metals in both vegetables and fruits grown in both home gardens, as well as professional farms, were evaluated as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat any fruits and vegetables grown in Sudbury. The consumption of locally grown produce is supported by many local groups and initiatives as part of a healthy lifestyle. The practice of thoroughly washing garden produce and peeling vegetables before eating is considered good practice for any home gardener.

The potential for interactions between the chemicals of concern was evaluated as part of the assessment (please refer to Chapter 6.4 of the HHRA).

For our reply to the Environmental Defense report prepared by Dr. Khatter please refer to the attached document (Comment 40).

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 15
**Submission Date:** October 27, 2008
**Name:** Elizabeth Dornbush
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

As a retired couple who grow vegetables that comprise most of our diet for the entire year, I would like to know how to have our soil tested. We have lived in Wanup for eight years, and have noticed what seem to be high rates of cancer around us. The old stacks of Coniston are easily seen from high points here, and I wonder if those few miles give us reason to rest easy in the quality of our soil. I'm sure there are many gardeners who are similarly disconcerted about the safety of the food we had assumed to be safe.

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## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

Concentrations of metals in both vegetables and fruits grown in both home gardens, as well as professional farms, were evaluated as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat any fruits and vegetables grown in Sudbury. The consumption of locally grown produce is supported by many local groups and initiatives as part of a healthy lifestyle. The practice of thoroughly washing garden produce and peeling vegetables before eating is considered good practice for any home gardener.

If you have concerns, or would like more information about managing the risks associated with the Human Health Risk Assessment, you can call the Sudbury Soils Study Toll-free Information Line (1-866-315-0228). If you leave a message with your contact information, an independent, third party professional will contact you. This professional will be able to address your concerns and provide information about reducing lead exposure in daily life, as well as provide information about property-specific consultation including soil sampling.

Sudbury Soils Study | Étude des sols sudburois
metals • health • environment
métaux • santé • environnement

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 16
**Submission Date:** October 27, 2008
**Name:** Melissa Welch
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

To whom it may concern;

I have HUGE concerns over the findings of the Sudbury Soil Study. After the study was re-assessed by Dr. Kapil Khatter, on behalf of Environmental Defence, I am concerned that I was mislead by the Sudbury Soil Study findings and the SARA group. It seems that the report, put out by Environmental Defence, has brought to light many of the suspicions Sudburians have had over Vale INCO's "Sudbury Human Health Risk Assessment" carried out by the SARA group.

When I attended the public forum I was lead to believe that the findings (in soil and air) were of little risk to our community, yet the findings of Environmental Defence have lead me to believe that I should have cause for concern. With Sudbury being a hotspot for autism and cancer I am more inclined to believe the findings of Environmental Defence. (as an aside- I jog regularly at delki dozzi park - where the level of nickel in the air was said to be higher but at acceptable levels, as reported by the SARA group. Now I am worried that I have been overexposing myself to high level of nickel in the air)

I would like the findings and recommendations of Dr. Khatter to be reviewed and included in the study to ensure, not only that the truth be brought to light but also, that our evironment and the health and safety of our community be taken care of.

Sincerely,
Melissa Welch

Please see a list of key points and recommendations below:

***(Environmental Defence report submitted with comment)***

## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a Human Health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf, provides up to date information on local cancer rates.

The Ministry of the Environment also supports the results of the study. Ministry scientists and experts participated fully in the study process and they have a duty to protect the public interest.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

To view our reply to issues indentified in the Environment Defence report please refer to the attached document (Comment 40).

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 17
**Submission Date:** October 28, 2008
**Name:** Samantha Baulch
**City:** Sudbury ON
**Affiliation:**

### Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Hello,

I've been reading about a recently study commissioned by Mine Mill Local 598 CAW and Steelworkers Local 6500 and conducted by Environmental Defence Canada.

I'm concerned that the levels of lead, nickel and arsenic that were found to be 10 times the levels of store-bought food and lead contamination was found to be above safe levels in four communities.

Is there a study that compares cancer rates of our city compared to other North American cities with similar socio economic backgrounds?

If the cancer rates are found to be unusually high (and it can be inferred that this is due to the high level of lead (etc) in the soil), what can be done to clean up the soil?

Do the communities with high contamination include farming communities? If local farmers have safer soil what can be done to protect their livelihood and promote the safety of locally grown food?

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### Response:

Thank you for your comments and interest in the Sudbury Soils Study.

For a complete reply to comments in the Environmental Defense Fund report commissioned by the local Unions please refer to the attached document.

Based on the results of both the 2001 Soil Study, as well as the Vegetable Garden Survey conducted as part of the Sudbury Soils Study, concentrations of metals in the soils from the farming communities in Sudbury are lower than those found in the more urban areas of the Greater Sudbury Area. This is not

surprising as these communities are a further distance from the historical and ongoing smelter operations, and have felt limited impact from deposition of emissions over time.

Concentrations of metals in both vegetables and fruits grown in both home gardens, as well as professional farms, were evaluated as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat fruits and vegetables grown in Sudbury. Therefore, no clean up of soil is warranted.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a Human Health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf , provides up to date information on local cancer rates.

The Ministry of the Environment also supports the results of the study. Ministry scientists and experts participated fully in the study process and they have a duty to protect the public interest.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 18
**Submission Date:** October 28, 2008
**Name:** Shannon Dennie
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I was horrified after reading The Environmental Defence report. Here I was, a mother of two young children, thinking I was doing the right thing by feeding them fresh, organically grown, local foods when in all reality I was slowly poisoning them with the pollution caused by the mining companies in Sudbury.
How much more do we take? How many more people need to get sick, develop cancer and lose their lives before we say enough is enough.

I have watched my mother's family, who all grew up near Falconbridge on a farm, die off one by one with one form of cancer or another.

What they all had in common? They were a farm family who worked their land and ate the crops that they themselves grew in what was contaminated and poisoned soil.

Something needs to be done, and quickly before our children all suffer the consequences of their parents not speaking out.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

The Human Health Risk Assessment determined the health risks related to metals in Sudbury soils to be quite low. As well, a presentation by the SARA Group of the results was attended by local farmers and vegetable growers as a way of re-emphasizing that locally grown vegetables and fruit are safe to eat.

To increase scientific credibility to the Sudbury Human Health Risk Assessment an independent expert review panel (IERP) was assembled by the Study's Technical Committee. The IERP agreed with the methodologies used in the risk assessment.

For our reply to comments in the Environmental Defense Fund report commissioned by the local Unions please refer to the attached.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf, provides up to date information on local cancer rates.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 19
**Submission Date:** October 28, 2008
**Name:** David A. Patterson
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I would like to raise two points of interest for consideration:

1.) has there been any inquiries of the ongoing struggle in Port Colborne concerning soil contamination by INCO METALS LTD. I am sure there is info from this environmental court battle which could be used in defining more definitively what the root causes of health problems associated with the various heavy metal contamination in and around the GSA.

2.) has there been a campaign to take hair samples of residents in and around the effected areas to determine the levels of lead or heavy metals. I would assert, the schools in the effected areas have a captive sample group on which to draw samples. Secondly, soliciting volunteers to donate a hair samples could be a very effective means to achieve some scientific numbers about the heavy metal issue.

I wish you well in your endeavours. I will attempt to stay abreast of your progress over the coming weeks and months.

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## Response:

Thank you very much for your comments.

The issues in Port Colborne have been followed by all partners on the Sudbury Soils Study. It is important however to note the studies completed for Sudbury are based on information on elevated soils metals levels and other conditions that are specific to Sudbury.

As part of the 2001 survey, soil samples were collected and analyzed from every school yard and park in Sudbury. These samples revealed low concentrations of all the metals analyzed.

The results of the Human Health Risk Assessment indicate that there are potential risks to the public from lead in soil in some areas and for nickel in air in some communities, noting that, as the consultant and the Medical Officer of Health have indicated, neither present any need for immediate concern. The HHRA also assessed that there were no unacceptable risks for the remaining four chemicals of concern: arsenic, cobalt, copper and selenium.

You raise the idea of collecting hair samples to determine levels of metals in local residents, such as school children. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community that type of human health study, involving biological sampling, is not warranted at this time. Similarly, the HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Additional information on City of Greater Sudbury community health and other illnesses can be found at the Sudbury District Health Unit web site under Health Status at this link:
http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0
and cancer at this link http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0.

Should any individual feel that he or she has a health concern they are advised to see their family physician or primary health care provider for advice.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 20
**Submission Date:** October 30, 2008
**Name:** Clarissa Lassaline
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

The risk assessment leaves me feeling very uneasy. It seems to disregard cumulative exposure to risk over a lifetime and the effect of the risk from other sources on that of any specific substance. It puzzles me that the assessment for health risk is done separate from that for environmental risk because of the effects of environmental problems on human health. It's a big step forward that there is now a challenge to the SARA interpretations in the Environmental Defence Report, one that speaks to some of the concerns people have been having about the soils study. The fact that lead is a probable carcinogen and there are higher than acceptable levels of air-borne nickel and arsenic from both soil and air are presented more clearly and not swept away as inconsequential. At a time when communities want to turn even more to their own localities for their food, we need assessments that are arrived at in an arms-length,independent fashion from the sources of the polluting problems so we know they are reliable. We need information and action plans when contamination is found and we need to be able to make our own decisions about risks we are willing to take as a community.

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## Response:

Thank you very much for your comments and interest in the Sudbury Soils Study.

The Sudbury Soils Study human health risk assessment was conducted using standard risk assessment procedures established by key regulatory agencies such as the U.S. EPA, Health Canada, the World Health Organization, the Ontario Ministry of the Environment, and others. It was peer reviewed by a panel of independent experts from across North America, as well as by experts representing each of the parties on the Study Technical Committee. The risk assessment fully considered the potential cumulative exposure over a lifetime, as well as from all relevant exposure pathways (*i.e.*, air, home garden food, water, soil, indoor dust, sediment, supermarket foods, wild berries, fish, wild game, *etc*.).

The possibility that lead could have carcinogenic health implications was also considered in the assessment. However, the risk of exposure to lead causing development health effects in children is much more sensitive (*i.e.*, occurs at lower concentrations) than the possibility of causing cancer. As a result, protection of sensitive children was selected as the appropriate endpoint to prioritize for the assessment, rather than the less sensitive carcinogenic endpoint.

For our reply to comments in the Environmental Defense report commissioned by the local Unions please refer to the attached document (Comment 40).

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 21
**Submission Date:** October 31, 2008
**Name:** Destiny Roy
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Letter to the Sudbury Soil Study;

I am writing this letter to the Sudbury Soil Study for the inclusion of my recommendations.

The Sudbury Soil Study entirely based on predictions, not realistic testing, which, at the high percentage of population with too many coincidal diagnosis of chronic and fatal disease in our community, calls addressing realistic and further study. I feel further testing is crucial for the community to have realistic facts, figures, data and conclusions tested realistically at realistic measurements. I am demanding the following tests are crucial for inclusion of the Sudbury Soil Study's Human Health Risk Assessment, ensuring the health of all residents in the Greater City of Sudbury and the health of our children's futures, including; body burden testing, blood sampling, hair follicle and skin sampling, and an epidemiology report. These tests are vital in assessing and determining real results and conclusions that may be linked between our exposure to the high levels of metal concentrates found in our environment to the high percentages of people diagnosed with chronic illnesses. I feel these are reasonable demands for determining whether residents of the Greater Sudbury Area are at risk.

Many residents living in the greater Sudbury Area have traveled afar to do these tests with specialist resulting with legitimate paperwork showing their bodies are contaminated with high levels of the many of the metals found in our soil, many of which are are poisoned with these metals . The families of people diagnosed with MS, ME, respiratory diseases, HDHC, Cancers, and many other diseases forms of neurological disabilities face expensive medical expenses. I also feel the families living in the Greater Sudbury Area who's legitimate documentation by doctors and scientific expertise showing their bodies are definitely poisoned by these metals be reimbursed for their expensive testing and medical expenses.

The Sudbury Soil Study tests were measured at 400ppm, resulting the release of the HHRA report to the public showing these four metals to fit in the low risk category of the Sara Group's high to low risk scale. The MOE standards and other communities test at 200ppm. Soil testing for all metals need to be remeasured at 200 ppm and included into the Sudbury Soil Study's Risk Assessments. The Sara Group created a scale in three parts, high, medium and low risk, to show their predicted levels of risks at tests

measurements based at 400ppm. Of all the 20 metals found in Sudbury, 16 were dismissed based on those measurement's results. Again, All of the 20 metals need to be included into the Sudbury Soil Study at a measurement or 200ppm and be reintroduced to the low to high risk scale the Sara Group has created to the public once these reasonable measurements, results and conclusions have been made.

Radon is found to be have the highest levels in Ontatio throughout the Greater Sudbury Area and was also dismissed along with many other metals in this study. Radon needs to be included for testing at 200 ppm in the Human Health Risk Assessment.

The evaluation of synergistic interactions of all metals found in our soil also have not been assessed and need to be included in the Sudbury Soil Study's Assessments.

Especiation also need to be included in the Sudbury Soil Study's Assessments. All of these tests need to be realistically tested at 200ppm for acceptable measurements in the evaluation of human health risks posed on Sudburians.

I ask that past and present workers and the soil in all of their working conditions on all company property be included in the Sudbury Soil Study's Assements to ensure their safety and risks posed to their health. These workers have higher exposure rates working directly with the metals on a daily basis and are more likely to have risks posed to their health. They cannot be dismissed in this Human Health Risk Assessment which has been paid for by their employers, although dismissed them. I also recommend the MOE and MOL step up and ensure these studies be conducted outside the company's contract by independent expertise to ensure all of these people are included in all stages of the further recommended testing as well.

The areas that have been tested including the families properties which have found high contaminations must be dug up, and replaced, taking care of those families and ensuring their safety.

The companies, Vale Inco and Xtrata must take responsibility of 100% of the cleanup for their leftovers that show high levels of metals based at 200ppm measurements and pose threat to health of Greater Sudbury Area Residents. This includes all areas where loally grown food is produced.

I also recommend that no applications for alternative standards and regulations by Vale Inco or Xtrata for increasing production and producing more emissions be approved until these tests have been made and both companies meet and maintain the existing standards and regulations put in place for our safety and protection.

Furthermore, I fully support the recommendations in the attached Environmental Defense Report and feel strongly that **all** of Dr. Kapil Khatter's findings, results, conclusions, and recommendations be included into the Sudbury Soils Study's Assessments.

## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

Sophisticated mathematical models, which simulate the movement of chemicals through the environment and within the body, were used to estimate total exposures for the residents of Sudbury. These models are based on the most recent scientific and regulatory guidance, and have been used in many similar assessments throughout Canada. Results of these estimates are generally conservative and tend to over-estimate potential exposures and risks. This overestimation is designed to be extra protective of human health and the environment. We believe that the calculations used did not under estimate the risk due to heavy metals in the community.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0.

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf, reports colorectal cancer incidence rates in SDHU area as higher (65 per 100,000 population) than both north eastern Ontario (58 per 100,000 population) and Ontario rates (51 per 100,000 population). Additional information on causative factors for Colorectal cancer area available at http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/colorectal-eng.php and http://www.cancercare.on.ca/documents/Insight_Colorectal.pdf.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

When discussing which metals were evaluated in the current assessment, it is important to understand the process by which the SARA Group selected chemicals of concern (COC) for the assessment.
The Technical Committee for the Sudbury Soils Study established three criteria to guide this "screening" process. To be evaluated as part of the current HHRA, a chemical had to meet each of the three criteria. These criteria were:

1. The concentration of the chemical in soil exceeded the soil quality guidelines established for residential soils by the Ontario Ministry of the Environment;
2. The chemical was known to be emitted by mining companies as part of their industrial processes; and,
3. The chemical was present throughout the Study Area.

The most important of these three criteria was the comparison to MOE soil quality guidelines. These guidelines were established as conservative benchmarks to quickly evaluate whether concentrations of a particular chemical may pose a risk to human or ecological species under certain circumstances. These guidelines are generic in nature, and do not take into account any site-specific conditions. The purpose of the current risk assessment was to take into account site-specific conditions, as well as local data (such as vegetable garden produce, drinking water, air quality, wild berries, fish, game, *etc*.), to establish a Sudbury-specific soil quality guideline.

Each of the chemicals has a different soil quality guideline established by the Ontario Ministry of the Environment. For example, the soil quality guideline for lead established by the MOE is 200 ppm. One would only compare concentrations of lead in soil to this guideline. It is not an appropriate comparison guideline for other chemicals. Using site-specific data as well as information in the scientific literature, the SARA Group conducted a detailed evaluation of the potential risk of lead exposures in Sudbury, and based on a weight of evidence approach, established a Sudbury-specific soil quality guideline for lead of 400 ppm.

While the SARA Group provided an information scale, derived from the scientific literature, to provide readers with a method to evaluate potential risks in easy to understand terms, this scale was not used in any way within the assessment to add or remove chemicals from the list of those under consideration.

In the case of radon, it is a naturally occurring substance, and is not released as an emission from the mining companies' facilities. As such, radon was not selected as a COC for evaluation in the current assessment.

The HHRA also closely examined the potential for interactive effects between the metals (see Chapter 6.4 of the HHRA). No interaction information identified for any of the COC was considered adequate at this time for quantitative or even qualitative incorporation into the HHRA. However, despite the uncertainties involved with this approach, given the generous uncertainty factors built into the development of each of these COC-specific toxicological reference values, it was concluded that it was highly unlikely that potential risks were underestimated in the assessment.

Some people may be concerned about the effects of direct skin contact with heavy metals in the soil. Such exposures rely heavily on personal activities, and require intimate contact between an individual and the contaminated soil. Typically, soil exposures are higher for children than for adults, because of frequent direct contact with soils during play and other outdoor activities. Some individuals will be at greater risk than others, for a variety of reasons. Some people will be more sensitive to exposures due to genetic factors, nutritional considerations, age and other lifestyle factors (such as smoking). Likewise, exposure will be higher in some individuals who engage in activities and behaviours (diet, occupation) that increase their exposure. From the outdoor environment, these would include all activities that increase time spent out of doors and interactions with the soil. However, increased exposure does not necessarily mean increased "disease" or health problems. Should you have any health concerns with respect to personal exposures you are advised to contact the Sudbury Soils Study toll-free information number (1-866-315-0228).

The recommended soil risk management level for lead in soil in Sudbury is 400 ppm (parts per million), based on the results of the HHRA. The Ontario Ministry of Environment (MOE) sets generic standards for total lead exposure to provide a conservative level of health protection across the entire province. A generic standard is based risk assessment. As part of this study, we measured the concentrations of lead in media to which people are exposed in Sudbury such as air, water, food, dust, local fish and meat. These measurements allowed the study team to make specific calculations, and conclude that a level of 400 ppm lead in soil is protective of human health in Sudbury. In many older, urban communities in Canada, it is common to see lead levels of 1,000 parts per million or greater. Since exposure to lead from soil in Sudbury represents less than 10 per cent of total exposure, removing soil is not an effective measure to reduce risk.

Vale Inco has made application to the MOE for an alternative standard for their nickel emissions. This is separate from the Sudbury Soils Study. You are encouraged to have your say on Vale Inco's application by providing comments through the Environmental Bill of Rights registry. The registry number for their proposal is 010-5356. Please note that the comment period ends April 10, 2009.

For our reply to the Environmental Defence report please refer to the attached (Comment 40).

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 22
**Submission Date:** October 31, 2008
**Name:** Sierra Harris
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Hi there I just wanted to give my input about the Sudbury Soil Study Results. I'm a student at LU and I'm thinking of becoming a doctor upon graduating. This soil study affects my decision to stay in Sudbury or not. I think after learning of the soil results I'm more inclined to look for work elsewhere. I would rather raise a family in a healthier environment where my future children are not exposed to increased levels of metals. I'm sure I don't stand alone on this subject. I'm sure these results will affect many student's decisions to also stay or to leave Sudbury upon graduating. Many intelligent students, which are our future doctors, nurses, teachers, researchers, and environmentalists might move to a healthier non-mining town to begin their careers. So we continue to educate these individuals, but we cannot seem to keep them in our cities.

I'm also disturbed that Vale Inco and Xstrata are not owned by Canadians anymore thanks to the current government. In the past Sudbury benefited from the mines much more then we do now. So these CEO's from other countries care a lot less about some small town in Northern Ontario and the people who live there. The mines have always had pollution issues associated with them, only now our economy doesn't benefit in anyway. (I'll add that Vale is changing the Nickel Bonus, so now the citizens of Sudbury will benefit even less)

So now we live in a mining town that's been polluted for over 100 years from mines that we don't even own. As I ate tomatoes from my garden this morning I couldn't help but wonder if it was going to affect my health later down the road.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

Early in the process, there were commitments made in writing from Falconbridge and INCO that the companies would support the results of the risk assessments, and risk management planning would be appropriate for the risks identified. When the companies became Xstrata Nickel and Vale Inco, these

commitments were re-confirmed to the Technical Committee, emphasizing the need to manage risk appropriately, in a transparent way.

Both companies continue to provide significant economic benefit to the City of Sudbury through direct employment and employment in many supporting services. In addition, both companies continue to support local charities, environmental initiatives and teaching and research at local academic institutions.

The results of the human health risk assessment did not identify unacceptable risk related to eating locally grown vegetables and produce. Overall, the results of the HHRA were positive indicating minimal risk to current metal levels in the Sudbury environment. We would encourage you to read the Human Health Risk Assessment Technical Report or the Summary Report which can be viewed at www.sudburysoilsstudy.com.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 23
**Submission Date:** October 31, 2008
**Name:** Mercedes Cueto
**City:** Sudbury ON
**Affiliation:**

### Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I've read the report and I think its very important for the companies be responsible in taking care of the environment, the community and the well being of the citizens of Sudbury.

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### Response:

Thank you for your comment and interest in the Sudbury Soils Study.

Both Vale Inco and Xstrata Nickel have reconfirmed their commitment to manage and reduce any risks indentified in the Sudbury Soils Study.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 24
**Submission Date:** October 31, 2008
**Name:** Gord Lundgren
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

As I have read in our local papers The Sudbury Star and Northern Life, comments have been made on two theories of judgement given. When a person is to look up information on any given site, all information leeds to; Environmental Defence web site on the "Sudbury Soils Study Report" soils around the Grand City of Sudbury are not up to standards as to the Canadian Government Ministry of Environment. A report given on the Environmental Defence web site, is by Dr. Kapil Khatter a national specialist on Human Health Risk Assessment. His analysis included; "Food Grown here in Sudbury had levels of 'Lead', 'Nickel', and 'Arsenic' that were found to be 'Ten Times the levels of store bought food' and 'Lead Contamination wuz found to be Above Safe Levels in Four Communities". Dr. Penny Sutcliffe states that there are three areas of study that are in fact many times higher in Toxins of metals in our fruit and vegetables.

By my understanding it is known that the Sudbury Soil Study, has taken measures - statistics from the Ontario Ministry of Environment Reports. Well to my amazement I can not understand why would this City have this study performed when there is substantial evidence already from the ministry.

What I can not understand is?, that the Sudbury Soil Study's report is on the Environmental Defence web site and not on the Sudbury Soil Study web site, why is this? When can this report be known? We Citizen's of Grand City of Sudbury should be fully aware to the local food we eat is safe! or not?

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

Both Volume I (Background, Study Organization, and 2001 Soils Study) and II (Human Health Risk Assessment) are available of the Sudbury Soils Study website: (http://www.sudburysoilsstudy.com/EN/indexE.htm).

The results of the human health risk assessment concluded that it is safe to eat local foods. As noted by the Medical Officer of Health, Dr. Penny Sutcliffe: “We should all be reassured that local data were used in the HHRA. Inputting these data into the HHRA analysis tells us that the consumption of local produce poses no unacceptable health risk.”

One of the findings of the HHRA is that consuming local produce does not present unacceptable health risks to residents. This finding is supported by the Medical Officer of Health and the Ministry of the Environment. Washing garden produce and peeling vegetables before cooking is considered good practice for any home gardener.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 25
**Submission Date:** October 31, 2008
**Name:** Doreen Ojala
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

**Question 1:**

a) In the summary table 3.35 in Volume II, Chaper 3: Phase 2, (page 3-73) - lead is noted to exceed the 200 ppm guidelines in residential garden soils (results - range - 5.9 - 520 ug/g dry weight) and nickel is noted to exceed 150 ppm (results - range - 31-1100 ug/g dry weight), and aresenic exceeded the 20 ppm guidelines (results - undetectable to 173 ug/g dry weight) - all at at 0-15 cm depths. Samples were taken from May to October, 2003.

b) What follow up has there been with gardeners who were tested in 2003 that showed high levels of lead, nickel, or arsenic in their gardens?

c) As this data was used as part of the exposure assessment component of the HHRA - what advice was given to gardeners to ammend their soil if there soil was contaminated and if they continued to grow food, was their garden food retested?

**Question 2:**

What further soil and vegetation analysis and advice will be available to reassure GSA gardeners that were not included in the SARA study that their soil and garden food is safe?

**Question 3:**

Are all the reported results in the SARA soils study report in ppm? Is there a difference in ug/g dry weight and ug/g wet weight - are they all ppm measurements? Why are some results reported as dry weight and some as wet weight?

**Question 4:**

Are there any outstanding deficiencies in how SARA group tested local food producers (residential and/or commercial) that will be addressed in the future?

As is stated on page 107 of the City of Greater Sudbury 2001 Urban Soil Survey - MOE SDB-008-3511-2003 - MOE noted the following deficiencies:

- produce was taken over a very narrow time span, -there were laboratory quality contol issues, -the presence of magnetic particles skewed some results, -and there was a lack of control data for residential produce Deficiencies in the SARA sampling could include:
- the selection of control garden sites and control vegetation from outside the GSA,
- the total number of samples taken (64 residential properties, 15 commercial and 10 natural),
- where the samples were taken from (was there a representative sample size from each area of concern?),
- or deficiencies with any other follow-up procedures or in the analytical process itself?

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## Response:

Thank you very much for your questions and interest in the Sudbury Soils Study. We have provided responses to your comments below.

**Response to Question 1:**

Information on garden soil quality, including the concentrations of metals, was provided to each homeowner who participated in the study. The Ontario Ministry of the Environment (MOE) soil guidelines are screening values used to determine whether there is the need for further evaluation of metal concentrations on that property. These garden soil concentrations were considered as part of the HHRA, and the results of the assessment indicated that these concentrations would not result in adverse health risk to Sudbury residents. However, in the case of lead, a soil risk management level (SRML) was established at 400 µg/g, which would also be applicable to garden soils. Should you have any health concerns with respect to personal exposures you are advised to contact the Sudbury Soils Study toll-free information number (1-866-315-0228).

**Response to Question 2:**

The extensive soil survey conducted in 2001 of residential properties was considered to statistically represent all properties in the community. Therefore, there should be no additional risk associated with properties that were not sampled as part of this study, and no further sampling is considered necessary.

**Response to Question 3:**

Most data in the HHRA is presented in µg/g, which is equivalent to ppm. In the case of produce, the distinction between dry and wet weight is an important one. Dry weight measurements occur after all of the water has been removed from produce, and can result in a higher concentration than would wet weight (*i.e.*, the water has been removed, but the metals remain, leaving the same amount of metal, but less overall weight to the produce due to the water loss). Different laboratory analytical methods provide results in either dry or wet weight format. However, as people generally eat their fruits and vegetables in their original form (not dried in a laboratory), wet weight concentrations are generally used in the HHRA.

As such, any analytical results provided in dry weight form are converted to a wet weight equivalency, based upon the moisture content of that particular type of produce.

**Response to Question 4:**

The deficiencies you listed were for a study conducted by the Ontario Ministry of the Environment prior to the initiation of the Sudbury Soils Study. These deficiencies were why those data were not used for the HHRA, and required the SARA Group to conduct a separate, larger home and commercial garden survey. All of the deficiencies noted in the MOE study were considered as part of the study design for the study conducted as part of the Sudbury Soils Study. Further details can be found in Appendix E of the HHRA report.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 26
**Submission Date:** October 31, 2008
**Name:** Destiny Roy
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Dear _____

Like most Canadians, I am very concerned about the conservation and preservation of our precious freshwater resources. With the onset of global warming we are being warned that these resources may be in jeopardy from things like drought and overuse. We are being encouraged to conserve the water resources we have and use for future generations. I believe that you have publicly stated that you share these concerns and have publicly expressed your commitment to protecting our fresh water and aquatic ecosystems.

However, the current policy of your government of allowing mining companies to use pristine natural lakes as tailings dumps is directly contrary to what you are asking us as citizens to do. It is contrary to your government's commitments to the people of Canada. I am appalled and opposed to this practice and I want you to put an end to it immediately.

There are alternative, safe and environmentally effective methods of dealing with mining waste that are currently employed in other parts of Canada and around the world. I would respectfully insist that you require all new mining ventures in Canada to avail themselves of those technologies and leave our lakes alone.

Mining companies are discarding their toxic leftovers in our lakes right now! Tail Lake (Nunavut) and Scully-Wabush Lake (Newfoundland) have already been approved and the federal government is reviewing applications to okay 14 more.

Decisions on eight bodies of water will be made by the end of this year. Visit here for a map and list of all the mines/lakes currently under review.

Industry had other disposal options. **These lakes must not be sacrificed.**

Trout Pond and Duck Pond (near Buchans, Newfoundland) were approved for destruction in this way in 2006. These lakes used to contain Atlantic salmon and brook trout and were also home to otters. They are now essentially biological dead zones.

Since then, the requests from the international mining industry to use Canadian waters for their toxic waste disposal have increased at an alarming rate. Why? Because it would save them tens of millions of dollars in operating costs over the life of their mine. Why build and maintain a tailings pond if you can simply dispose of your waste in a natural lake basin?

Dear Sudburians and fellow supporters,

Have you heard about the 7 year soil study that has been undergoing testing in our community? Since the public release of the Sudbury Soil Study, the study was reevaluated by Dr. Kapil Khatter a National Specialist on Human Health Risk Assessments under Environmental Defense who has made specific recommendations to include in the Study to ensure our clean environments be taken care of, and the health and safety of our community here in Sudbury. The Community Committee on the Sudbury Soil Study is asking the pubic to take the information in this report and submit YOUR SAY, by the Saturday, November 1st deadline for the public's opinions and decisions to be taken into consideration for the management of the high metal contaminants found all over the Greater Sudbury Area.

Have you heard about the 7 year soil study that has been undergoing testing in our community and was release to the public this past May? Since the public release of the Sudbury Soil Study, the study was reevaluated by Dr. Kapil Khatter a National Specialist on Human Health Risk Assessments under Environmental Defense who has made specific recommendations to include in the Study to ensure our clean environments be taken care of, and the health and safety of our community here in Sudbury. The review was release this past Wednesday, October 22nd to the public. The Community Committee on the Sudbury Soil Study is asking the pubic to take the information in this report and submit YOUR SAY, by the Saturday, November 1st deadline for the public's opinions and decisions to be taken into consideration for the management of the high metal contaminants found all over the Greater Sudbury Area.

With only one week left for Greater Sudbury Residents to have their say and make a decision on what level of risk they are willing to accept as acceptable living conditions.

The review of the Human Health Risk Assessment was issued by our local Unions, Mine Mill Local 598 CAW and Steelworkers Local 6500. The Environmental Defense report was commissioned to analyze the Soil Study's report by expert doctor, Dr. Kapil Khatter, national specialist on Human Health Risk Assessment. The report to the public includes specific recommendations that need to be included to ensure our the safety of our health.

Its points make a clear outline for the importance of Greater Sudbury Area residents rights to know about the risks posed on all of our health and be given the opportunity to be consulted and make our own decisions for the fate of our futures.

What risks you are willing to accept? Leave your comments, or copy and paste the recommendations below from the official Environmental Defense Report issuing full corporate responsibility in cleaning up, taking care of their workers and the people living in our community who's health is being impacted by it. The Environmental Defense Report by Dr. Kapit Khatter commissioned for our use is below. Please submit your inclusions before Saturday, November 1st, 2008, ensuring the recommendations below and or your comments and decisions included and followed through on.

To:
Easy one step posting at : http://www.sudburysoilsstudy.com/EN/indexE.htm
or By email to: comments@sudburysoilsstudy.com

Below is the full report and review of the Sudbury Soil Study for your participation in this important decision making process for Sudburians futures.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

In addition to the issues you raise in your letter about the Sudbury Soils Study, you have identified concerns with respect to the use of natural lakes for tailings disposal by mining operations. Separate from any requirements of the federal government, in Ontario, proposed new mining operations must make application for approval under section 53 of the Ontario Water Resources Act for their tailing disposal systems. Although natural lakes have been used in the past for tailings disposal in Ontario, this is no longer considered to be an acceptable practice and if such an application was made alternatives to lake disposal would be required.

To read our response to the Environmental Defense report, please refer to the attached (Comment 40).

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 27
**Submission Date:** October 31, 2008
**Name:** Allison Reed
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

To Whom It May Concern:

My name is Allison Reed. I'm writing you regarding some key points I'd like to talk about regarding my chronic illness associated with pollution, my heavy metal toxicity results, the effects of pollution on those in our community with Cancer and other chronic illnesses (including the economic impact on our community), and my opinion that we hold companies such as Vale INCO accountable and certainly not allow "Alternative Standards" when our community is already a 'hot spot' for M.S., and people are becoming sick daily at an alarming rate. The points I'd like to mention are as follows:

-The neuromuscular disorder I suffer from is called M.E. these days by up-to-date doctors and informed patients, short for Myalgic Encephelomyalitus. It is the modern term for the scientific basis for the neurological condition that is Chronic Fatigue Syndrome with Fibromyalgia. Because people with Fibromyalgia and Chronic Fatigue were often doubted several years ago, many people are unaware of the progress made in the diagnosis, understanding, much struggled for recognition of the diagnosis as a neurological condition by the medical and general community, and progress towards treatments. The main problem is that there are no pain clinics locally, and government sponsored pain clinics have nearly year long waiting lists (if not longer) and these pain clinics often due little to address the underlying problems. There is much to be done. Another major problem is that, while there is an Arthritis Foundation and an M.S. drop-in centre being developed (since 1 Sudburian a week is being diagnosed with M.S. which is certainly linked to pollutants), there are few pain specialists in Sudbury, and M.E. sufferers develop a wide range of problems. M.E. is considered to be a "Sister Disease" to M.S., different in that it doesn't create lesions on the brain and that it usual isn't fatal. A condition initiated by my M.E. but also a symptom of M.S. is my Trigeminal Neuralgia (developed after I dislocated my jaw more than a year ago, and my slip TMJ disc is yet to be fixed), a horrible condition known too well by to many Sudburians. And yet there are no specialists here to help them… or at least not to help me. My sister also has M.E.

-For these reasons and others, I am anxious to hopefully recover from my Trigeminal Neuralgia and jaw dislocation, so that I may advocate for people in Chronic Pain (for the opening of a local government subsidized clinic, as well as a broader network for understanding of treatment, as well as public

awareness for those with a diverse range of chronic pain disorders and problems that are DISPROPORTIONATE to our region).

-From here I'd like to discuss the strategy on Vale INCO's part of calling "aggressive" steps to reduce emissions bad for the economy, when cancer and chronic illness is clearly bad for the economy (as is clearly visible in my case, since my family and I have spent thousands of dollars and will spend thousands more on my condition, not to mention my loss of income and requirement of ODSP). Job loss is unlikely from Vale INCO's failure to meet the standards presented to them. It is unacceptable for us to approve Alternative Standards while we watch our friends and family become sick at an abnormal rate. Illness is bad for the economy, and I can explain how those like me, with chronic illness, spend at least 1 million in their lifetime on their health, all of which is paid by their families and, mostly, by taxpayers, not companies like Vale INCO. Also, I would be a junior architect in the workforce in Sudbury right now, for which I had prospects lined up after already working as an apprentice architect in this city, if I hadn't dislocated my jaw from my development of M.E. five years ago. Instead, I have been unable to go to school or work for over a year and will soon receive ODSP. This is NOT good for the economy. My family has spent thousands on my health and will spend thousands more. This is NOT good for the economy.

-Also, no decision should be made as to whether to approve these "Alternative Standards", which in my opinion are completely unacceptable, until the alternative health risk assessment is completed and released to the public, by Dr. Kapil Khatter and the independent committee.

-Finally, as to whether my condition and other neuromuscular disorders are caused by INCO's pollution, I have tested positive for Nickel, Cobalt and Copper poisoning, Nickel being the most severe level found in my test results (and also the one being discussed right now in terms of air particle emissions not being reduced to appropriate standards). Nickel and Cobalt poisoning was found in hair follicle test results when I first became ill nearly five years ago, and my doctor has already run some blood tests to re-assess my Nickel and Cobalt levels, as well as re-test my Copper levels, as recent blood tests have already found that I have Copper poisoning. I can provide any test results that you're interested in looking at, and Laurentian University has also done broader testing regarding Nickel absorption through hair follicle and, I believe, blood testing. I ask you, where did my heavy metal poisoning come from? Why did I only become chronically ill after four years of living in Sudbury? Could I ever be compensated for my poor quality of life? Currently, I am so crippled that I only leave the house for appointments (I'm basically a shut-in at 22) and can only enjoy movies with my family and few friends since I can barely talk, while I await jaw surgery in December. My quality of life hardly exists. Also, I live in New Sudbury, where in fact people are still incredibly vulnerable, since some people are more genetically predisposed to being sensitive to heavy metal absorption, not to mention the fact that I went to school for four years in Sudbury Centre. Listen, we know that heavy metal absorption is dangerous. And just because we don't know the synergistic effects of heavy metals on human health does not mean they aren't extremely dangerous. I urge our entire community to become more informed.

-Normalization about pollution in our community is dangerous. Our water isn't safe. High consumption of locally grown food isn't safe. Our air isn't safe to breathe if we don't insist on cracking down. Knowledge is power and we must make a difference. It's not a coincidence that the Soil Study results and the recent Coppercliff forum were put off so long and so soon before the deadline for community comments on

October 31st. I encourage people in our community to speak out, to insist that Vale INCO meet the original standards rather than "Alternative Standards", and I encourage all people who are chronically ill to tell their stories, to test for heavy metals, and ask for accountability.

Thanks for your time and your consideration of my comments.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study. We cannot publicly comment on personal health issues but offer the following information.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf , provides up to date information on local cancer rates.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

The Vale Inco application to an alternative nickel air standard is outside of the realm of the Sudbury Soils Study. This application process is regulated by the Ontario Ministry of the Environment. For more information or to provide comments on this matter, refer to the Environmental Bill of Rights registry. The registry number is 010-5356. Note the comment deadline period ends April 10, 2009.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 28
**Submission Date:** October 31, 2008
**Name:** Mary Jo Cullen
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Of the many valuable observations and recommendations of Environmental Defense's analysis, by Dr. Kapit Khatter of the Human Health Risk Assessment in the Sudbury Soils Study, I find the following particularly telling:

"The consultants' conclusions go beyond the science to subjective opinions on whether the risks are low enough. The documents themselves state that: "the selection of an acceptable risk level is predominantly a policy-based, rather than a science-based, decision," and that "an alternate acceptable risk level may be appropriate". A few pages later, however, they write that: "Where estimated risks … are less than the acceptable level, it can be concluded that no observable adverse health effects would be expected to occur including sensitive subpopulations or groups." This is not accurate. Even low risk does not mean no risk, nor does it mean that no one gets harmed. This is especially true for carcinogens that may not have safe thresholds. In addition, these are "risk estimates" and so are not assurances that there are no health effects, only probabilities. The assessors' conclusions therefore go beyond what a risk assessment can and should do. They decide the acceptable level of risk for the community, **which should be a community decision.** And they propose to assure residents that no harm at all is occurring, which the assessment can not do." (Emphasis, mine.)

Furthermore, how could anyone disagree with Aaron Freeman, of Environmental Defense, who said, in commenting on Dr. Khatter's suggestion that "the high levels of metals in locally grown foods highlight the need for mining companies to reduce levels of pollution." --"You've got an overflowing bathtub. The first thing you have to do is turn off the water."

Thanks for the opportunity to comment. Although I do not live in the Greater Sudbury Area, I spend many months a year nearby on the northern shores of Georgian Bay and regularly pass through Sudbury. The particulate in the air is invariably so dense I always fear for the health of local residents who must endure such pollution 24/7 24/7 year after year.

## Response:

Thank you for your interest in the Sudbury Soils Study. For our reply to the Environmental Defense Fund report please refer to the attached document.

We also encourage you to read both the Human Health Risk Assessment Technical Report and Summary report, which can be found at www.sudburysoilsstudy.com.

In addition, Volume I of the Sudbury Soils Study provides and overview of the significant reductions in air emissions achieved by both companies over the past 30 years.

The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time. Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0.

Recent work undertaken by the Sudbury & District Health Unit in 2007 titled A Snapshot of Cancer Rates in the Sudbury & District Health Unit Area, which can be found at http://www.sdhu.ca/uploads/content/listingsSnapshotCancerSDHU2007Final.pdf , provides up to date information on local cancer rates.

Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 29
**Submission Date:** November 1, 2008
**Name:** Mette Kruger
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I strongly hope that you will recognise the expertise that has gone into the Environmental Defence report. Their report raises important issues that require further study. It is my hope that further study would be carried out by a government agency so that there is no impression that the study is in some way biased as I fear the Human Health Risk Assessment is.

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## Response:

Thank you for your interest in the Sudbury Soils Study.

The Environmental Defence report has been submitted as part of the public comments on the Human Health Risk Assessment report. For our reply to the Environmental Defence report please refer to the attached (Comment 40).

A number of measures and procedures were included in the HHRA study process as checks and balances to ensure that a transparent and scientifically rigorous study was conducted. This included the establishment of a Public Advisory Committee, involvement of an Independent Process Observer to consider the interests of the community, consultation with an independent Scientific Advisor; as well as the review of the entire HHRA by an Independent Expert Review Panel. Further, the results of the HHRA are fully supported by the Medical Officer of Health and the Ministry of the Environment, who have been directly involved as study partners since work began on the study in 2001.

The results of the HHRA do not warrant any further studies and none are planned at this time.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 30
**Submission Date:** November 1, 2008
**Name:** Gordon Harris
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I came to Sudbury more than a decade ago and found myself welcomed within this vibrant city. There is much that Sudbury can offer the rest of Canada. The environmental recovery from the re-greening program and the restoration of many of the lakes from past industrial activity is a testament to the expertise the Sudbury has built up.

My key concern for this HHRA is that the transparency of the process is not marred by on-going public suspicions that the results are too good, and thus subject to scepticism and possible outright rejection. I can understand the actual healthy risk for contact with the residual from more than 100 years of industrial activity would be fairly limited as most people in Sudbury today do refrain from swimming in turquoise waters or roll around on the slag heaps, and are thus, by the nature of our lifestyles to have limited direct daily contact with the contaminating elements.

I am keenly observing the upcoming third section that deals with the state of nature within Sudbury. There is a growing interest within the Sudbury community to expand community gardens using vacant lands. This concern is whether the existing soils can be used for crops; or is the risk of contamination too much and that soils from other areas need to be brought into the city, at significant expense.

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## Response:

We appreciate your comments and perspective on the HHRA as an interested Sudbury resident. Despite some voiced concerns on the assessment, it is important to note that the HHRA went through a detailed peer review process by a panel of experts from across North America, in addition to the thorough review conducted throughout the Study by the representative agencies on the Technical Committee (*i.e.*, the Ministry of the Environment, Sudbury District Health Unit) and their experts. It is hoped that this review will assist in the transparency of the process, and help allay some of the suspicions you have noted.

The potential implications of metal concentrations in garden soil were also evaluated as part of the HHRA. In fact, a detailed home and commercial garden survey was conducted, which provided excellent data on potential exposures arising from these foods. The results of the assessment indicated that there were no risks associated with eating vegetables grown in Sudbury.

The results of Volume III of the Sudbury Soils Study, the Ecological Risk Assessment (ERA) will be released later this winter. We encourage you to review the Technical Report and associated summary reports when they become available. A review period will be scheduled to give members of the public an opportunity to review the ERA and to provide comments.

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# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 31
**Submission Date:** November 1, 2008
**Name:** Diana Wiggins
**City:** Sudbury, ON
**Affiliation:**

### Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Please use this copy of comments as we did have time to add to them before the deadline.

There is an extraordinary amount of public review that would be needed for the Sudbury Soils Study\Human Health Risk Assessment. The lack of sufficient public time allocated for that within the SSS\HHRA, this introductory review of the report is very limited in capturing concerns that we have in regards to this extremely important report. It must also be mentioned that we are doing such review on our own initiative as concerned and interested members of the general public. We do not have the same certified qualifications to support our comments, as do other stakeholders in this process. That being said this submission is an incomplete submission to the SSS\HHRA and we request the right to comment further on this assessment and any further assessments.

## Metal Speciation Task Force Minutes of November 3, 2004

It is noted that the Sudbury District Health Unit did not attend this meeting. Please direct these readers to the comments and input of the SDHU on the issues discussed during this meeting. If there are no comments and input from the SDHU please explain why, considering they are the entity charged to care for the general public health. Please supply written correspondence from the SDHU that they were in agreement with the approach that was decided during this meeting.

During this meeting it is stated by Dr. Bruce Conard, *"the urinary arsenic can't tell you quantitatively what the exposure was. It will tell you the level of body burden, but not what fraction of arsenic in the stomach is taken up. The study will be of limited use in the risk assessment. Since there are no standard method for arsenic speciation there are 2 options 1) develop a method (not recommended due to costs) or 2) take a protective approach and assume that all ingested arsenic will be taken up.*"

In response to this comment Elliot Sigal stated, "*Assuming that all the arsenic will be taken up would give predicted cancer rates of well over 1 in 1,000,000.*"

Given the discussions during this meeting, please explain how it is you came up with the conclusions that the risk from arsenic exposure was considered to be unimportant based on the additional Falconbridge arsenic study which found comparable urinary levels with those residents of Hanmer the control study area. Were Hanmer's soil and water tested to ensure that this was indeed a "clean community?" In your tables for air monitoring it shows Hanmer to be 3rd only to the Sudbury Center and Coniston with PM10 arsenic in the air. In other words it shows that Hanmer is higher with arsenic in the air than that of Falconbridge. Please justify using Hanmer as a control community when it appears that they have even higher levels of arsenic in the air than that of Falconbridge.

Both soil and inhaled arsenic levels are significantly increased throughout most of the Greater Sudbury Area (GSA). Urinary arsenic levels were not found to be higher than in control communities because purchased food is the main source of exposure. There are still concerns that inhaled arsenic and specific types of ingested arsenic may put GSA residents at increased risk. Increased risks from inhaled arsenic may not be represented by urine levels if the arsenic stays in respiratory tissues the way nickel does. How does this HHRA deal with this issue?

Please explain how it is that you are able to come to your conclusions using the urinary arsenic study when the half-life of arsenic is 10-30 hours. Please direct these readers to the complete urinary arsenic study.

It appears that Dr. Evert Neibor is the representative for the SDHU. This reader would like to point out that he is also the representative for the Niagara Health Department for similar issues. We find that this could be a potential for a conflict of interest.

### Bioaccessibility testing of soil and house dust samples from the SSS

What are the ph values in the soil that was tested? Was the soil or dust that was used in these studies altered in any way prior to the testing?

It is unclear to these readers whether the Chebyshev 95UCL, or the Students – t or Drexler Bioaccessibility was used. So we will assume that it was all three with our following comments. Please provide which was used and for which COC.

### Students – t

Using this for all perimeters seems to be in contradiction of your own work. As you stated in this HHRA nickel and other metals are not found to be in a Normal distribution. If you did use this please explain the rational and what the limitations, confidence and uncertainties would be by doing so.

### Chebyshev 95UCL

If this was used for nickel and other metals please explain what the limitations, confidence and uncertainties would be by doing so.

In other papers it has been noted that the Chebyshev 95UCL is used as a confidence limit. However, that isn't the formula of this, as it appears to be a tolerance limit. Was this used as a confidence limit or a tolerance limit in this HHRA?

## Drexler Bioaccessibility Report

How is this used in this HHRA report? The gut of a rat is greater in ph values than that of a human. Considering Nickel and some compounds react to lower Ph levels, how will this affect the outcome of this report for all COC's?

## Lead

The Sudbury risk assessment for lead has no meaningful value at this time in regards to the risks posed to the population in Sudbury and its most sensitive receptor - a child. In a recent blood lead study conducted in Port Colborne by CanTox (now Intrinsik) which looked at soil lead levels in the community and using the US EPA's IEUBK model to determine "safe" lead levels in Port Colborne, the Ontario Ministry of Environment has now refused to accept the findings of that study, which produced a 351 ppm soil lead level as being "safe", citing recent changes in their regulations for lead (Pb) exposures.

The Ministry of Environment recently updated the Ontario air standards for lead (Pb), which takes into account human exposure to air, soil and water to Pb in our environment. This recent change to the MOE's acceptable air standards is a result of advice received from credible scientific and medical advisers. The Ontario Ministry of Environment's regulated standard for air also includes exposure risk calculations from soil and water levels with an acceptable soil level being set at 200 ppm to protect the most sensitive receptor - a child. It should also be noted that the medical and scientific communities are heading towards accepting a 5 ug/dL for protective blood lead levels in children replacing the 10 ug/dL currently thought to be more protective.

The Sudbury risk assessment for lead, at minimum, should be re-assessed given the recent changes in the Ontario Ministry of Environment's regulated standards and the concerns from the medical and scientific communities regarding lowering the protective blood lead level in order to protect our children and communities we live in. It should also be noted that the CCME levels for Pb in soil are 140 ppm based on Human Health.

Air levels of nickel are higher than recommended exposure limits for non-cancer and cancer effects in three communities. The assessors dismissed the risk saying the assessment had a margin of safety. The margin of safety is meant, however, to compensate for the gaps and uncertainties inherent in the assessment and it does not mean that there is no significant risk. Please explain how you have dealt with this issue.

Food grown in the GSA tended to have higher levels of lead, nickel and arsenic. In some instances more than 10 times the levels of store-bought food. These higher levels are a concern for those eating local food as they increase these residents overall exposure level. Please explain how you have dealt with this issue in the HHRA.

The risk assessment cannot demonstrate that no harm is occurring; it can only estimate the level of risk. The assessors have inappropriately decided what that acceptable level of risk should be. This is a decision the community should make with a qualified Consultant at the choice of the residents paid for through the Sudbury Soils Study.

The levels of inhaled nickel exceeded benchmark regulatory standards for both cancer and non-cancer endpoints. The assessors, however, dismiss the excess exposure as unlikely to cause harm given the margin of safety built into the assessment. Where can one find the generous margin of safety that was built into this assessment to warrant this? If is pertaining to the Seilkop Study, this study has not been approved by any regulatory agency. In fact the first draft of the Seilkop Study resulted in it having to be withdrawn. How heavily does this HHRA report rely on the Seilkop study and how is it used to produce the clean up criteria number for Ni?

Levels of inhaled nickel were higher than non-cancer exposure limits at the Copper Cliff, Falconbridge and Sudbury Centre West monitoring stations (particularly Sudbury Centre West). Inhaled nickel is considered to be carcinogenic as well, but there are insufficient data to know how cancer-causing oral or skin-absorbed nickel is. Nickel is also a sensitizer and a significant percentage of the population reacts to nickel but there was no evaluation done of how local nickel pollution impacts this. Please explain how this will happen.

Removing the "outliers" in the soil measurements. In evaluating the soil concentrations of the metals in various locations, the assessors decided to ignore the highest readings out of statistical convention. Presumably this is to keep results that are inaccurate or not representative of the normal range of concentrations out of the calculations. What this does however is leave out the most contaminated spots, where the risk would be highest. Please explain how this will be protective of ALL RECEPTORS in the study area.

The assessors point to the lack of research on the interactions between metals and with other pollutants, but conclude that synergistic interactions (interactions which enhance effects rather than just adding to them) have been rarely found at the levels of exposure seen. They then leave the potential for multiple exposures to different metals out of the assessment. This has the potential to greatly underestimate risk assessments if there are additive or synergistic interactions not accounted for. Lead and arsenic for example, may be more than additive when affecting the nervous system.

It appears that indoor air sampling was not part of this HHRA. In the Port Colborne studies for the similar issues there was limited indoor air testing done for the HHRA there. The study in Port Colborne did show elevated levels of contaminants in some homes higher than that of the outdoor air monitoring. Other studies done by government agencies have shown that indoor air contaminants could be magnitudes greater than that of the outdoor air quality. Unfortunately due to time constraints these readers do not have such studies to site at this time. However, if the author requires any of the studies please let us know and allow us time to deliver them. You may also find this information in the comments with reference to the CBRA in Port Colborne

On going emissions seem to be an issue. How will this HHRA address the ongoing emissions and future emissions?

The readers have not been able to locate how asthma or dermatitis fit into this HHRA. Considering one or more of the COC's have been shown to affect both asthma and dermatitis how is this going to be dealt within the SSS?

As this risk assessment is to deal with the most sensitive receptor the readers were unable to locate where in the HHRA a pica child was considered and used in the outcome. It appears that a pica child would most likely be the most sensitive receptor, how is this dealt within the study design and results?

Considering there are no drinking water standards for nickel in water how was this study used to come to the author's conclusions? It appears that the levels of nickel in the water supplies are above the WHO standards for nickel. As well, it is stated in this report that water is considered to be 100% bioavailable.

Although the following comments are not directly related to an HHRA they are indirectly related. A concern that many homeowners and potentially new homeowners need to take into consideration is the MOE has set regulations for many contaminants of concern. They are no longer just guideline values. It is imperative that the SSS address the fact that if a homeowner has elevated COC's in the soil of their property, the homeowner is responsible for this issue regardless if the SSS finds no risk. For example if a homeowner sells their property with a known contamination in the soil that exceeds any regulations to anyone including but not limited to a child with pica it is the responsibility of the seller to disclose this information. How is the SSS structured to deal with this issue?

It is the understanding of these readers that a HQ greater than 1 is a risk that is not acceptable to the Province of Ontario. Although this HHRA doesn't deal with the risk management portion of these studies we are curious as to how this will be handled. Could the author direct us to the mechanism in place to deal with these issues?

This review is incomplete.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

A question was asked about the Speciation Task Force meeting of November 3, 2004 held in connection with the Sudbury Soils Study. During the discussion of speciation priorities, the task force confronted whether speciation of arsenic should be sought. An opinion was expressed by Dr. C. Wren that the results of the Falconbridge urinary arsenic study would be useful in the risk assessment and, by implication, that speciation of arsenic was not that important. Dr. B. Conard’s opinion was that the urinary arsenic data from Falconbridge and a non-arsenic-impacted reference community would not be useful in

quantifying arsenic exposure because the urine reflects a body burden, not a measure of intake (or exposure). That is, Dr. Conard suggested that the urinary arsenic data would quantify only the amount of arsenic being eliminated from the bloodstream. It would not be telling us anything about the fraction of the total intake that had reported to the blood.

The total intake of arsenic is what the risk assessor has as input data. The risk assessor sums the arsenic from food, water, soil, dust, etc. However, the additional information the risk assessor needs is the fraction of the total that is absorbed into the bloodstream because it is that fraction that is toxicologically important. Indeed, the risk assessor may believe that different arsenic-containing compounds in each medium may have a different fraction absorbed. For example, nickel arsenide in soil may be only 10% bioavailable, whereas an organic arsenic compound in shellfish may be 80% bioavailable. The question is: does the risk assessor need to speciate each food material and soil and dust for its constituent compounds and then determine the bioavailability of each compound? The answer is: that would be a perfect solution. But the answer is also that such data are rarely practical to obtain for both technical and economic reasons. Therefore, the risk assessor must fall back on other measurements or assumptions to stand in place of these “perfect” data.

Dr. Conard’s opinion was that the urinary arsenic study does little to fill this data gap. He went on to say that he knew of no established technique to yield quantitative information about the speciation of arsenic in, for example, various foods. Therefore, he stated that we could try to develop such techniques (impossible because of time and costs) or rely on other assumptions. One such assumption he suggested was to assume that all the arsenic taken into the body was 100% bioavailable. This is obviously a very conservative and overly protective approach, but it is one that could be made with considerable simplicity.

Dr. E. Sigal responded to this last suggestion by saying that doing this would surely result in an over-estimation of the bioavailable arsenic. Dr. Sigal implied that bioaccessibility measurements, while not speciation per se, reflected the availability of arsenic in the mix of compounds present and would be preferred to assuming 100% was bioavailable.

As it turned out, Dr. Sigal’s suggestion was followed in the Sudbury HHRA. However, as can be seen in the results of the HHRA on arsenic, the bioavailable arsenic estimated to be received daily by certain human receptors in the communities of interest was higher than the arsenic believed to be the safe limit.

A further note should be added, based on additional conversations with Dr. Conard. When Dr. Conard said that the Falconbridge urinary arsenic study would be of little value in the risk assessment, he was specifically talking about its ability to help the risk assessor determine what fraction of the total arsenic was bioavailable. He was not indicating that the urinary arsenic study provided no value whatsoever to the risk assessor. Indeed, the use of the urinary arsenic study, as an element in a weight of evidence evaluation, was a valuable contribution to the overall risk assessment conclusions for arsenic in Sudbury.

**Urinary Arsenic Study**

Hanmer was selected as a comparison community due to lower arsenic concentrations within the soil, compared to other areas of the GSA. Concentrations of arsenic in drinking water in Hanmer were less than those found in Falconbridge. While concentrations in air were marginally higher on average in Hanmer than Falconbridge, the measured concentrations were extremely low (*i.e.*, the 95% UCLM was slightly above the analytical detection limit, and 54-fold below the Ontario ambient air quality criteria for arsenic), and did not contribute significantly to the overall risk (it represented less than 1% of the overall risk).

As noted in Figure 5-7, in the HHRA Technical Report, the primary differences in exposures to arsenic between Hanmer and Falconbridge were higher exposures *via* drinking water and soil/dust consumption. However, despite these higher exposures in Falconbridge, analysis of the urinary arsenic of Falconbridge residents showed similar levels to that observed in Hanmer. This indicates that while exposure may be theoretically higher in Falconbridge (due to higher soil and drinking water concentrations), arsenic from these sources are not being absorbed into the body. In fact, urinary arsenic concentrations in the residents of Falconbridge (and Hanmer) are similar to those observed in other studies of "un-impacted" communities (*i.e.*, no mining) in North America. This information is outlined in detail in Chapter 3.9 and Appendix N of the HHRA report.

**Bioaccessibility testing of soil and house dust samples from the Sudbury Soils Study**

The pH of the soil varied slightly from sample to sample. However, the starting pH of the soil or dust sample is somewhat irrelevant as it was then added to an acidic solution, buffered to match the pH of an individual's stomach.

The U.S. EPA recommended statistical software package, ProUCL, was used to analyze the data for each of the COC, and the software provided a recommendation as to which analytical method from the list of parametric and nonparametric approaches best fit the data. This approach was then used to calculate the UCL for that particular COC. Results of each selection, including the value predicted by each analytical approach, are provided in the data output summaries in the Drexler Bioaccessibility Report in Appendix J.

The resulting UCL is an upper confidence limit, and not a tolerance limit.

**Drexler Bioaccessibility Report**

The output of the bioaccessibility analytical work allows one to calculate a relative absorption factor (RAF). This standard risk assessment method allows one make an adjustment based on a comparison between the inherent bioaccessibility of the media under study (in this case, soils and dusts) with that of the original media used in the RfD study. In the case of nickel, it allows for a relative adjustment between the soils consumed by Sudbury residents, and the "spiked" chow consumed by rats in the nickel oral toxicity test used to develop the RfD.

**Lead**

First, a clarification must be made on Intrinsik's role in Port Colbourne. Cantox Environmental Inc. (now Intrinsik), under contract to the MOE, conducted modeling using the U.S. EPA IEUBK lead model for a variety of scenarios pertaining to the Port Colborne community study. In this work, Cantox staff were not directly involved in the blood survey but simply modeled the exposure scenarios requested by the MOE, and was not involved in any of the calculations or discussions conducted by the MOE to establish their acceptable lead soil level in Port Colborne.

All of the recent scientific and regulatory literature was reviewed and incorporated into the weight of evidence approach used in the current assessment to establish the SRGL for lead in Sudbury.

**Nickel**

The SARA Group did not dismiss airborne risks related to nickel. As noted on page 5-35, "while the predicted risks at the Copper Cliff and Sudbury Centre West stations are of potential concern, it is the opinion of the SARA Group that the potential risks around the Falconbridge monitoring station are marginal given the degree of safety built into the assessment." This section concludes by stating, "the above weight-of-evidence evaluation indicates the calculated risk to airborne nickel exceeds regulatory benchmarks for both cancer and non-cancer health effects in the community of Copper Cliff and western end of Sudbury Centre. This information, as well as other elements of the weight-of-evidence evaluation, can be used as a basis to make informed risk management decisions on addressing potential health risks related to airborne nickel in the GSA." Based on these recommendations, Vale Inco has undertaken a number of significant actions intended to reduce fugitive dust emissions from the Copper Cliff facility.

**Food**

Concentrations of the COC present in home and professional gardens were evaluated as part of the HHRA. Based on guidance for the U.S. EPA, a portion of the residents' daily intake of fruits and vegetables was allocated to those derived from local Sudbury sources. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat any fruits and vegetables grown in Sudbury.

**Establishing Acceptable Risk**

Regulatory agencies, such as the Ontario Ministry of the Environment, Health Canada, and the U.S. EPA, have established protocols and thresholds to denote levels of acceptable risk. The SARA Group has not "inappropriately decided what that acceptable level of risk should be". Rather the SARA Group used acceptable risk benchmarks established by the MOE in their guidance documents to quantify the potential risk to Sudbury residents. This information, as well as all of the other data collected by the SARA Group, is then used by the risk managers to evaluate what next steps may be necessary in the Sudbury Soils Study.

**Inhaled Nickel**

The research conducted by Seilkop and his colleagues was included as one of the studies evaluated by the SARA Group in selecting the nickel inhalation TRV used for HHRA. The Seilkop study was ultimately not selected for use in the assessment; as such the HHRA report does not rely on it at all, nor was it used to produce a "clean up" number of nickel. In fact, no "clean up" number for nickel was established by the HHRA. Refer to Chapter 5.2.5 of the HHRA report for further details.

It should be noted that the TRV selected for the evaluation of inhalation nickel risks was protective of both non-cancer and cancer (at a 1-in-1,000,000 incremental lifetime cancer risk threshold) endpoints. Further, a whole section was included in the HHRA discussing the potential implication of nickel sensitization. Please refer to Chapter 6.6 for further details.

**Removing "outliers"**

Only one lead sample was removed from the calculation of the 95% UCLM for lead in Falconbridge. It was a duplicate sample that was well outside the range of the original sample, as well as all other collected in the surrounding area. It should be noted that the inclusion of this outlying data point would not have significantly changed the 95% UCLM (as it was only one sample among many). It should be noted that a SRML was recommended for lead, and this value was not calculated based upon the soil concentrations included in the data set for any of the COI (*i.e.*, it was based on a weight-of-evidence approach). As such, removal of this one outlier for the Falconbridge data set did not influence the prediction of potential risk in maximal soil exposure conditions in the GSA, or the establishment of the SRML to be used by the risk managers to establish next steps for the Sudbury Soils Study.

**Mixture Effects**

As noted in Section 6.4, the TRVs selected for use in the current assessment are based upon the most sensitive endpoints for each COC. There is no evidence in the scientific literature of additive (or synergistic) effects related to any of these endpoints. However, as noted in this section (as well as the uncertainty discussion in Chapter 7), the scientific literature of metal-to-metal interactions is quite limited and inadequate for quantitative or even qualitative incorporation into the HHRA.

**Indoor Air Sampling**

Indoor air sampling was not conducted for the current study. It was assumed that indoor air would be of the same concentration as the outdoor air. It is important to note that the studies conducted in Port Colborne and other locations were taken in homes not near an ongoing airborne emission source. In the case of the Sudbury HHRA, upper confidence level concentrations of each of the COC measured for a given COI was assumed present throughout the entire COI. Given the COC under assessment, it is unlikely that there would be indoor sources of the COC higher than those observed outdoors within the community. The other studies referred to by the commenter are not likely a relevant comparison point for the current study.

### Ongoing Emissions

The current air quality within the GSA was evaluated through a year-long air monitoring program. This, as well as the detailed sampling programs of other media, inherently evaluates ongoing emissions. Both Vale Inco and Xstrata have greatly reduced emissions of the COC over the past decade. Due to stricter federal and provincial standards on particulate matter coming into force, these reductions are expected to continue, and go even further.

### Asthma and Dermatitis

Research has not indicated the COC themselves are specifically linked to increased asthma rates (refer to each of the toxicological profiles in Appendix A of the HHRA report). Asthma episodes would likely be more closely related particulate or $SO_2$ concentrations in air. Both of these endpoints are currently managed through provincial regulations, and were considered outside of the scope of the Sudbury Soils Study by the Technical Committee.

The potential for nickel dermatitis was evaluated as part of the HHRA. Please refer to Section 6.6 for further details.

### Pica Children

The implications of pica consumption in children were considered in the HHRA. Please refer to Section 6.5 for further details.

### Nickel in Drinking Water

Nickel present in drinking water was evaluated, along with all other oral exposure pathways, by comparing all oral exposures to the oral TRV of 20 µg/kg bodyweight/day established by the U.S. EPA (1996). Refer to Appendix A-5 for the full toxicological profile for nickel.

Dr .Evert Nieboer, Ph.D. Emeritus, Professor of Toxicology at McMaster University Department of Biochemistry and Biomedical Sciences provided technical support on the speciation issue as well as with other aspects of the HHRA over the course of the study. His valued opinions were considered internally among the SDHU team. The Medical Officer of Health in concert with internal staff and other external experts assisted in providing comment on the numerous study protocols formulated throughout the study period. As the Sudbury & District Medical Officer of Health, Dr Penny Sutcliffe supports the findings of the HHRA and is satisfied that the conclusions are scientifically valid. She was involved in the study for several years and has a fully independent, statutory duty to protect the health on the community. SDHU comments were considered and included in protocols and document reviews, and in scientific meetings which included speciation discussions.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 32
**Submission Date:** November 1, 2008
**Name:** Patricia Reed
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

The Sudbury Soils Study - HHRA Public Comments
My Comments on the Human Health Risk Assessment - Sudbury Soils Study

Thank you for the opportunity to comment on the results of five years of study. I have been following your study since the autumn of 2003. That is when I first contacted you and your partners (you would have a record of this). Initially, I was looking for information on lead but later focused on nickel (particularly the incidence of multiple sclerosis/B 12 deficiency) As well, I expressed my concern about nickel as a carcinogen (we are to accept the fact...1 of every 4 people will get cancer). Having had my water tested for lead by the city, results were good….I never got written confirmation regarding nickel results. However. your website offered help for addressing human exposure to industrial emissions (wash, clean, brush the dog) and you used the ATSDR (reference FDA) and the EPA (documents attached). I was directed to your medical consultant and assured there were no concerns with nickel in the water or any incidence of multiple sclerosis. Upon reading EPA guidelines, a hair analysis showed nickel at 97 ppm (with·0.1 • 1 ppm being normal) and I followed EPA recommendations (regulate nickel).

Attending your September 16th PAC meeting (invitation attached), there was a question as to whether you had decided to go with 400 ppm for lead (despite the fact that the MOE advises minimal risks to be under 200 ppm). This followed with a clarification stating you were using EPA standards. If Vale Inco can request an exemption for nickel; what about an exemption for lead? Are requests for exemptions to regulations for big companies routine?

This leads me to page 3 of the Summary document of your HHRA and conclusions of no unacceptable health risks from exposure to four Chemicals of Concern: minimal risks for nickel and lead. Your conclusions appear to be based on a complex statistical methodology, calculating chronic daily intake of chemical toxins to determine the threshold for it might constitute poison for children, based on research showing No..Observable-Adverse-Effect-Levels (please see attached). This is conflicting information: while educating children about the health risks associated with tobacco (carcinogens) and drugs.(neurotoxins); you assure these children and their parents that there no unacceptable health risks

to carcinogens and neurotoxins from industrial emissions and is of no assistance to people who could not meet the thresholds which were established (or not) to accommodate industry.

I do not accept your conclusions.

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## Response:

Thank you for your comments and interest in the Sudbury Soils Study.

The level of 400 ppm lead in soil was not arbitrarily selected. The level of 400 ppm lead was developed to represent a Sudbury-specific soil guideline that protective of human health, and particularly toddlers. Other soil quality guidelines exist for lead such as the Ontario generic level of 200 ppm. The generic soil guidelines are based on many assumptions and worst case scenarios across the province. The level of 400 ppm was developed by the SARA Group after collection of thousands of samples in the Sudbury area including soil, air, dust, water, vegetables and fish and their analysis for lead content. These data were all input to a Sudbury-specific exposure model that allowed the calculation of a level of lead in soil that is protective of human health. The 400 ppm value is based on a great deal more information than the generic soil quality guidelines, therefore, has a great deal of certainty attached to it.

As you are aware, Vale Inco has made application to the Ministry of the Environment for an alternative standard for their nickel emissions, it is not an exemption. The alternative standard process for air emissions is a part of Regulation 419/05, the ministry's regulation on air pollution. You may comment on Vale Inco's application by providing comments through the Environmental Bill of Rights registry. The registry number for their proposal is 010-5356. Please note that the comment period ends April 10, 2009.

A standardized regulatory approach was used to evaluate the potential health risk related to exposures to both threshold and non-threshold chemicals. When addressing non-threshold toxicants, like carcinogens, the intent is to strive to reduce exposures as much as possible, but to establish an acceptable incremental lifetime risk level at which exposures to that chemical would be considered statistically insignificant. In the province of Ontario, the Ministry of Environment has established the acceptable incremental lifetime cancer risk at one-in-one-million. In other words, if the predicted incremental lifetime cancer risk does not exceed the potential to cause one additional incidence of cancer in a population of a million people, then it would be deemed an acceptable level of risk for the population. This approach is used in regulatory jurisdictions around the world, though the level of acceptable risk can vary from jurisdiction to jurisdiction.

The methods and results of the Sudbury Human Health Risk Assessment have undergone considerable scrutiny and scientific review to provide confidence in the results. All reports were reviewed by representatives within the Technical Committee that included scientists from the Ontario Ministry of the Environment and Sudbury District Health Unit. The methods and approaches used for the study were peer reviewed by a group of scientists, primarily from the United States, as part of the Independent Expert Peer Review Panel. In addition, all reports and conclusions were reviewed by an external scientific advisor, Dr. Ron Brecher who is one of the eminent human health toxicologists in Canada.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 33
**Submission Date:** November 1, 2008
**Name:** Gabriel Keresztesi
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

I am writing to express my concern that there has been confusion over the deadline for commenting on the Human Health Risk Assesment. I had understood that the deadline was today, November 1st, but now I see that the deadline seems to have been 11:59 p.m. on October 31st. I hope this concern over confusion and my comment below will receive a response and be included in the public record.

I would like to comment publicly that because the institutions involved in organising and funding the HHRA soil study are not arms-length entities I have serious concerns over the legitimacy of the findings. My concerns were deepend when another study was released that called some of the findings into question.

I think that further study is required and great effort should be made to ensure that it is unbiased. My wife is expecting our first child and we would dearly love to feed our family with vegetables from a backyard garden. More than nutrition, caring for a garden is an important family activity, a time for children and adults to regain an appretiation for the land and what it gives us. I hope gardening will not endanger my children. It would be hard to forgive the powerbrokers if it does.

Thank you for considering my concerns,

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## Response:

Thank you for taking the time to provide these comments and your interest in the Sudbury Soils Study.

Great care was given to ensure a transparent and fair process. The Sudbury Soils Study was overseen by a Technical Committee comprised of members of the Sudbury & District Health Unit, Ontario Ministry of the Environment, Health Canada-First Nations and Inuit Health Branch, City of Greater Sudbury, Xstrata Nickel and Vale Inco.

An Independent Process Observer, Mr. Franco Mariotti, had access to all meetings and documents and reported his observations and impressions of the Study process to the community. Finally, both the United Steelworkers and the Canadian Auto Workers were invited to observe Technical Committee meetings in their entirety.

The methods and results of the Sudbury Human Health Risk Assessment have undergone considerable scrutiny and scientific review to provide confidence in the results. All reports were reviewed by representatives within the Technical Committee that included scientists from the Ontario Ministry of the Environment and Sudbury District Health Unit. The methods and approaches used for the study were peer reviewed by a group of scientists, primarily from the United States, as part of the Independent Expert Peer Review Panel. In addition, all reports and conclusions were reviewed by an external scientific advisor, Dr. Ron Brecher who is one of the eminent human health toxicologists in Canada.

Potential health risks related to the consumption of both home garden and local produce were evaluated as part of the human health risk assessment. While metal concentrations in some home garden produce were higher than those observed elsewhere, results of the assessment indicated that the consumption of this produce would not result in any adverse health risks to Sudbury residents. As noted by Dr. Penny Sutcliffe, Sudbury & District Medical Officer of Health, “safe, nutritious and accessible food is an essential part of healthy living. The promotion of healthy eating and consumption of local produce is a big part of the work we do every day. We should all be reassured that local data were used in the HHRA. Inputting these data into the HHRA analysis tells us that the consumption of local produce poses no unacceptable health risk.”

Sudbury Soils Study | Étude des sols sudburois
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métaux • santé • environnement

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 34
**Submission Date:** May 26, 2008
**Name:** Joan Kuyek
**City:** Ottawa, ON
**Affiliation:** Mining Watch Canada

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

***An Open Letter to The SARA Group***

***Re: The Sudbury Soils Study Human Health Risk Assessment***

I am writing, both as the National Coordinator of MiningWatch Canada, and as a former Sudbury resident, to ask some preliminary questions about the Sudbury Soils Study Human Health Risk Assessment.

Can the deadline for comments on the Human Health Risk Assessment be extended for at least a six month period, to allow the public to properly study and analyze the findings. July 31 is much too soon to deconstruct and absorb a highly technical study that the SARA group has been working on for over five years.

How many of the samples for lead were over 100 parts per million (ppm)? It appears that the 400ppm level has been deliberately chosen to minimize the perception of risk, and there is nothing in the documents (that I have found with a preliminary scan), that indicates a valid reason for using this level.

Where exactly were the samples taken that exceeded 100ppm for lead? Were other Chemicals of Concern also present in those samples? What are the suspected interactions between these chemicals?

Is there any intention to look at toxins in Sudbury in general? I note that the Chemicals of Concern were chosen based on three criteria. Two of these criteria are particularly troubling, if we are truly concerned about human health in the Sudbury area. *The chemical was only studied if it was found across the entire study area, and if it could have come from the smelter*. However, the study indicates that 54% of the Chemicals of Concern are derived from the “supermarket food basket”. In my mind this raises serious questions about the toxins being ingested by people in Sudbury from other sources, and about their interaction with smelter-derived toxins.

How do we know the theoretical risk assessment actually jibes with the reality of the toxins in people's bodies? The Human Health Risk Assessment is entirely based on a theoretical model of risk, and does nothing to "ground truth" the assumptions. We need to know what the actual levels of contaminants are in the people. Unless blood and hair testing are undertaken by an independent organization, especially on vulnerable populations in the "Communities of Interest"- Sudbury Centre, Copper Cliff, Coniston and Falconbridge, we should not trust the risk assessment model that has been used.

I would appreciate an answer to these questions, which I think are of interest to all Sudburians. Thank you.

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## Response:

July 8, 2008

Dear Ms. Kuyek,

Thank you for your comments to the SARA Group. Below you will find your original comments in bold and our reply.

1. In response to comments from MiningWatch Canada and other stakeholders, the period for public review and formal comments has been extended until November 1, 2008. This provides over 5 months for interested parties to submit comments and questions that will form part of the final record for the Human Health Risk Assessment. Please note, however, that questions or comments submitted after this deadline will still be answered, but they will not form part of the public record.

2. The level of 400 ppm lead in soil was not arbitrarily selected. The level of 400 ppm lead was developed to represent a Sudbury-specific soil guideline that protective of human health, and particularly toddlers. Other soil quality guidelines exist for lead such as the Ontario generic level of 200 ppm. The generic soil guidelines are based on many assumptions and worst case scenarios across the province. The level of 400 ppm was developed by the SARA Group after collection of thousands of samples in the Sudbury area including soil, air, dust, water, vegetables and fish and their analysis for lead content. These data were all input to a Sudbury-specific exposure model that allowed us to calculate a level of lead in soil that is protective of human health. The 400 ppm value is based on a great deal more information than the generic soil quality guidelines, therefore, has a great deal of certainty attached to it.

3. Soil samples that contained lead were distributed throughout the study area. However, soil samples with elevated lead levels tended to be closer to the smelters at Copper Cliff, Falconbridge and Coniston. This is one of the reasons why lead was selected as a Chemical of Concern (COC) for the Sudbury Soils Study. The distribution of lead in soils is discussed and illustrated in Volume I of the Soils Study, chapters 7, 9 and 10.

The other COC were generally always present in the soil samples as they are naturally occurring elements. There was a high degree of correlation between the levels of COC in soil samples particularly in residential soils near the smelter sources.

Some of the COC may have interactions, but the target organs and mode of toxicity is generally quite different for each of the COC. The suspected interactions between COC is discussed in some detail in the Human Health Risk Assessment in section 6.4.

4. There was never any intention to examine every potential toxin in the Sudbury area as part of the Sudbury Soils Study. Every risk assessment has a focus and selects specific Chemicals of Concern for a specific purpose. The rationale for the Soils Study and human health risk assessment was quite clear and developed by the Ontario Ministry of the Environment, the Sudbury District Health Unit, the City of Greater Sudbury in conjunction with the two mining companies.

5. The risk assessment models used in this study are very conservative and tend to over-predict risk even when the probability of risk is low. In the situation where risk is estimated to be high, there would be justification to undertake biomonitoring such as hair or blood sampling. In the absence of predicted risk there is no reason to undertake wide scale sampling of human tissues.

   In 2004 there were community concerns in the town of Falconbridge regarding elevated arsenic levels in the soil. As a result, arsenic levels were measured in people using urine as the appropriate sampling medium. The results of that study clearly demonstrated that although arsenic levels in soil in Falconbridge were approximately 20 times higher than in the reference community of Hamner, the level of arsenic in the two populations were almost identical. In other words, the arsenic was not bioavailable and not making its way into the residents of Falconbridge.

   If a Sudbury resident has continued concerns regarding lead in the environment they can have their blood sampled and analyzed through their local physician. Dr. Lesbia Smith, a member of the SARA Group is available to help an individual to interpret their results. The local Sudbury District Health Unit should be contacted to assist making the necessary arrangements for any sampling.

   In the case of lead there are international standards and guidelines available that can be used to interpret blood lead results. This is not generally the case for the other COC. Without guidance from developed standards it is very difficult to attach any meaningful interpretation to results for individual biomonitoring results.

I trust these replies provide some information that is helpful to MiningWatch in their review of the Sudbury Human Health Risk Assessment.

Should you have any further questions, please do not hesitate to contact us again.

Regards,
Christopher Wren, Ph.D.
Director, SARA Group

Sudbury Soils Study | Étude des sols sudburois
metals • health • environment
métaux • santé • environnement

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 35
**Submission Date:** June 19, 2008
**Name:** Denis Constantineau
**City:** Sudbury, ON
**Affiliation:** Centre de santé communautaire de Sudbury

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Monsieur, Madame

Au nom du Centre de santé communautaire de Sudbury, nous nous devons de faire certains commentaires au sujet du dernier rapport de la série de l'Étude des sols sudburois, intitulé « Évaluation du risque à la santé humaine. »

Le Centre de santé communautaire de Sudbury (CSCS) est un organisme à but non lucratif qui a pour mandat de desservir les personnes, familles et les communautés francophones du Grand Sudbury et du Nord. Le CSCS offre des soins de santé primaires, des activités de promotion de la santé et de développement communautaire afin que la population francophone puisse atteindre un niveau optimal de bien-être physique, mental, économique, social, culturel et spirituel.

Suite à la publication du dernier rapports, plusieurs inquiétudes ont fait surface tant au niveau du processus qu'au niveau du contenu du rapport.

1. Tout d'abord, la période de commentaires publics sur l'étude ERSH est trop courte. L'équipe de recherche a mis plus de cinq ans à produire l'étude, et ce, quand un délai de trois ans avait été prévu au départ. Il n'est pas réaliste de s'attendre que le public, ayant à naviguer le langage scientifique utilisé dans le rapport, soit en mesure d'étudier le rapport, en tirer des inquiétudes ou commentaires, et vous les faire parvenir avant le 31 juillet. Nous nous permettons de souligner que le mois de juillet n'est pas un moment idéal pour ce genre de consultation communautaire.

2. Le rapport n'est pas disponible est français. Le sommaire de 4 pages, publié dans les journaux locaux, est le seul document qui soit disponible en français jusqu'à date. Celui-ci est loin de contenir l'information nécessaire pour permettre au public de réagir, et donc constitue un obstacle à l'accès de l'information pour la population que nous desservons.

3. Afin de déterminer le niveau de risque à la population quant au niveau de plomb dans le sol, l'équipe de recherche a utilisé une limite de 400 parties par million (ppm) plutôt que 100 ppm qui représente la limite acceptable selon le gouvernement fédéral, ou 200 ppm, la limite acceptable selon le gouvernement provincial. Pouvez-vous nous expliquer pourquoi vous avez choisi d'utiliser cette norme, et quelles sont les répercussions sur la santé de la population qui habite dans des quartiers avec des taux entre 100 et 399ppm de plomb?

4. L'étude identifie que 5% de la population des quartiers de Coniston, Copper Cliff, Falconbridge et Sudbury sont à risque à cause des taux élevés de plomb présents dans le sol. Quels suivis seront fait auprès de cette population afin d'assurer non seulement que le sol dans leur quartier soit dûment réhabilité, mais aussi, que ces gens reçoivent l'attention médicale nécessaire afin d'éviter tout risque à leur santé.

En espérant recevoir sous peu vos réponses à nos inquiétudes, nous vous prions d'agréer, Monsieur, l'assurance de nos sentiments distingués.

Le directeur général,

Denis Constantineau
Directeur général / Executive Director
Centre de santé communautaire de Sudbury

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## Réponse :

Merci d'avoir pris le temps de nous faire part de vos réactions au sujet du rapport sur l'Évaluation du risque à la santé humaine (ERSH), qui fait partie de l'Étude des sols sudburois. Nous fournissons ci-après nos réponses selon la numérotation des questions employée dans votre présentation du 19 juin 2008.

1. Comme vous le savez, en réponse à votre lettre et aux réactions d'autres membres du public, le délai accordé au public pour examiner le rapport sur l'ERSH a été prolongé du 31 juillet au 1er novembre 2008, laissant donc au public trois mois supplémentaires pour prendre connaissance du rapport technique et des documents connexes.

2. Il y a eu des retards dans la préparation de la version française du rapport sommaire de l'ERSH, celle-ci étant devenue disponible seulement le 29 juillet 2008. Le nécessaire a été fait depuis pour que ce contretemps ne se reproduise pas lorsque le rapport de l'évaluation des risques écologiques sortira au printemps. Nous convenons avec vous qu'il est important que la population francophone de Sudbury et de sa région ait accès à l'information sur l'ERSH. C'est d'ailleurs pour cette raison qu'il avait été décidé de traduire en français le résumé du rapport, document rédigé dans une langue simple, qui était considéré comme le principal outil pour informer le public sur le rapport.

3. La ligne directrice provinciale pour la concentration du plomb dans le sol est de 200 parties par million (ppm). Il ne s'agit pas d'une valeur « acceptable » ni d'une valeur-seuil « sécuritaire » au-delà de laquelle des effets sur la santé pourraient commencer à apparaître. Il s'agit plus exactement de la ligne directrice qui est utilisée pour évaluer des biens-fonds particuliers dans le cadre plus large de la législation sur les friches industrielles (Règlement de l'Ontario 153/04). Lorsque la concentration du plomb dans le sol d'un terrain dépasse cette valeur, le promoteur a la possibilité soit de faire le nécessaire pour que la teneur en plomb de ce terrain baisse à 200 ppm, soit de procéder à une évaluation plus détaillée.

   L'ERSH de Sudbury est un exemple de ce type d'évaluation plus détaillée. En outre, elle a porté sur une base plus large, soit une communauté tout entière, et non sur des biens-fonds en particulier. Le groupe SARA a utilisé toutes les données scientifiques disponibles pour déterminer qu'une concentration de plomb dans le sol de 400 ppm est un niveau qui est protecteur de la santé des habitants de Sudbury. Cette concentration de 400 ppm a été déterminée au moyen d'une modélisation de l'exposition des habitants de Sudbury aux concentrations de plomb effectivement mesurées dans l'environnement de Sudbury, notamment dans les aliments, l'eau, le sol, la poussière à l'intérieur des maisons et les légumes cultivés dans la région. Par conséquent, la teneur de 400 ppm qui a été retenue dans l'ERSH se fonde sur des données plus précises que celles de la ligne directrice générique pour la qualité du sol, soit 200 ppm de plomb, et elle permet de protéger la santé avec une certitude considérable.

   Un numéro sans frais (1 866 315-0228) a été créé pour l'Étude des sols sudburois afin de renseigner et de conseiller les habitants de la région qui s'interrogent au sujet des taux de plomb, de nickel et d'autres métaux qui ont été mesurés dans l'ERSH. En outre, comme on peut le lire dans le rapport technique de l'ERSH, la surveillance des taux de plomb dans le sang est la mesure définitive de l'exposition d'une personne au plomb présent dans son environnement. Quiconque le souhaite peut consulter son médecin personnel et demander à faire doser le plomb dans son sang. Le coût de cette analyse est pris en charge par l'OHIP. On peut se faire aider dans l'interprétation des résultats de cette analyse sanguine en s'adressant à son fournisseur de soins de santé ou en appelant le numéro sans frais de l'Étude des sols sudburois. Les résultats de l'ERSH n'indiquent pas qu'il est nécessaire de faire analyser le sang de tous les habitants de Sudbury et de la région. Certes, il peut y avoir d'autres raisons valables (p. ex. pour faire avancer les connaissances scientifiques, pour enquêter sur des cas d'exposition particuliers) pouvant justifier la mesure du plomb dans le sang. Cependant, il n'est pas indispensable de connaître les taux de plomb sanguins de tous les habitants de Sudbury et des environs pour évaluer les risques potentiels pour la santé découlant de leur exposition au plomb contenu dans le sol, l'air, l'eau potable et les aliments et ayant un lien avec les exploitations minières et les fonderies.

4. L'étude ne dit pas que 5 p. 100 de la population de Coniston, de Copper Cliff, de Falconbridge et de Sudbury encourt un risque à cause de concentrations de plomb élevées dans le sol. Il y a peut-être là une mauvaise interprétation de la statistique et de la terminologie utilisées dans le rapport technique.

   Ce que le rapport technique indique, à la page 5-54, c'est que la concentration de 400 ppm qui est recommandée pour la gestion du risque présenté par le plomb dans le sol permet de protéger les enfants en bas âge et qu'à ce niveau, la probabilité que des enfants présentent un taux de plomb

sanguin de plus de 10 microgrammes par décilitre (ug/dL) est de 5 p. 100. Le groupe SARA a retenu le chiffre de 10 ug/dL comme étant la concentration à viser pour protéger la santé.

En d'autres termes, chez les enfants en bas âge qui vivent à des endroits où la teneur du sol en plomb est de 400 ppm ou plus, la probabilité de voir chez eux un taux sanguin de plomb supérieur à 10 ug/dL est de 5 p. 100. Le rapport insiste sur le fait que cette probabilité ne concerne que les zones où le sol contient plus de 400 ppm de plomb et non tous les biens-fonds (« propriétés »). À Sudbury, une concentration de plomb dans le sol de 400 ppm ou plus n'a été constatée que dans un très petit nombre des biens-fonds résidentiels échantillonnés (8 sur 533).

Comme nous l'avons dit plus haut, les personnes qui sont préoccupées par les effets du plomb sur la santé peuvent obtenir de plus amples renseignements en s'adressant au Service de santé publique de Sudbury et du district, à leur fournisseur de soins de santé, ou au numéro sans frais de l'Étude des sols sudburois.

Nous vous remercions encore une fois de l'intérêt que vous portez à l'Étude des sols sudburois.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 36
**Submission Date:** October 31, 2008
**Name:** Joan Kuyek
**City:** Sudbury ON
**Affiliation:** Community Committee on the Sudbury Soils Study

**Comment regarding the Sudbury Soils Study Human Health Risk Assessment:**

The Community Committee on the Sudbury Soils Study
c/o Rick Grylls, 19 Regent Street, Sudbury P3B 4B7

Open submission to the SARA group
regarding the Human Health Risk Assessment

October 31, 2008

Please accept this letter, together with the attached report from Environmental Defence, as our formal comments on the Human Health Risk Assessment. The Environmental Defence review of the HHRA was commissioned by Mine Mill 598 and Local 6500 of the Steelworkers this summer, and released to the public on October 22, 2008.

The Community Committee on the Sudbury Soils Study came together this summer as result of community concerns with the process and findings of the Sudbury Soil Study Human Health Risk Assessment.

The purposes of the Committee are:

* To ensure that the Sudbury community provides their informed consent for the risks to the environment and human health from historic and current mining and smelter activities, and determines effective response to those risks.

* To move the Ontario Government and its agencies to respond effectively to the Sudbury Soils Study findings. This response must ensure that contamination from mines and smelters in the Sudbury region is properly identified, remediated and (where it cannot be remediated) contained, and that those whose health might be affected (or may be affected) by contamination are provided with diagnosis, treatment and (where this is not possible) with compensation.

Members of the Committee sit as individuals or representatives, and are added by invitation of the Committee. Committee members are from a variety of backgrounds and include individuals from the unions, the university and community college, from health care and the environmental community. The Committee has a Steering Committee, consisting of Rick Grylls, President Local 598 CAW, Homer Seguin, retired, United Steelworkers, Monique Beaudoin, Health Promoter, Centre de Sante Communautaire, and Joan Kuyek, retired, formerly of MiningWatch Canada. Joan Kuyek chairs the Committee.

We make the following recommendations:

1. We recommend that the Ontario Ministries of Environment, Health and of Labour step up and assume their responsibility for the health of Sudburians, by facilitating a community process to ensure that the Sudbury public decides what level of risk it can accept, what will be done to clean-up affected properties, and what will be done to treat those whose health is at risk". As the Environmental Defence Report states. " The HHRA cannot demonstrate that there is no harm occurring, it can only estimate level of risk. The assessors have inappropriately decided what that acceptable level of risk should be. This is a decision the community should make."

2. The Ecological Risk Assessment (ERA) has yet to be released, and we want an improvement in community engagement compared to the HHRA process. The community needs and deserves real involvement in reviewing these results, and the government needs to be ready to take real action at the end of the process. We believe this should happen without the presence of Vale or Xstrata representatives, as they are in a serious conflict of interest, as they are investigating themselves.

3. The francophone community and the community in general have the right to information in their language and to the tools and resources that will allow them to participate effectively in the Ecological Risk Assessment. The studies must be available simultaneously in French and English.

4. We recommend further studies that incorporate the findings of prior studies on SO2 and heavy metal fallout, that evaluate past and current exposures, that address the health risk to the adult population as well as children, and that address the possible synergistic effects of exposure to a number of heavy metals at one time ( including metals that may or may not be in the metals of concern).

5. The need for further studies is especially true of the highest risk group of residents- the current and past employees at Inco, Falconbridge and their sub-contractors, and successor companies. We recommend that both epidemiological analysis and bio-monitoring of the employees be undertaken.

6. We recommend that the Technical Committee, which has been overseeing the studies to date, provide resources for effective participation of the community (such as funds for independent technical advice); that its minutes (current and past) be made public and that it cease to operate by consensus. While consensus decision making can be very useful in a context where the values of participants are shared, in situations where the interests of participants may be in

conflict, such as this one, it can mean that more powerful representatives are able to block decisions and to lower safety and/or health standards.

7. As lead contamination is above safe levels in Greater Sudbury based on international standards, and children may be harmed at even lower levels, we recommend testing of the blood lead levels of children in Sudbury, and treatment for those children with excessive lead in their bodies.

8. We want the same testing and treatment for residents exposed to arsenic, nickel and any other metals of concern that may surface during further studies.

9. We strongly recommend bio-monitoring (human hair, blood and/or urine sampling) be made available free of charge for any current or past residents of the communities of concern. We also recommend further testing of daycares, schools, homes and farms that are, or are adjacent to, sampling "hotspots" .

10. We recommend that the Ministry of the Environment develop a plan with the Sudbury public to ensure the clean-up and/or containment of all contaminated areas on an urgent basis.

We look forward to a response to these recommendations.

Yours respectfully,
Joan Kuyek, Chair of the Community Committee on the Sudbury Soils Study
On behalf of:
Rick Grylls, Homer Seguin, John Fera, Monique Beaudoin, Tanya Ball, Mercedes Steedman, Stuart Cryer, Francois Depelteau, Gary Kinsman, John Peters, Brennain Lloyd, Laurie McGauley, and others.

CC. Minister of the Environment, the Honourable John Gerretson, fax 416-314-6790
Minister of Labour, The Honourable Peter Foncesca, fax 416-326-1449
Minister of Health, The Honourable David Caplan, fax 416-326-1571
City of Sudbury, Mayor John Rodriguez, fax 705-673-3096

***(Submitted Environmental Defence report with comment)***

**Une Soumission ouverte au groupe SARA**
**Expéditeur : Le Comité communautaire sur l'Étude des sols de Sudbury**
**Le 31 octobre, 2008**

Veuillez accepter cette lettre, ainsi que le rapport ci-annexé de Défense environnementale Canada, comme nos commentaires sur l'Évaluation des risques à la santé humaine. La critique de l'ÉRSH préparée par Défense environnementale Canada a été commandée par la section locale 598 de Mine Mill-TCA et par la section locale 6500 du Syndicat des métallos cet été, et a été rendue publique le 22 octobre, 2008.

Pour sa part, le Comité communautaire sur l'Étude des sols de Sudbury a été créé cet été par un groupe d'individus et de représentants communautaires qui avait des inquiétudes quant au processus et aux résultats de l'ÉRSH.

Les buts du comité sont :

* Assurer que le public sudburois donne son consentement éclairé quant aux risques à la santé humaine et environnemental qui proviennent de l'activité minière et des fonderies actuelles et historiques, et que ce soit le public qui détermine les réactions efficaces à ces risques.

* Demander au gouvernement de l'Ontario et à ses agences de réagir efficacement aux résultats de l'Étude des sols de Sudbury. Ces réactions doivent également assurer que la contamination provenant des mines et des fonderies dans la région du Grand Sudbury est identifiée, remédiée, et là où elle ne peut être remédiée, contenue. Aussi, que ceux dont la santé est ou pourrait être impactée par la contamination reçoivent les diagnostiques, traitements et au cas où les traitements ne sont pas possibles, une compensation adéquate.

Les membres du comité sont là à titre personnel) et en tant que représentants d'agences communautaires. Autres membres sont recrutés sur invitation du comité. Les membres actuels du comité proviennent d'une diversité de domaines, dont les syndicats, la communauté collégiale et universitaire, les soins de santé, et la communauté environnementale. Notre comité de direction est composé de Rick Grylls, Président de la section locale 598 de Mine Mill-TCA; Homer Seguin, un mineur à la retraite représentant le Syndicat des Métallos; Monique Beaudoin du Centre de santé communautaire de Sudbury; et Joan Kuyek, à la retraite et anciennement de l'organisation Mining Watch Canada. Joan Kuyek préside le comité.

Nos recommandations sont les suivantes:

1. Que les Ministères de l'Environnement et du Travail assument un rôle de leadership quant à la santé des Sudburois, en assurant des processus communautaires qui permettront au public du Grand Sudbury de décider par lui-même le niveau de risque qu'il est prêt à accepter, mais aussi de déterminer les remèdes aux propriétés impactées par la contamination, et l' appui aux gens dont la santé est à risque. Comme l'indique le rapport de Défense environnementale Canada, l'ÉRSH représente une « estimation des risques ». Il n'est donc pas assuré qu'il n'y a aucun

effet) sur la santé, rien que des probabilités. Les conclusions des évaluateurs dépassent le cadre d'une évaluation des risques, car ils décident pour la collectivité le niveau acceptable de risque, alors que cette décision doit être prise par la collectivité.

2. L'Évaluation des risques à l'environnement n'a pas encore été rendue publique, et nous voulons assurer une amélioration au processus d'engagement du public. Celui-ci mérite et a besoin de participer activement à la révision des résultats de l'Évaluation des risques à l'environnement, et le gouvernement doit être prêt à entreprendre un suivi à la fin du processus. Nous considérons que tout plan d'action doit être préparé sans la présence de Vale ou Xstrata, qui sont en sérieux conflit d'intérêt.

3. La communauté francophone a le droit de recevoir l'information dans sa langue et dans un délai raisonnable, et et la communauté francophone et sudburoise en général a aussi le droit d'avoir accès aux outils et aux ressources qui nous permettront de participer de façon efficace à l'Évaluation des risques à l'environnement. Les rapports doivent être disponibles simultanément en français et en anglais.

4. Nous recommandons que des études supplémentaires soient incorporées aux résultats des études précédentes sur les retombées de SO2 et de métaux lourds, et qui en évaluent l'exposition passée et présente, tout en explorant les effets synergétiques possibles de l'exposition simultanée à un certain nombre de métaux lourds, y compris les métaux appartenant ou non à la liste des métaux étudiés.

5. Le besoin d'études supplémentaires est spécialement aigu lorsqu'il s'agit du groupe de résidents exposés au risque le plus élevé : employés présents et passés de l'Inco, de Falconbrdge et de leurs sous-traitants, et des compagnies qui les ont remplacés. Nous recommandons que des analyses épidémiologiques ainsi que des analyses de contrôle bioliogique des employés soient entreprises.

6. Nous recommandons que le Comité technique, qui dirige les études jusqu'à date, assure que le public ait accès aux ressources qui lui permettront de participer de façon efficace y compris le financement pour des conseils d'experts indépendants. Aussi, que ces procès-verbaux actuels et du passé soient rendus publics et que le comité cesse d'opérer par consensus. Alors que la prise de décisions par consensus peut être utile dans un contexte où les valeurs des participants sont partagées, dans des situations comme celle-ci, où les participants peuvent être en discordance, le consensus peut donner aux acteurs avec plus de pouvoir la possibilité de bloquer le consensus et donc, de réduire les normes de sécurité et ou de santé

7. Étant donné que les niveaux de plomb dans plusieurs régions du Grand Sudbury dépassent les niveaux considérés sécuritaires selon les standards internationaux, et que les enfants sont à risque aux niveaux actuels et même à des niveaux plus bas, nous recommandons que le niveau de plomb soit testé chez les enfants du Grand Sudbury, et que les enfants qui ont des niveaux excessifs de plomb dans leur corps reçoivent un traitement adéquat.

8. Nous recommandons aussi que les citoyens qui sont exposés à l'arsenic, au nickel, et à autres métaux dangereux reçoivent les tests et les traitements nécessaires pour rétablir leur santé.

9. Nous recommandons instamment que des analyses de contrôle biologique (échantillons de cheveux, sang et urine)soient faites gratuitement pour tous les résidents actuels et passés des localités affectées. Nous recommandons également que des tests supplémentaires soient effectués dans les garderies, écoles, maisons d'habitation et fermes qui se trouvent dans les « zones de danger » de l'échantillonnage, ou à proximité.

10. Nous recommandons que le Ministère de l'environnement, en collaboration avec avec la population de Sudbury, mette au point dans les délais les plus courts un plan garantissant le nettoyage et/ou le confinement de toute région contaminée.

Dans l'attente d'une réponse aux recommandations ci-dessus et avec nos salutations respectueuses,

Joan Kuyek, Présidente, Comité communautaire sur l'Étude des sols
De la part de :
Rick Grylls, Homer Seguin, John Fera, Monique Beaudoin, Tanya Ball, Mercedes Steedman, Stuart Cryer, François Depelteau, Gary Kinsman, John Peters, Brennain Lloyd, Laurie McGauley, et autres.

Cc : le Ministre de l'Environnement, l'Honorable John Gerretson, téléc : 416-314-6790
le Ministre du Travail, l'Honorable Peter Foncesca, téléc : 416-326-1449
le Ministre de la santé, l'Honorable David Caplan, téléc : 416-326-1571
le Maire de la Ville du Grand Sudbury, John Rodriguez, téléc : 705-673-3096

***(Submitted Environmental Defence report with comment)***

## Response:

Thank you very much for your detailed response and continued interest in the Sudbury Soils Study. Below we have provided responses to each of the questions in the order presented.

**Response to question 1:**
This study is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interests of the public.

- The Sudbury and District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community, a human health study is not warranted at this time.

- The Ministry of the Environment supports the study. Ministry scientists and experts participated fully in the study process and they have a duty to protect the public interest.

- An independent panel of scientific experts reviewed the study and concluded it accurately describes risks in this community. In fact, these impartial experts stated risks were not underestimated, if anything they were overestimated.

- Acceptability of risk was determined by legislated policy (for example: 1 in 1 million risk level for cancer). These acceptable risk levels are very conservative and are derived from a precautionary principle.

**Response to question 2:**
The Sudbury Soils Study team made considerable effort to reach out to the community in an appropriate fashion with the respect to the HHRA. The team will continue to communicate with the public with the ERA results and is considering additional opportunities for public participation in the management of ecological risks. Both mining companies will remain as an integral part of the process as they have considerable technical expertise to offer, they are providing the funding and they are important partners in the study. Note that there are many checks and balances built into the study process that prevent any one group from influencing the science or the results.

**Response to question 3:**
There were delays in the preparation of the French version of the HHRA Summary Report and as a result only the 4 page newsletter was available in French for the May, 2008, public release. The French

Summary Report for the Human Health Risk Assessment did become available at the end of July 2008. The Summary Report for the Ecological Risk Assessment will be available in French when the report is released later this spring. French-speaking members of the Technical Committee are willing to meet with any Francophone group to discuss the results, the process or any other concerns related to the Study.

**Response to question 4:**
Evaluating past exposures in the Greater Sudbury Area is simply not possible to undertake from a technical perspective, which is why the HHRA focussed on current health risk assessment. The health risks of adults and children were certainly addressed by the HHRA. The HHRA discussed the interaction of metals in considerable detail. There is simply not enough scientific information in the world at this time that would make it possible to address the interactions of metals fully. The HHRA reviewed the available literature on the matter, and concluded the following, "*No interaction information identified for the COC is considered adequate at this time for quantitative or even qualitative incorporation into the human health risk assessment. However, despite the uncertainties involved with this approach, given the generous uncertainty factors built into the development of each of these COC-specific toxicological reference values, it is not expected that this would result in a significant underestimation of health risks even under worst case scenarios."* The Independent Expert Review Panel (IERP), a group of internationally recognized scientists with no connection to Vale Inco or Xstrata Nickel concluded that the HHRA had addressed the issue of interactions among COCs appropriately.

**Response to question 5:**
The Sudbury Soils Study was intended to examine potential health risks to the community in general. The employees of both Vale Inco and Xstrata Nickel have Joint ( ie. with both management and union representatives) Occupational Health Committees (JOHC), which is part of their Collective Bargaining Agreements, both having a research budgets. These committees were established in the 1970s, for the purpose of developing a better understanding of the working environment through independent industrial health surveys and research in connection with potential occupational illnesses and disease.

Vale Inco will continue to do such work in conjunction with the Steelworkers under the JOHC framework. With respect to retired workers, those who worked in high-risk areas, for example the Copper Cliff Sinter Plant, continue to be offered ongoing medical surveillance through the Vale Inco Occupational Medicine Department. For active workers, medical services including biological monitoring for nickel, lead, and arsenic are available. Similarly, Xstrata Nickel conducts equivalent surveillance programs in its workplaces.

**Response to question 6:**
There are many checks and balances in the study process that prevented any one group from influencing the science or the results. The companies are equally important members as the other partners in the study. All of the study partners agreed to make decisions by consensus. In practice this made for many long discussions where all members had a chance to be heard, which we believe resulted in the best decisions being made. Examples of the checks and balances in the process includes the establishment of a Public Advisory Committee, involvement of an Independent Process Observer (IPO) to consider the interests of the community; consultation with an independent Scientific Advisor; and review of the a draft

of the HHRA by an Independent Expert Review Panel. Note also that the IPO has made it clear in his reports that the companies did not block the process or any important decisions in this study.

Both the Steelworkers and the Canadian Autoworkers were invited to participate in the study process as observers. This meant representatives from both unions were invited to attend Technical Committee meetings, meetings of the Public Advisory Committee and other meetings associated with the study.

**Response to Questions 7 and 8:**
Concentrations of lead in soil and dust in Greater Sudbury are similar to concentrations seen elsewhere in Ontario and North America, particularly in older communities. The Sudbury Soils Study Human Health Risk Assessment used the current state-of-the-science model and found that expected blood lead concentrations in children were below levels requiring medical intervention. Parents who believe that their children have high exposure to lead should consult a health professional.

The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations.

Any residents with health concerns about lead or the other metals assessed by the HHRA can get more information by contacting the Sudbury and District Health Unit, their health care provider, or the Sudbury Soils Study toll-free number (1-866-315- 0228).

**Response to Question 9:**
Based on the completed HHRA and recently reviewed health profiles of the Sudbury community, further biomonitoring or human health studies are not warranted at this time.

**Response to Question 10:**
Although the results of the risk assessment indicate that there are potential risks to the public from lead in soils in some areas and for nickel in air in some communities, the study did not conclude that any areas of Sudbury require immediate “clean-up”.

Vale Inco and Xstrata Nickel have responded to the risks assessed in the HHRA in their Risk Management Report of May 13, 2008. Both companies will continue to work to reduce emissions from their properties as described in the report. The Risk Management Report was shared with all Technical Committee members, and received their support.

For our replies to the Environmental Defence report please refer to the attached (Comment 40).

## Réponse :

Merci beaucoup pour votre réponse détaillée et l'intérêt soutenu que vous portez à l'*Étude des sols sudburois.* Veuillez trouver ci-dessous les réponses à chacune de vos questions selon l'ordre dans lequel celles-ci ont été présentées.

**Réponse à la question 1 :**
L'étude a fait fond sur un corpus scientifique solide qui a été scruté rigoureusement par d'éminents spécialistes de l'évaluation des risques ainsi que par des organismes gouvernementaux de l'Ontario dont le mandat est d'agir dans l'intérêt supérieur du public.

- La D$^{re}$ Penny Sutcliffe, médecin-hygiéniste de Sudbury et du district, a déclaré qu'elle souscrivait aux résultats de *l'Évaluation du risque à la santé humaine* (ERSH). Elle a participé à cette étude pendant plusieurs années, en sa qualité de professionnelle chargée par la loi d'agir en toute indépendance pour protéger la santé des membres de la communauté. En se fondant sur l'état actuel de l'environnement dans la région de Sudbury, l'ERSH a prédit, pour les habitants du Grand Sudbury, un risque d'effets sur la santé découlant de la présence de métaux dans l'environnement qui va de minime à négligeable. Étant donné les constatations de l'ERSH maintenant achevée et les profils de santé de la communauté de Sudbury récemment revus, il n'existe pas de raison de procéder à une étude sur la santé humaine à l'heure actuelle.

- Le ministère de l'Environnement souscrit aux conclusions de l'étude. Des scientifiques et des experts du ministère qui ont pour mandat de protéger l'intérêt public y ont participé à part entière.

- Un groupe d'examen indépendant constitué d'experts scientifiques a examiné l'étude et conclu qu'elle a pris la mesure exacte des risques existants pour la communauté de Sudbury. D'ailleurs, ces experts impartiaux ont déclaré que ces risques n'étaient pas sous-estimés et que, si erreur d'estimation il devait y avoir, ce serait plutôt dans le sens d'une surestimation.

- L'acceptabilité du risque a été déterminée par les politiques inscrites dans la loi (par exemple : risque de cancer de 1 sur 1 million). Ces niveaux de risque acceptable procèdent d'une approche très prudente, conservatrice, et ont été calculés conformément au principe de précaution.

**Réponse à la question 2 :**
L'équipe de l'Étude des sols sudburois n'a ménagé aucun effort pour faire connaître l'ERSH à la population locale. Elle continuera de communiquer avec le public de manière à le tenir au courant des résultats de l'évaluation des risques écologiques (ERE) et elle envisage de créer des moyens supplémentaires de faire participer le public à la gestion des risques écologiques. Les deux sociétés minières continueront à être membre à part entière du processus, car elles ont une expertise considérable à offrir, elles fournissent le financement et sont des partenaires importants de l'étude. Soulignons ici qu'un ensemble complexe de poids et de contrepoids avait été intégré dans le processus

de l'étude de manière à empêcher qu'aucun des groupes ne puisse peser sur les données scientifiques ou sur les résultats.

**Réponse à la question 3 :**
À cause des retards rencontrés dans la préparation de la version française du rapport sommaire de l'ERSH, seul le bulletin de quatre pages a pu être publié en mai 2008. Néanmoins, la version française du rapport sommaire de l'ERSH a été mise à la disposition du public à la fin de juillet 2008. Pour ce qui concerne l'évaluation des risques écologiques, la version française du rapport sommaire paraîtra à la même date que le rapport, c'est-à-dire dans le courant de ce printemps. Les membres francophones du comité technique se tiennent à la disposition de tout groupe de francophones désireux de discuter des résultats, du processus de l'étude et de tout autre sujet de préoccupation lié à l'étude.

**Réponse à la question 4 :**
Une évaluation des expositions passées aux métaux à Sudbury n'est tout simplement pas réalisable du point de vue technique; c'est la raison pour laquelle l'ERSH s'est concentrée sur l'évaluation du niveau présent des risques pour la santé. Les risques pour la santé des adultes et des enfants ont été assurément pris en compte dans l'ERSH. Celle-ci a abordé en grand détail la question de l'interaction des métaux. Il n'existe tout simplement pas assez d'information scientifique dans le monde, à l'heure actuelle, pour pouvoir appréhender en profondeur la question des interactions entre les métaux. L'ERSH a dépouillé la documentation scientifique disponible sur ce sujet et en est arrivé à cette conclusion : « [Traduction libre] *On ne trouve pas actuellement de renseignements sur l'interaction des substances chimiques préoccupantes (SCP) qui soient considérés adéquats pour pouvoir être intégrés d'un point de vue quantitatif ni même qualitatif dans une évaluation des risques pour la santé humaine. Néanmoins, en dépit des incertitudes associées à cette approche et compte tenu des facteurs d'incertitude généreux qui ont été intégrés dans l'élaboration des valeurs toxicologiques de référence pour chacune des SCP, il est peu probable qu'il puisse en résulter une sous-estimation importante des risques pour la santé, même dans le plus pessimiste des scénarios.* » Le groupe d'examen indépendant, constitué de scientifiques de stature internationale n'entretenant aucun lien avec les sociétés Vale Inco ou Xstrata Nickel, a constaté que l'ERSH avait traité comme il se devait la question des interactions entre les SCP.

**Réponse à la question 5 :**
L'Étude des sols sudburois avait pour objet d'examiner les risques potentiels pour la santé de la communauté en général. Les employés de Vale Inco, tout comme ceux de Xstrata Nickel, ont un comité mixte de la santé au travail (CMST) (où syndicat et patronat sont représentés) qui est prévu par leur convention collective et qui dispose d'un budget de recherche. Ces deux comités ont été mis sur pied dans les années 1970 dans le but d'améliorer la compréhension des conditions environnementales en milieu de travail au moyen d'enquêtes sur la santé dans le secteur industriel et de recherches sur les maladies et autres troubles de santé pouvant avoir un lien avec le travail.

La société Vale Inco continuera de mener ce genre de travaux de concert avec le Syndicat des métallurgistes dans le cadre de son CMST. Pour ce qui est des travailleurs retraités, ceux qui travaillaient dans des zones à haut risque, par exemple l'usine de frittage de Copper Cliff, continuent de bénéficier d'un suivi médical par l'entremise des services de santé du travail de Vale Inco. Quant aux travailleurs en activité, ils bénéficient de services médicaux et notamment de dosages biologiques de leurs taux de

nickel, de plomb et d'arsenic. De la même façon, la société Xstrata Nickel administre des programmes de surveillance biologique équivalents dans ses lieux de travail.

**Réponse à la question 6 :**
De nombreux poids et contrepoids ont été prévus dans les modalités de l'étude pour éviter qu'un groupe en particulier n'exerce son ascendant sur la science et sur les résultats. Les sociétés minières participent à l'étude et ont une importance égale à celle des autres partenaires de l'étude. Tous les participants à l'étude avaient convenu que les décisions devraient être prises par consensus. Dans la pratique, la nécessité d'atteindre le consensus a occasionné de longues discussions au cours desquelles tous les membres ont eu la possibilité de se faire entendre, ce qui, nous le croyons, a permis que les meilleures décisions soient prises. Des exemples de poids et de contrepoids inclus dans le processus ont été la création du comité consultatif public, la participation d'un observateur de processus indépendant (OPI) chargé de veiller aux intérêts de la communauté; la consultation d'un conseiller scientifique indépendant et la soumission de l'ébauche de l'ERSH à l'examen d'un groupe d'experts indépendants. Il est à noter que l'OPI a clairement indiqué dans ses rapports que les sociétés minières n'avaient fait aucunement obstacle ni au processus de l'étude ni à aucune décision importante de l'étude.

Tant le syndicat des métallurgistes que le syndicat des travailleurs et travailleuses de l'automobile (TCA) ont été invités à participer à l'étude en qualité d'observateurs. Cela veut dire que des représentants de ces deux syndicats ont été invités à assister aux réunions du comité technique, aux réunions du comité consultatif public et aux autres réunions traitant de l'étude.

**Réponse aux questions 7 et 8 :**
Les concentrations de plomb dans le sol et la poussière dans le Grand Sudbury sont comparables à celles que l'on observe partout ailleurs en Ontario et en Amérique du Nord, en particulier dans les communautés établies de longue date. L'évaluation du risque pour la santé humaine, qui est un volet de l'Étude des sols sudburois, a utilisé un outil de modélisation à la pointe de la science et a trouvé que les concentrations sanguines de plomb chez les enfants étaient inférieures aux concentrations qui justifieraient une intervention médicale. Les parents qui croient que leurs enfants sont soumis à une exposition élevée au plomb devraient consulter un professionnel de la santé.

Les résultats de l'ERSH ne donnent pas à conclure que tous les habitants de la région doivent faire doser le plomb dans leur sang. Certes, il peut y avoir d'autres raisons valables (p. ex. pour faire avancer les connaissances scientifiques, pour enquêter sur des cas d'exposition particuliers) pouvant justifier la mesure du plomb dans le sang. Cependant, il n'est pas indispensable de connaître les taux de plomb sanguins de toute la population pour évaluer les risques potentiels pour la santé des habitants de la région de Sudbury associés à leur exposition au plomb contenu dans le sol, l'air, l'eau potable et les aliments du fait des exploitations minières et des fonderies.

Les personnes qui sont préoccupées par les effets du plomb sur la santé peuvent obtenir de plus amples renseignements en s'adressant au Service de santé publique de Sudbury et du district, à leur fournisseur de soins de santé, ou au numéro sans frais de l'Étude des sols sudburois (1 866 315-0228).

**Réponse à la question 9 :**
Au vu de l'étude ERSH et des profils de santé de la population de Sudbury qui ont été récemment examinés, des épreuves biologiques complémentaires ou d'autres études sur la santé humaine ne s'avèrent pas nécessaires à l'heure actuelle.

**Réponse à la question 10 :**
Bien que les résultats de l'évaluation du risque indiquent qu'il existe des risques potentiels d'exposition du public au plomb présent dans le sol à certains endroits et d'exposition au nickel dans l'air dans certaines localités, l'étude ne conclut pas que des zones particulières de la région de Sudbury doivent faire l'objet de travaux d'« assainissement » immédiats.

Les sociétés Vale Inco et Xstrata Nickel ont réagi à l'évaluation des risques dans leur rapport sur la gestion des risques du 13 mai 2008. Elles continueront à s'efforcer de réduire les quantités de substances qui sont émises de leurs installations, comme elles l'ont indiqué dans leur rapport. Le rapport sur la gestion des risques a été transmis à tous les membres du comité technique et a reçu leur aval.

Pour ce qui concerne nos réponses au rapport du Environmental Defence, veuillez lire le document joint en annexe (annotation 40).

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 37
**Submission Date:** October 31, 2008
**Name:** Ramsey Hart
**City:** Sudbury, ON
**Affiliation:** MiningWatch Canada

**Comment regarding the Sudbury Soils Study Human Health Risk Assessment:**

Dear SARA Members,

On behalf of MiningWatch Canada, I would like to respectfully submit thcse comments on the Sudbury Soils Study's Human Health Risk Assessment.

Mining Watch Canada is a pan-Canadian initiative supported by environmental, social justice, Aboriginal and labour organizations from across the country. It addresses the urgent need for a co-ordinated public interest response to the threats to public health, water and air quality, fish and wildlife habitat and community interests posed by irresponsible mineral policies and practices in Canada and around the world. While much of our work is focused on the mineral exploration and extraction side of the industry, we are also concerned with ensuring that when and where mineral processing occurs, that it is done in the most responsible and accountable way possible, to provide maximum benefits to local communities, while minimizing or eliminating the risks to human health and the environment. For this reason we have an interest in the results of the Sudbury Soils Study, and the Human Health Risk Assessment.

Given limitations of time J have not conducted a comprehensive review of the entire study. I have, however, read the executive summary and, where questions or clarifications were needed, referred to the full document. Some of my comments will relate to information that should have been presented in this summary, given that it is what the majority of non-experts will feel they are capable of reading and understanding, though, given the technical language used - even it will be a challenge for many. I have also read the analysis of the study by Dr. Kapil Khatter. Several of my comments stem from his analysis of the report.

As stated within the document itself, the Human Health Risk Assessment represents a model of reality. As with any model, it contains a number of assumptions, estimates and uncertainties. For most Sudbury residents the details of the model will remain a black box, with the results and predictions of the model being of principal interest. To increase confidence in the model's output, it is imp0l1ant to test its findings against "reality". Though I am not as familiar with Human Health Risk Assessments, testing a model's predictions against hard data is cel1ainly the norm in other types of environmental modelling J am more

familiar with. Confidence in the risk assessment model's predictions will be increased ifits finding "of little risk to residents" is confirmed by analyses of body burdens and epidemiological analyses and we strongly recommend that such analyses be undertaken.

Where the report analyzes the exposure from arsenic and of the "worst cases" for lead contamination, findings which could be interpreted as indicating a risk to health were rejected and further analysis using a weight-of-evidence approach was conducted. The weight of evidence analysis, in turn, found there was "no risk" given the current levels of contamination. The Executive Summary does not do an adequate job of explaining or justifying the use of the weight-of-evidence approach, leaving the reader to speculate about what was wrong with the initial analysis. A sceptical reader might wonder if the repol1's authors weren't looking for a method that would offer a more favourable result of "little or no **risk."**

In the case of arsenic, the use of weight-of-evidence in the report is justified (within the full report, but not the Executive Summary) by the finding that "the majority of arsenic burden comes from drinking water and market food items". If, however, background levels of arsenic are already high, does this not mean that we need to be that much more concerned about additional consumption, even if only a small percentage of the total?

Within weight-of-evidence analysis for the worst cases of lead contamination, it was determined that a soil concentration of 400 !lg Pb/g soil was a more appropriate guideline than the HQ value used in the initial analysis. Again the rationale for rejecting the initial finding is questionable. Given the uncertainties that exist around lead toxicity at even very low exposure levels, it would seem that a more cautious approach should have been taken, especially given that the report shows that over half of estimated lead uptake comes from soil, dust and local foods.

While lead is certainly one of the most problematic and dangerous of the COCs being considered, it is not clear why lead was the only COC analyzed with the maximum concentrations or worst case data. The high variability and non-normal distribution of the data clearly suggest that there are propel1ies/areas that will be at greater risk than the average. **Additional work needs to be done to identify the risks associated with the most contaminated properties/areas.** A general finding of no or little risk throughout the Communities of Interest does little to help the families living in the most contaminated parts of the GSA.

In his analysis of the repoli, Dr. Khatter notes that concentrations of the COCs in locally grown foods were in some cases ten times higher than concentrations found in store bought food. Discussion of this finding and its implications are absent from the Executive Summary. This finding is of great relevance to local community members and the implications need to be fUliher assessed. **A risk analysis ofa subpopulation consuming a larger than average portion of their diet from locally grown foods needs to be conducted, as was done for those consuming more fish and game from the area.**

## Response:

Thank you very much for taking the time to provide detailed comments and your interest in the Sudbury Soils Study.

Models do only provide estimates of risk. However, the risk assessment methodology used in the current HHRA (Human Health Risk Assessment) has been refined by practitioners and regulatory agencies around the world over the years, striving to provide a more accurate, yet still conservative, assessment of health risk. The approaches used in the current assessment were based on these methodologies developed by agencies such as the U.S. EPA, Health Canada, the Ontario MOE, the World Health Organization, and others. While there are uncertainties within the assessment (as outlined in Chapter 7 of the report), we are confident that we are not underestimating the potential risk. One recommendation made in the report was that a blood lead survey could be used to establish baseline conditions in the study area prior to any risk management activities being conducted (see Chapter 8). It is important to note, because of the low risks determined through the HHRA, that a human health study or bio-monitoring is not warranted at this time.

The details of the Weight-of-Evidence approach are difficult to relay in the Executive Summary and the actual body of the Technical Report should be reviewed to get the details for both arsenic and lead. A Weight-of-Evidence approach is more robust than a single approach to estimating risk as several pieces of information are used and considered when coming to a conclusion. It is not always possible, or practical, to use a WOE approach, but in this study we considered additional information for both arsenic and lead.

In the case of arsenic, the primary piece of information used in the WOE approach to support our conclusion was the results of the Falconbridge arsenic exposure study. The Falconbridge urinary arsenic exposure study was probably the largest study of its kind in Canada with almost 350 residents participating in each of the communities of Falconbridge, and the reference community of Hanmer. The results of that exposure study unequivocally demonstrated that although arsenic levels in soil in the community of Falconbridge were elevated above the generic soil quality guidelines, and were on average about 20 times higher than in Hanmer, the concentration of arsenic in a person's body, ie. urine, was virtually identical between the two communities. In other words, arsenic was not significantly more available and was not being accumulated by the residents of Falconbridge. Thus, the residents of Falconbridge are at no greater risk due to arsenic than residents of Hanmer, or average residents of Canada.

For the evaluation of risk pertaining to lead we considered a great deal of information including published studies of blood lead levels in other communities with elevated lead, in addition to calculating HQ (Hazard Quotient) values relative to exposure in Sudbury.

The HQ values for lead in all the communities of interest were less than one (HQ < 1.) indicating negligible risk when average soil lead concentrations were input to the exposure model. Using average soil concentrations is a reasonable approach. However, when maximum soil concentrations were used in the exposure model, the HQ values were slightly greater than one. Therefore, we based our conclusions pertaining to elevated risk due to lead exposure in the some areas using maximum soil concentrations. This is a conservative, or very protective approach, as it is unlikely that a toddler would be continuously exposed to maximum soil lead concentrations in any one community.

As part of the 2001 Soil Survey, 10% of the residential properties in the GSA were sampled. The 2001 soil survey is considered to statistically represent all residential properties in the Sudbury area. Therefore, there should be no properties with significantly higher metal levels that would increase the level of predicted risk. A toll-free number (1-866 315-0228) has been established by the Sudbury Soils Study to provide guidance for any residents who have continued concerns about lead, nickel, and the other metals assessed in the HHRA.

Concentrations of metals in both vegetables and fruits grown in both home gardens, as well as professional farms, were evaluated as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat fruits and vegetables grown in Sudbury. Concentrations of the metals in fish and wild game were also evaluated as part of the HHRA, and showed no unacceptable risks related to these food sources.

Sudbury Soils Study | Étude des sols sudburois
metals • health • environment
métaux • santé • environnement

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 38
**Submission Date:** November 2, 2008
**Name:** Brennain Lloyd
**City:** Sudbury, ON
**Affiliation:** Northwatch

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

Dear Members of the Technical Committee:

**Re. Invitation to Comment on the Human Health Risk Assessment Report**
**Sudbury Area Risk Assessment, Sudbury Soils Study**

Northwatch is a regional coalition of environmental and social organizations in northeastern Ontario. Founded in 1988 with a mandate to promote the protection of the environment and the incorporation of environmental concerns into economic and social decision-making Northwatch's interests in the Sudbury Soils Study processes and outcomes include the use of risk assessment as part of the decision-making process, the ability of the public to participate effectively in the various phases of the research and decision-making processes, the outcomes of the process relative to the protection of human health and the environment, and the options considered and selected for remediation. Northwatch has a similar interest in contaminated soils studies that have been conducted or are underway in Wawa, Cobalt and Virginiatown following Ministry of the Environment sampling programs in those communities several years ago.

Our participation in the Sudbury Soils Study to date has included attendance at information centres and Pubic Advisory Committee meetings, and review of reports and materials that have been produced as part of the study process, including the Independent Process Observer's quarterly reports, SARA Group newsletters, study results including Volumes 1 and II and related summaries, and meeting reports and other materials made available through the Sudbury Soils Study web site. More recently we have contributed to the formation of the Community Committee on the Sudbury Soils Study and participated in a news conference with the Mine Mill & Smelter Workers - Local 598 of the Canadian Auto Workers, United Steel Workers Local 6900, and the Centre de santé communautaire de Sudbury at the time of the Mine Mill CAW and USWA's release of a report commenting on the Human Health Risk Assessment in late October.

Our concerns and comments can be grouped under five general categories:
- the findings and conclusions of the Sudbury Soils Study (Final Report, January 2008) raise questions about the basis for the subsequent Human Health Risk Assessment
- we do not have confidence in the findings and conclusions of the Human Health Risk Assessment and hold the view that further work is required
- the Ecological Risk Assessment should be available before the public is asked to provide "final" comments on the Human Health Risk Assessment and Sudbury Soils Study findings more generally
- the large volume of information to be reviewed and the highly technical nature of much of the material means that meaningful public involvement requires technical support
- the decision-making process that is to follow the Sudbury Soils Study process needs to developed, with clear opportunities and supports for public involvement and clarity around decision-making roles

We note that the invitation to the public to review and submit written comments on the Human Health Risk Assessment Report emphasizes that the comments "must be relevant to the contents of the HHRA Report". While we consider that the following comments are directly relevant and related to the Human Health Risk Assessment, it must be acknowledged that it is difficult to draw lines between concerns and comments related to the Human Health Risk Assessment and those related to the Volume I Sudbury Soils Study, the still not released Ecological Risk Assessment, and the broader issues of public participation, decision-making, and the all-important questions of response and remediation.

The following comments are preliminary in nature. Given the directive to make comments only with respect to the Human Health Risk Assessment (Volume II) and the current lack of clarity around the broader and longer-term decision making processes, we will make our comments of a general nature, with the intention of providing an indication of our areas of concern, rather than a detailed exploration of some of those concerns, particularly as they relate to the Sudbury Soils Study (Volume I), the Ecological Risk Assessment (Volume III) and the larger issues around decision-making and longer term followup and remediation.

<u>Sudbury Soils Study (Volume I, Final Report, January 2008)</u>

We acknowledge that comments on the Sudbury Soils Study Volume I have not be solicited at this time; to our knowledge, comments on Volume I (Background, Study Organization and 2001 Soils Study) have not been solicited at any point, and we have no recollection and can find no record of comments having been solicited on the 2001 Sudbury Soils Data Report when it was released in 2004. Given the importance of this phase of the Study process to the subsequent Human Health Risk Assessment and Ecological Risk Assessment we are somewhat troubled by this missed step.

By our assessment, the methods, findings and conclusions of the Sudbury Soils Study (Final Report, January 2008) raise important questions about the basis for the subsequent Human Health Risk Assessment and Ecological Risk Assessment. In our view, there are several examples of decisions that were made or approaches taken which do not instill confidence, and raise questions about the reliability of the study and its findings. Examples include:

- only 10% of residential properties were sampled in Copper Cliff and Coniston and an even smaller percentage of residential properties were sampled in the remainder of the City of Greater Sudbury

- the criteria applied to identify Contaminants of Concern means that some important hot spots may be excluded from the study, eg if the parameter was not present across the study area

- an extremely large assumption - and one that, in our view, is unsupported - was made in the decision to apply Table A and B criteria to the urban soils on the basis of there being a common practice of importing soils and making soil amendmentsl; this is one of several instances where we believe the SARA group opted for a standard or criteria that was less protective and would produce results which were less "alarming" in terms of the picture they would paint of levels of contamination and related potential consequences for human and ecological health

- the decision to address Cadmium as a Chemical of Concern only the Ecological Risk Assessment (ie not in the Human Health Risk Assessment) on the basis of it being well below the Table A criteria is unfounded because the Table A criteria was inappropriate on the basis of the pH levels in the soils being below 5.01; it is not clear why low soil pH having been largely associated with rural and remote areas could be thought to justify this decision2

- the presentation of the upper 95th percentile concentration in the summary of findings on the Chemicals of Concern is unexplained and unsupported; while it may be a common practice in preparing statistical summaries (we are only speculating that this may be the rationale), it has the effect in this instance of making invisible the 5% of sample results which would be of greatest concern

- the decision to exclude Ba, Cd, Cr, MO and Sb for further consideration as a Chemical of Concern on the basis of the 95th percentile concentration of these elements being less than Table F is questionable; again, the 5% of the samples above the 95th percentile are the ones that are of the greatest concern and interest, and their being made invisible by substituting the $95^{th}$ percentile in the discussion of concentrations is problematic

As noted in the Sudbury Soils Study report Volume I, "risk assessments performed for different assessment purposes will use different methods"3. Further to our review of the Sudbury Soils Study Volume I we are left to question the purpose of this risk assessment process and the influence a given purpose will have on the selection of methods and approaches. In our view, the purpose of the Sudbury Soils Study should be to determine what action is required to protect human health and the environment in relation to soil contamination from mining and smelting in the Sudbury basin. The Ministry of the Environment has stated that the purpose is to "assess potential human health risks to residents related to exposure to arsenic and metals from soil, water, food, and air (and) potential risks to terrestrial and aquatic wildlife and ecosystem health of the Sudbury area from metals and arsenic in soils"4 According to these purposes, the approaches and methods should be conservative and protective, which would not include eliminating the most contaminated sample results and would not include opting for less protective standards.

Human Health Risk Assessment (Volume II, Final Report, May 2008)

In general, we are disappointed by the Human Health Risk Assessment Report, its findings, and its presentation. We consider the primary message of “little” and “no” unacceptable health risks delivered by the SARA group with respect to the study findings to be inconsistent with the actual findings of the Report, and to be a disincentive to further public involvement. Further, we found no middle ground between the highly simplified presentation of results in the “Summary of Volume II: Human Health Risk Assessment” and the extremely technical and voluminous report itself. And,.finally, we feel that there should have been more opportunities for dialogue and discussion between the May 2008 release and the November 1st deadline for comment to allow members of the interested public to read sections of the report and discuss and clarify areas of concern prior to submitting their comments.

Our comments on the Human Health Risk Assessment include the following:
- as per our comments with respect to the Sudbury Soils Study Volume I, we are not persuaded that the use of the 95th percentile is sound or justified, and are concerned that it could result in a “skewing” of conclusions
- the risk evaluations appear to take a single-chemical approach, and do not address cumulative, synergistic or additive effects among the seven Chemicals of Concern, the 13 contaminants which did not “rank” as Chemicals of Concern, and other health impactors
- the exclusion of SO2 and its potentially synergistic or cumulative effects with the selected Chemicals of Concern is an additional concern5
- while we appreciate the discussion provided in HHRA Chapter 6, Section 6.4 in response to concerns raised during the Sudbury Soils Study process about the failure of the Study to address cumulative and synergistic effects, the discussion does not address the concern
- providing risk estimates for ***average*** resident of a community does not address the concerns about the most vulnerable and the most exposed individuals6
- Chapter 5 indicates that “if unacceptable risks were predicted, site specific risk management goals (termed a Risk Management Level or SRMLs) were derived”7 but the risks related to lead
- for which a SRML has been developed - have never been acknowledged by the HHRA as unacceptable; they should be acknowledged as such
- we note the report author’s view that soil standards for arsenic which are health-based are “impractical”
- we struggled throughout our review of the report to follow the logic of a study that acknowledges that exposure levels are higher than acceptable levels, and produced risk estimates that were higher than acceptable, and yet still concluded that there was no risk to human health; arsenic and selenium are cases in point
- we concur with the HHRA findings that exposures to nickel and lead at levels documented by the Sudbury Soils Study may result in unacceptable health impacts
- we do not concur with the decision to exclude occupational exposure, as the source of additional body burden, from the HHRA; the workers at CVRD Inco and Xstrata are a significant percentage of the population in the affected communities, and their exposure levels warrant careful consideration as part of this study; the statement in the HHRA report that “different levels of acceptable ‘risk’ are assumed for employees in the workplace compared to a resident in the general Sudbury population” should be clarified
- we similarly do not concur with the decision to exclude nickel dermitits10

- while it may not be appropriate to base estimates of ingestion of soil on the consumption of pica children, it may be equally inappropriate to overlook those consumption rates entirely,11 given that some studies indicate approximately 1 child in 5 may exhibit pica behaviour12

We have particular concerns about the way arsenic, lead and nickel were addressed in the HHRA and its conclusions.

As indicated in our comments above, there is a seeming disconnect between measured levels of arsenic that are above acceptable levels and a conclusion that there is no human health risk.

One of the aspects of the Human Health Risk Assessment findings and their presentation we find most troubling is the selection of a "soil risk management level" for lead of 400 ppm, which is double the provincial standard for the clean up of contaminated sites which have a pH of above 5.0 and more than triple the standard for sites which have a pH of below 5.0.

As the Technical Committee will be well aware, lead is a toxicant with demonstrated cumulative effects in humans, as has been well documented by many researchers, agencies and institutions, including the Ontario Ministry of the Environment.

> *The health effects associated with overt toxicity and with high blood lead levels (BLLs) involve several organ systems, in particular the central and peripheral nervous systems, haematopoietic, renal, gastrointestinal, and reproductive systems. Other health effects associated with lead toxicity involve the cardiovascular and immune systems. Lead has also been the subject of several reviews and reclassifications that have examined the potential associated between carcinogenicity and exposure to lead. More relevant to the intent of this Rationale Document is a description of the health effects of low level exposures of lead, as these represent common exposure levels for humans, and serve as the basis of the air standard.*
>
> *A description of lead's toxicity has been the topic of several recent reviews and scientific interpretations presented elsewhere (US EPA, 2004; WHO, 2000; ATSDR, 1999; Rationale Document for the Development of Ontario Air Standards for Lead and Lead Compounds 7 CEOH, 1994). The exposure component of these reviews is usually expressed in terms of an internal lead concentration in the blood, usually in micrograms per deciliter (µg/dL), but also in micromoles per litre (µmol/L) (note: 1.0 µg/dL is equal to 0.0483 µmol/L). This internal dose measurement does not distinguish between routes of exposure (e.g., inhaled or ingested) or from the organic or the inorganic forms of lead. Lead in blood is an indicator representing a dynamic balance between recent exposure and a re-distribution between body compartments and deposits, such as bone.*
>
> *Among the health effects that are associated with increased BLLs, the impairment in children's neurological function is considered to be an appropriate and sensitive endpoint for assessing toxicity of low levels of lead13.*

The following information is derived from epidemiological studies and is the subject of many reviews and a variety of scientific opinions (Wilson et al., 2005; ATSDR, 1999, and was summarized in the Ministry of the Environment's 2004 Rationale document for a lead standard for air:

- Lead is a potent neurotoxicant affecting the central nervous system (CNS) and peripheral nervous system (PNS)
- Lower levels are associated with impairments in neurocognitive and behavioural development in children, with no evidence of a threshold.
- Gastrointestinal effects have been observed with high BLLs.
- Lead nephrotoxicity is associated with renal functional deficits evidence from occupational, clinical, and general population studies suggests that lead may affect the cardiovascular system in humans. Effects include hypertension, increased heart rate, and increased blood pressure.
- The effects shown in studies of lead exposure on immunological parameters indicate that lead may have effects on cellular components of the immune system
- Lead has long been known to affect several of the enzymes involved in the heme biosynthetic pathway, resulting in a decrease in heme production.
- there is limited information demonstrating lead as a rodent kidney carcinogen
- high BLLs lead causes adverse effects on both male and female human reproductive function, decreasing fertility and alteration of sperm in men and increasing spontaneous abortion and stillbirths in women *14.*

The Human Health Risk Assessment discovered a problem: a large number of samples (approximately 129) indicated that numerous properties had lead levels at or above the 200 ppm clean up standard level of the Ministry of the Environment Table A15 and a presumably much larger number of samples indicated that the lead was at levels above the Table F guideline of 120 ppm.

However, one of the key findings of the HHRA was that of the 553 total number of properties sampled, only nine properties had lead exceeded the Soil Risk Management Level (SRML) of 400 ppm. During the public presentations of the HHRA findings there was no explanation of how the Soil Risk Management Level had been developed, and no acknowledgment that it was double the Ontario clean up standard and more then three times above the Table F guideline level, although it was acknowledged in response to a question from a member of the public that the provincial cleanup standard was 200 ppm.

The explanation provided in response to a question from the public during the May 12th presentation of the HHRA findings about the basis of the SRML for lead was not particularly helpful, providing only a very generalized description of the SRML being based on a number of sources plus local conditions. Nor is the explanation provided in Chapter 8 of the HHRA helpful. It essentially says that the study found the lead levels to be too high so they determined a need to create a "Soil Risk Management Level" based on weight of evidence, literature reviews, local conditions etc., and through that process concluded that a level of 400 ppm would "provide a sufficient level of protection minimize the likelihood of harm to public health."16

We strongly disagree with both the approach and the conclusion.

We disagree with the approach because, in our view, it has misrepresented the reality and the seriousness of the soil study findings to the people of Sudbury. Whether that misrepresentation was deliberate or simply the byproduct of a series of poor decisions is a question we will not insist on having an answer to. We do, however, insist that the people of the Sudbury basin deserve a much more straightforward accounting of the Soil Study results.

We disagree with the conclusion because there is no safe level of exposure to lead; there is not a dispute about this statement in the scientific or medical community. So when the SARA group presentation of the HHRA findings summarizes the “risks” related to lead by discussing “typical exposures to lead in the environment throughout the Greater Sudbury area” and by describing them as “acceptable benchmarks for protection of human health”, and then goes on to say that there are only nine properties which warrant concern (despite 129 samples being above the clean up standard) we disagree. The statement that “lead levels are similar to other older urban communities in Ontario” does not provide the people of Sudbury with any insight into the environmental hazards they are living with or understanding of the need for remediation; being told that the levels are also high in the Rodney Street neighbourhood in Port Colburne is of no comfort or assistance, although the Port Colborne situation does perhaps offer an interesting example of other responses to the problem of industrial contamination.

The presentation of the HHRA findings with respect to nickel is also problematic.

Again, it is a case of understating the seriousness of the findings. Again, we come to no conclusion whether any misrepresentation is intended. However, to say that there is only a “minimal risk” of respiratory inflammation from lifetime exposures to airborne nickel in Copper Cliff and Western portion of Sudbury Centre and that the health risks related to nickel inhalation were negligible in the other communities is, in our view, a serious understatement of the problem. And while we appreciate that the presentation of findings acknowledged that respiratory inflammation has been linked cancer and that “some chemical forms of nickel are considered carcinogens”, we consider these, again, to be grievous understatements.

Following a toxicity assessment done by Environment Canada in 1994, nickel compounds were classified as "Carcinogenic to Humans", i.e., "substances for which there is believed to be some chance of adverse health effects at any level of exposure." The available data also indicated that exposure to nickel induces contact dermatitis in a proportion of the population. It was also concluded that each of the groups of nickel compounds as a whole are entering the environment in a quantity or concentration or under conditions that may constitute a danger in Canada to human life or health.17

The net effect of having the seriousness of the Sudbury Soils Study results so understated is that the study process -and the Human Health Risk Assessment in particular - has been put under a cloud of suspicion. Based on the findings of our own review of Volumes I and II of the Sudbury Soils Study, we are convinced that the contamination of soils in the Sudbury basin is extremely serious, and we are deeply disappointed that we cannot rely on the Human Health Risk Assessment to help us understand the consequences of that contamination and begin to think constructively in terms of possible responses and necessary remediation.

Ecological Risk Assessment (Volume III, unpublished)

While we understand that the Sudbury Soils Study has been an enormous undertaking, we find it problematic that the HHRA was released before the ERA, that the public is being asked to comment on the HHRA without the benefit of having seen the ERA, and that there is no clear timeline for when the ERA will be released, how its relationship to the HHRA will be described, and how the two risk assessments will singly or in combination inform the as yet unidentified decision-making processes which much ultimately follow.

Public Role and Involvement

Both the establishment of the Public Advisory Committee and the creation of the role of the Independent Process Observer are positive aspects of the Sudbury Soils Study process, and any criticism we may have of the limitations of public involvement are in no way a reflection on the importance of the PAC and the Independent Process Observer.

The members of the Public Advisory Committee have made a tremendous contribution of their time and effort, and having such a committee is essential to any exercise of this importance to the community. The Public Advisory Committee was comprised of community members charged with reviewing and contributing to all study communications and consultation materials and initiatives18, and in our view the community members performed well and offered much. However, the efforts of the Public Advisory Committee could not compensate for other shortcomings or difficulties which have plagued the Sudbury Soils Study process.

One difficulty has been what we have considered to be the dominance of the Technical Committee members at Public Advisory Committee meetings. At meetings we attended, TC members would sit at the table with the PAC members, undistinguishable from the PAC members in most respects, and would answer question from the public and others, often creating an impression that they were speaking on behalf of the Public Advisory Committee. While we knew this to not be the case, from a structural point of view, we understood the confusion and frustration we have heard members of the public express over this point.

Another difficulty was that the Technical Committee meetings were in-camera. While a period for public presentations was added to the beginning of the TC meetings mid-process, this still did not provide a window into the Technical Committee discussions, and meant that members of the public - and perhaps even the Public Advisory Committee - had only limited access to the discussions of TC members, and between TC members and various experts. We accept the Independent Process Observers remark in his most recent report that it was important that the TC members have the ability to speak freely among themselves, but the overall effect has been that of keeping the discussion very private, despite the very public nature of the concern.

At the May 13th presentation of the findings of the Human Health Risk Assessment I asked the Ministry of the Environment representative how the public would be involved in the Ministry of the Environment's review of the Sudbury Soils Study and its findings and in the Ministry's formulating of its response (e.g.

requirements for remediation, mitigative measures, and other appropriate measures that might be identified in the Sudbury Soils Study or in the course of the subsequent review). There was no discernable response. It would be an understatement on my part to say that I was surprised to learn, just a few minutes later, that in fact CVRD Inco and Xstrata had already produced a "Risk Management Report" described their intended response, and that it was available on a table at the back of the meeting hall. At no point was the public informed that this report existed, at no time has the public been asked for comments on this proposed response, and in no way does this constituted meaningful public involvement.

We have reviewed the Risk Management Report, dated May 13th 2008; suffice to say that we found it lacking. We would be pleased to provide more substantive comment should the Report's existence and the public's right to comment on it be acknowledged at some future date.

Decision-making

In the first paragraph in the first volume of the first study we are told that the various studies "provide the basis for future decisions on the management of potential risks identified in the Sudbury study area"19, but in the thousands of pages that follow we find no discussion of that deision-making process, the opportunity for the public to be involved in that decision-making process, or the role and responsibilities of the Ministry of the Environment as the obvious decision-maker, given their regulatory responsibilities.

While the following comments may not be deemed "relevant" to the review of the Human Health Risk Assessment by the Technical Committee, in our view there is a clear and pressing need for:

- a clearly defined review exercise to follow the Sudbury Soils Study process
- clear opportunities and supports for public involvement
- clarity around decision-making roles with respect to requirements for future remediation and mitigation, and
- confirmation by the Ministry of the Environment that they recognize their role as the lead decision-maker given their statutory responsibilities with respect to environmental protection, with the Ministries of Health and Labour, as well as federal agencies, also having certain responsibilities

The Ministry of the Environment should develop a proposed approach that addresses the above noted points, consult with the public and other decision-makers on its appropriateness, and provide a clear outline of the decision-making process(es) that are to follow the conclusion of the Sudbury Soils Study prior to the close of any comment period on the Ecological Risk Assessment, or by the end of March 2009, whichever is sooner.

In closing, we remain committed to participating in future discussions with respect to the Sudbury Soils Study and its findings, and thank the Technical Committee in advance for your careful consideration of our comments. We look forward to reviewing your response, and to seeing our concerns reflected in future outputs of the Sudbury Soils Study.

Sincerely,

Brennain Lloyd
Northwatch

Endnotes:
1.Sudbury Areas Risk Assessment, Volume I, Executive Summary, January 2008, EC-vii
2.Sudbury Areas Risk Assessment, Volume I, Executive Summary, January 2008, Chapter 8-7
3.Sudbury Areas Risk Assessment, Volume I, Chapter 8-1
4.http://www.ene.gov.on.ca/envision/sudbury/soilsstudybg.htm
5.HHRA Chapter 6, 6-12
6.HHRA Chapter 5, 5-3
7.HHRA Chapter 5, 5-3
8. HHRA Chapter 5, 5-14
9. HHRA Chapter 5, 5-14
10.HHRA, Chapter 6.6
11.HHRA Chapter 6, Section 6.5
12.http://cat.inist.fr/?aModele=afficheN&cpsidt=4608015
13.Rationale for the Development of Ontario Air Standards For Lead and Lead Compounds, Standards Development Branch, Ontario Ministry of the Environment, June 2006
14.Rationale for the Development of Ontario Air Standards For Lead and Lead Compounds, Standards Development Branch, Ontario Ministry of the Environment, June 2006
15.SSS Volume 1, Table 8.1, page 8-4
16.HHRA, Chapter 8, 8-4 to 8-6
17.Priority Substances List 1 Assessment Report, Environment Canada (1994)
18.Sudbury Areas Risk Assessment, Volume I, Executive Summary, January 2008, EC-v
19. Sudbury Areas Risk Assessment, Volume I, Executive Summary, January 2008, EC-i

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## Response:

Thank you very much for your detailed comments and continued interest in the Sudbury Soils Study. Our responses to your comments are provided below under the five general categories identified in your submission.

Comments were solicited on the Human Health Risk Assessment but comments on Volume I are also welcome. The reason we specified comments must be relevant to the HHRA is that while there are a number of environmental and health issues in Sudbury of interest to people many of these are matters are outside the scope of the Sudbury Soils Study. We wished to avoid situations where the public may have comments or questions on matters outside the responsibility of the SARA Group or Technical Committee.

Sudbury Soils Study; Volume I, Final Report, January, 2008.

The 2001 soil sampling of residential properties was designed and implemented by the Ontario Ministry of the Environment (MOE). Sampling 10% of the properties was considered to statistically represent all properties in the Greater Sudbury Area. Therefore, there should be no “hot spots” or areas of contamination significantly different than represented by the 2001 soil survey. Similarly, the results of the risk assessment should not be different if other residential properties were sampled.

A toll-free number (1-866 315-0228) has been established by the Sudbury Soils Study to provide guidance for any residents who have concerns about lead, nickel, and the other metals assessed in the HHRA.

The decision to use the MOE Table A and B criteria for screening of Chemicals of Concern (COC) was based on the fact that these are the most relevant guidelines available. It has nothing to do with the practice of soil being imported to some residential properties.

The pH of soil in the majority of residential or urban properties was within the pH range of 5.0 to 9.0, therefore, the MOE soil quality guidelines apply. In this situation Cadmium does not meet the COC screening criteria and was not selected as a COC for the human health risk assessment.

In the more remote or natural settings, soil pH is often less than 5.0, and the MOE guidelines are not strictly applicable. Since Cadmium was marginally above the background soil levels it was retained as a COC for the ecological risk assessment (ERA).

It was very appropriate to screen out Barium, Chromium, Molybdenum and Antimony from further consideration in the ERA given the low concentrations detected in over 8,400 soil samples.

The methods and processes followed in both the Sudbury HHRA and ERA followed recognized guidance documents published by such reputable agencies as Health Canada, Environment Canada, Ministry of the Environment, and United States Environmental Protection Agency (US EPA). The assumptions, equations and methods used in both the HHRA and ERA were all very conservative to ensure protection of the most sensitive receptors. In fact, the Independent Expert Review Panel that was retained to review the HHRA in detail made a number of comments that the approach taken was sometimes overly conservative.

Human Health Risk Assessment (Volume II, Final Report, May 2008).

The SARA Group and Technical Committee spent considerable effort to ensure that the key messages surrounding the HHRA accurately reflected the findings of the risk assessment. There were five specific findings of the HHRA (see Sudbury Soils Study Results Newsletter, May, 2008) that can be generally grouped into two categories; 1) the study predicted no unacceptable risks associated with exposure to arsenic, copper, cobalt or selenium, and 2) some risks, albeit minimal, were associated with exposure to lead in the environment and nickel in air. These key messages are very consistent with the findings of the HHRA. To suggest or report there is more risk due to the COC would be misleading and not an appropriate message for the residents of Sudbury.

The matter of possible cumulative or synergistic effects of the COC was discussed, as you mention, in Chapter 6, section 6.4. The discussion provides a valid scientific rationale of how the synergistic effects were considered. There is no methodology available, or rationale, to include other substances (ie. 13 metals that were not screened as COC) in the risk assessment. While the discussion may not provide satisfaction to some readers we have used state of the art science and information in addressing this matter.

The primary rationale for this study was the elevated concentrations of some metals in Sudbury soils. Therefore, sulphur dioxide was not included as a COC by the Technical Committee from the start of the study.

Estimates of risk were actually calculated for both average and maximally exposed individuals. In the case of lead, there was no predicted additional risk to toddlers exposed to **average** soil lead concentrations. However, when **maximum** soil concentrations were used in the exposure assessment, some risk was predicted. It was on the basis of possible continuous exposure to maximum soil lead concentrations that the key messaging surrounding lead was developed. This is perhaps not clear in the HHRA Summary Report or Results Newsletter but details can found in the HHRA Technical Report on page 5-24 to 5-25.

Worker exposure to metals is addressed by Joint Occupational Health Committees at both Vale Inco and Xstrata Nickel. Workers are offered biological monitoring on a routine basis to assess exposure to some of these COC. Occupational exposure is also addressed by regulations and policies administered by the Ontario Ministry of Labour which is not directly relevant to a study of environmental exposure of residents in the community.

The treatment of arsenic, lead and nickel in this risk assessment is extremely thorough, and the conclusions supported by the Ontario Ministry of the Environment and Sudbury District Health Unit.

We are not clear why there is a “disconnect” between arsenic in soil exceeding the provincial generic soil quality guidelines and the conclusions of the report. The generic soil quality guidelines are based on many conservative assumptions for both exposure conditions, availability and receptor characteristics across the province. Exceeding a generic soil quality guideline does not immediately mean there is a human health risk, only that more detailed evaluation is warranted. The Sudbury HHRA was a more detailed evaluation. In the case of arsenic, an extra step was undertaken and that was the Falconbridge urinary arsenic exposure study. This was probably the largest study of its kind in Canada with almost 350 residents participating in each of the communities of Falconbridge, and the reference community of Hanmer. The results of that exposure study unequivocally demonstrated that although arsenic levels in soil in the community of Falconbridge were elevated above the generic soil quality guidelines, and were on average about 20 times higher than in Hanmer, the concentration of arsenic is a person’s body, ie. urine, was virtually identical between the two communities. In other words, arsenic was not significantly more available and was not being accumulated by the residents of Falconbridge. Thus, the residents of Falconbridge are at no greater risk due to arsenic than residents of Hanmer, or average residents of Canada.

On page 6 of your submission it is stated that the HHRA discovered a problem in that a large number of samples had lead levels above the 200 ppm clean up level. This is incorrect. The provincial soil guideline of 200 ppm is not “a clean up level” but rather is a generic criterion that indicates that either remediation can be undertaken, or a risk assessment conducted to determine is a site, or area-wide standard is more appropriate. This is exactly what the Sudbury Soils Study HHRA did when it calculated Sudbury specific exposure to lead and established a Soil Risk Management Level of 400 ppm. There is considerable explanation in the HHRA Technical Report on how the 400 ppm SRML was developed, although we are

aware that it was difficult to effectively communicate this in public, and a number of people have asked for clarification on the process.

The level of 400 ppm lead in soil was not arbitrarily selected. The level of 400 ppm lead was developed to represent a Sudbury-specific soil guideline that protective of human health, and particularly toddlers. Other soil quality guidelines exist for lead such as the Ontario generic level of 200 ppm. The generic soil guidelines are based on many assumptions and worst case scenarios across the province. The level of 400 ppm was developed by the SARA Group after collection of thousands of samples in the Sudbury area including soil, air, dust, water, vegetables and fish and their analysis for lead content. These data were all input to a Sudbury-specific exposure model that allowed the calculation of a level of lead in soil that is protective of human health. The 400 ppm value is based on a great deal more information than the generic soil quality guidelines, therefore, has a great deal of certainty attached to it.

Both the SARA Group and Technical Committee spent considerable time and effort developing key messages around the results of the HHRA. While some organizations such as Northwatch may feel the health risk due to lead has been under-represented, we do not agree, and remain adamant that exaggerating risk to be overly protective is equally irresponsible and does serve the residents of the community.

Any resident of Sudbury with concerns about their exposure to lead can call the Sudbury Soils Study toll-free number (1-866-315-0228) to discuss their individual situation with a health care professional. Also, as mentioned in the HHRA Technical Report, blood lead monitoring is the definitive measure of exposure of a person to lead in the environment. Any person can consult with their personal physician and arrange to have a blood lead test conducted. The cost is supported by OHIP.

The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations.

Significant measures were implemented in the Sudbury Soils Study to ensure transparency of the process and credibility and scientific rigour of the results. As you are aware these measures included representation on the Technical Committee by the SDHU, the MOE and City of Greater Sudbury who participated in all discussions and decisions, and had their own experts review all reports. An external Scientific Advisor was engaged to review all reports independently on behalf of the TC and PAC. The methods and procedures were reviewed by an external Independent Expert Review Panel made up of leading scientists from the United States. An Independent Process Observer was appointed to observe all decision-making and to report publicly and un-obstructed to the public.

<u>Ecological Risk Assessment (Volume III, unpublished)</u>

The Technical Committee plans to release the results of the Ecological Risk Assessment (ERA) during the first quarter of 2009. The public will have ample opportunity to review and comment on the results of

the ERA. In addition, it is the intention of the companies to provide continuing opportunity for public dialogue on the ERA risk management framework that will be released to the public and key stakeholders.

Public Role and Involvement

Your recognition of the time and effort spent by members of the Public Advisory Committee (PAC) and Independent Process Observer is greatly appreciated.

The perception, at PAC meetings, that TC members were indistinguishable from PAC members is unfortunate as this was unintentional. The main role of the PAC was to facilitate meaningful communication between members of the public and the TC and SARA Group. When circumstances permitted, members of the TC and SARA Group as well as members of the public and the media were invited to sit at the same table. The intent was to make the meetings more informal and comfortable for the public as well as to avoid an "us" versus "them" mentality. Not all PAC meeting locations were able to accommodate this arrangement and the PAC's sensitivity to this situation evolved over the course of the study. Regardless of the arrangements, each PAC meeting opened with a round of introductions in which the people around the table stated their name and affiliation. During the proceedings, the chair directed PAC business to PAC members first and then, if appropriate, asked for comment from the TC or SARA Group. It is important to note that only PAC members "voted" on PAC business. Public questions that pertained to the PAC's role and responsibilities were answered primarily by PAC members. Questions or comments received from the public that related to the scientific or technical components of the study were directed to the TC or SARA Group for response. Care was taken to indicate the affiliation of the respondent, though it seems from your comment that this was not always successful. The PAC welcomes any opportunity to improve upon its role in the study process and will give your comment and any others due consideration.

In regards to the TC meetings, it should be noted that all members of the PAC were welcome to attend the entire TC meeting and that the PAC chair, Union representatives and the Independent Process Observer had observer status on the TC. These observers were also invited to the 2-day Independent Expert Review Panel sessions.

It was felt that development of a Risk Management Report by the companies was needed so that it could be available at the time of release of the HHRA results. Anyone wishing to comment on the proposed measures and information outlined in the report is welcome to contact either of the companies for further details.

Decision-Making

The Ontario Ministry of the Environment is the key agency with responsibility for environmental issues, and together with the Sudbury District Health Unit takes responsibility for protection of human health. Both agencies have been continuously involved with the Sudbury HHRA, as well development of the Risk Management Plan. Again, members of the public are encouraged to contact either agency for further information on their role in the study or responsibilities to the public moving forward.

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 39
**Submission Date:** October 21, 2008
**Name:** Rick Grylls
**City:** Sudbury, ON
**Affiliation:**

## Comment regarding the Sudbury Soils Study Human Health Risk Assessment:

**Sudbury Soils Study 2008 Report**
*By union observer Rick Grylls*

As a citizen of the area since 1952 and an employee of mining since 1969, I have experienced the changes of time here in Sudbury.

The changes have come only by the blood, sweat and tears of a community that endured the most destructive carnage of lost lives in the mines, mills, smelters and refinery, all the while living surrounded by an environment of a dead and bleak landscape from years of industrial pollution.

I have been on the front lines of representation of the employees since 1973, as a Steward, Health and Safety member, Executive Board member and the last seven years as the senior officer, the President of Mine Mill 598/CAW.

The changes within the workplace and within the community have always been opposed by the companies as too expensive or not needed. The re-greening of Sudbury, the safety standards within the industry, and the betterment of our community has always had an relationship with the workers collective strength of their union.

I have a front seat within our community and in using material from the Sudbury Soil Study and other sources, I have prepared this report. It is not easy to put into a few words the context or my conclusion of the study, which can be found at www.sudburysoilstudy.com.

**Information from the SARA paper – History of Sudbury Smelters June 1st, 2004:**

**20 Environmental Consciousness Awakens**

**"With the birth of the environmental movements in the 1960s, major sources of industrial pollution came under public scrutiny for the first time. Although the dangers present in smelter emissions**

**had been a concern to the community since the days of the early roaster yards. Only in the 1960s did the local, national and global concern reach the critical mass necessary to bring about change.In 1967, the Ontario legislature passed the Air Pollution Act, and announced a schedule for reducing Inco's emissions. That same year, Inco's annual report included a section called "Pollution Control" for the first time. In 1968, the province created the Environmental Health Studies and Services Branch of the Department of Health. The first site selected to study the effects of long-term exposure to air pollution was Sudbury."**

**20.1 The Government Response**

"Although the companies were complying with the existing emissions controls, the bottom line remained of paramount importance; the Coniston smelter was closed because it was obsolete, and the Falconbridge pyrrhotite plant was an uneconomic operation. When the companies complained that the emission reduction targets threatened profits and jobs, the government capitulated, allowing the companies more time to meet reduction targets.

The trend of governments placing the interest of the mining industry ahead of environmental problems was highlighted by the widely publicized Happy Valley episode. In 1972, air pollution readings recorded conditions unfit for human habitation. The provincial Energy and Resources Minister decided it would be better to move the families than to interrupt production.

"Happy Valley has become the first community to be wiped from the map of Canada to make way for continued air pollution."-Neil Stevens, Canadian Dimension, Nov. 1974

The extent of the pollution problem was brought into sharp focus by a secret 1974 federal government document titled "The Sudbury Pollution problem: Socio-Economic background," inadvertently made public in 1977. Using a U.S. -based formula, the report concluded that environmental damage would cost Sudbury "approximately $465,850,000 caused by emissions to human health, vegetation and property value in the Sudbury area on an annual basis (emphasis in original) Although it is difficult to place a dollar value on health effects, and both the MOE and the companies had invested considerable time, money and expertise into producing hundreds of reports investigating the environment health of the area, this report brought the enormity of the problem to the public eye."

"Government has been extremely lenient with Inco and Falconbridge. Historically there have been no prosecutions under applicable environmental legislation, and from 1924-1970 there was a curtailment of a citizens right to sue for pollution damages, and there has been a lack of government-sponsored research on the damage caused by the copper-nickel smelters." –The Sudbury Pollution Problem, Environment Canada 1974

**20.2 Acid Rain and Sulphur Dioxide**

"In the 1970s another "new" environmental issue hit the headlines: acid rain. Although Inco's superstack had reduced the effects of emissions in the immediate area of the smelter, studies were showing that the dispersion did not necessary equal elimination: what goes up must come down. As lakes across North

America showed damages from emissions produced in other provinces and even other countries, increasingly stringent controls came into effect."

**20.3 Metals in Sudbury Soil**

"Not till the late 1960s did environmental concerns expand to include metal levels and acidifications of soils. Into the 1970s, studies by local foresters and ecologists showed that soil acidity and concentrations of copper and nickel were elevated in many of the same areas where sulphur dioxide damage had been observed. Researchers reported that it was acidity of the soil combined with the heavy metals that created an environment toxic to plant growth.

Public and regulatory interest in contaminated soils has greatly increased in the past decade. With the advent of the MOE soil cleanup guidelines in 1997, regulations and industry had a clear set of criteria with which to make comparisons with monitoring data. In September 2001, the MOE released a summary report of approximately 30 years of soil metals data collected in the City of Greater Sudbury entitled "Metals in soil and vegetation in the Sudbury area – Survey of 2000 and addition historic data". That report concluded that the concentrations of nickel, copper, cobalt and arsenic are elevated in the three historic smelting centres of Copper Cliff, Coniston and Falconbridge.

On September 12th, 2001 the Ministry of Environment held an open house at the Falconbridge Legion on the Sudbury soil samples that had been taken up to that time. One other person other than me showed up that day as people where preoccupied by the Twin Towers destruction. The information that had been collected had prompted the MOE to order an extensive assessment to review the 100 years of mining pollution.

The Falconbridge manager of that day assured me that the companies would take on the expense of the study and that the study was completely independent with the companies only input to the structure of the review would be supplying technical data to the committee.

As the next year unfolded I felt as a Union President of Mine Mill 598/CAW representing the workers of Falconbridge (now Xstrata) I would also stay at arms length and not apply for the Public Advisory Committee (PAC for short). In 2002 the process begins to take form and the study begins in January 2003.

The early process involved community information and interaction meetings on land, air, water, fish, from which came the most common question, expressed one evening from a bewildered mother when she rose up and quoted "to hell with the birds and bees, the flowers and trees what about my children"

As 2003 ended most of the community show and tells were rapped up and the internal structure of the assessment was well entrenched to structure, definition and to the questions to be asked by the Technical Committee, (TC for short). It also became aware to us that the companies were doing more then providing data; they were full partners at the table contrary to the total independent quotes the year before.

The title “health risk assessment” leads most to believe something different then what will actually happen.

From the November 5th 2004 Sudbury Soils Study update:

**What is a Risk Assessment?**
“Risk assessments can be carried out with a various elements of nature in mind: the physical environment (soil, air, surface water, and ground water), plants and animals, and humans within the study area. A risk assessment examines the possible risk to human health from hazards, such as exposure to chemicals in the environment. This type of study must take into account all factors that might affect how people respond to the chemicals. Things like a person’s age, length and duration of contact with the chemicals in air, water, soil, dust and food, lifestyle activities and occupation.”

**What is a Human Health Study?**

“Human health studies examine the health conditions of a particular community, and identify trends that might occur as a result of exposures or changes in the environment.

Human health studies can be done in a variety of ways. These include surveys, self-evaluation reports of health status, and database analyses of measured health events such as cancer, hospitalizations and prescription use, just to name a few.”

**From the Union “Risk Assessment” meeting, October 26th, 2004 Sudbury:**

“Risk assessments do not look directly at the health of the people. Risk assessment would probably conclude that there is no health risk.”

“One at a time, not a problem, together there is a problem. There are interactions between chemicals such as nickel, copper, cobalt, cadmium, selenium, mercury and arsenic. We need to know more about the additive affect. An example, nickel and copper and sulfur dioxide and nitrogen, these mixes cause cancers, clean up SO2, nickel and copper pollutants.”
Thomas C. Hutchinson Full Professor, Environmental and Research Studies, Trent University

**From The Sudbury Star May 27, 2005**

“However, no risk assessment to date has been able to answer all the questions, particularly with respect to cumulative effects.” Dr. Christopher Wren, SARA Group

**Enter the Unions 2004**

In 2003 Homer Seguin and I questioned loudly that we did not trust the companies within the process and that the questions should be expanded to real health studies of the life long residents of Sudbury. We also questioned the single element theory of chemicals verses the synergistic combination of chemicals.

While very little research has been sponsored to allow scientists to find out the effects of toxic cocktails of a number of elements together, it is know that the nickel/copper combination is a higher toxin than the single science assessments of each element, nickel or copper, on their own.
Because of our voiced concerns, the unions were viewed as enemies to the sanction of the Technical Committee. We viewed the mining companies as the foxes in the hen house and we were viewed as "henny penny" and the sky is falling.

Active Union representatives were reluctantly allowed to observe the public meetings starting February 12th, 2004, but not the many working group meetings they held without observers and support staff. Homer being retired was not accepted here or the PAC committee because you needed unanimous votes from the TC committee.

One of the earliest observations I had was the five TC groups at the meeting were defending their position and interest of the people they represented. It was evident that not only the study was on some minds but also averting liability.

(Note: April 14th, 2008 the community of Blackwell, Oklahoma filed a class action suit against Blackwell Zinc smelter for contaminating the town with 58 million pounds of toxic waste including lead, arsenic, cadmium and zinc.

In their worst polluting years the two Sudbury mining companies chimneys emitted close to 3 million tons of emissions a year. Their total in 100 years is over 100 million tons.

There is no recording of the amounts of fugitive emissions escaping from mines, mills, smelters and refinery into the towns and cities.

Lead as a chemical of concern was being held up by one of the mining companies but consensus was arrived because of strong public concerned from TC members. The clinical cleaning of the minutes of the meetings that were going on the web site was another area of expertise.

We were viewed with suspicion during the meetings as were others and it was evident any time that Homer Seguin or Eric Gillespie the environmental lawyer representing Port Colburne citizens in their soil contamination study was mentioned or when they addressed the committee, by the facial gestures and comments at the table after they left.
In the fall of 2007 via their government standing and regulations the Ministry of Environment had concerns, which draw a long process to reach final consensus on a few details. Meeting after meeting was being cancelled and carried over into 2008. Unknown to the unions, because we were not informed and did not find out until 3 p.m. Tuesday May 13th at the 2008 public meetings that the company managers Fred Stanford and Mike Romaniuk had gotten involved months earlier and forced the process forward. We had no knowledge or observation of what took place for the last four months up to these public meetings.

The unions were not made aware of the City of Sudbury presentation or the press release held just before the public meetings on the 13th of which I found out from a newspaper ad.

The rudest observation I saw was at the Tuesday, May 13th, 2008, 7 p.m. public information meeting at Science North when Homer was making his way up to the mike during the public input time. Up to this time the other citizens did not draw any reaction from TC representatives, but when Homer was making his way to the mike, many TC members, especially the company ones I was sitting behind, reacted with disgusted facial expressions, comments and laughing between themselves.

This ongoing disregard of unions and others is still very evident.

The Union, a legal right of every employee, was formed in 1942 by the workers of the mining companies to have a collective agreement with the employer to achieve better Health, Safety, work rules and payment for their labour, thereby enriching the lives of their family and community. It was men like Homer who fought from the 1950s to today for Health and Safety improvements in the workplace, environmental improvements for our community, WCB payments for workers who got cancers from working in the sintering plants, and the enactment of the 1979 Occupational Health and Safety Act that makes Sudbury Mines some of the safest in the world.

Maybe if those smirking faces sat through as many inquests of workers killed on the job, or the home visits to the grieving widows and orphaned children, or hospital visits to friends dying from cancer, maybe they would understand the compassion of Mr. Homer Seguin in getting answers to the unasked questions in relationship to the 100 years of pollution and our cities citizens health issues.

**Sudbury Soil Study Report**

The report indicates the citizens of the area are still being negatively affected by lead and nickel. The Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, public health statement for nickel tells you about nickel and its compounds and the effect of exposures. Person receptors are inhalation, ingestions, and skin contact.

From ATSDR: “Under acidic conditions, nickel is more mobile in soil and may seep into groundwater. Nickel does not appear to concentrate in fish. Studies show that it does not accumulate in plants growing on land that has been treated with nickel-containing sludge or in small animals.

“The concentration of nickel in water from rivers and lakes is very low. The average concentration of nickel is usually less than 10 parts of nickel in a billion parts of water (ppb) in rivers and lakes”

“The average concentration of nickel in drinking water is about 2ppb”.

“The highest levels of nickel in drinking water, about 72 ppb, have been found in Sudbury, Ontario, Canada, where there is a large natural nickel deposit and where nickel is mined and refined.”

“The most common adverse health affect of nickel in humans is an allergic reaction to nickel.”

"The International Agency for research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined those nickel refinery dust and nickel subsulfides are human carcinogens."

From the Sudbury water quality data March 31, 2003: "The source water, the Wahnapitei River, like all surface sources may be under the influence of several sources of contamination. The primary influence is from atmospheric deposition of acid and metals from nickel and copper smelting operations in Sudbury, as well as mine drainage from the abandoned Whistle Mine north of Lake Wahnapitei. Although this has been a greater influence in the past, the river does have elevated levels of nickel, copper and manganese due to the smelting industry."

"Precautions: some people may be more vulnerable to contaminates in drinking water then the general population, in particular immuno-compromised persons, some elderly and infants. These people should seek advice about drinking water from their health care provider."

Skin contact and ingestion have little effect on humans but inhalation exposure for a long period of time, especially the workers in the plant can be harmful. The Sudbury Study and other information indicate residents in the areas in and around the smelters have been exposed and are still an area of concern. Respiratory inflammation and respiratory cancers cannot be ruled out. The companies need to do more pollution control.

**Falconbridge Arsenic Human Health Study**
(Not part of study but referenced to on page 21, 3.2.7.)

In May 2004 the Sudbury District Health unit gave warning to the citizens of Falconbridge that they should take precautions with the soil as it contained higher amounts of metals especially arsenic. This causes a stir with the residents and the TC committee. The citizen reaction led to a urinary heath study (outside the Sudbury Soils Study) of seven hundred residents from Hanmer and Falconbridge. The study shows the same arsenic levels in both groups even though Falconbridge soils contains much high arsenic levels.

This study is compared to four other Canadian studies from cities with high industrial arsenic in the soil. Pages 38 and 39 of study:

Falconbridge 2004: Overall Mean=7.2 (5.6): Under 13 Mean=9.1 (5.6)
Wawa 2001: Overall Mean=5.6 (4.4): Under 13 Mean= 7.0 (5.1)
Wawa 2002: Under 13 Mean=5.6 (3.4)
Deloro 1999: Overall Mean=4.36 (4.0): Under 13 Mean=5.34 (5.6)
Sydney 2002 Overall Mean=6.4 (8.2): Under 13 Mean=6.7 (9.5)

The May 2005 letter to Falconbridge and Hanmer citizens gave answers to two questions.

Keep in mind these the guideline of arsenic is viewed as "typical daily intakes of arsenic" by Canadians.

Question One: Do Falconbridge residents have higher arsenic levels than residents living in a comparison area with lower levels of arsenic in their soil?

Answer: No. Overall, Falconbridge residents' urinary arsenic levels were very similar to those in the comparison community of Hanmer, which had lower levels of arsenic in soil.

Question Two: What health risks relative to other communities are associated with the urinary arsenic levels of Falconbridge residents?

Answer: Falconbridge and Hanmer residents on average are within typical daily intakes of arsenic by Canadians, and therefore are not at any increased exposure as compared to other Canadians in general. Health risk associated with arsenic levels for Falconbridge residents would be similar to those in the comparison community of Hanmer.

The letter sent to the homes and given to the public did not give all the answers from the study answer. What was missing from page 51 and 52 of the report is:

"With respect to absolute risk, however, it is known that arsenic exposure in general in Canada is close to or above the toxicological boundaries of increased cancer risk. Health Canada uses the rates of 1/1,000,000 or 1 in 1/100,000 as an acceptable risk. However, most arsenic exposures in Canada provide a toxicological risk level above this level. What this means is that according to the mathematical risks of cancer, much of our ordinary arsenic intake as Canadians will be calculated as an increased risk.

For arsenic, the question is then, are Falconbridge or Hanmer residents experiencing an additional preventable risk because of their geographic location, the soils levels, or other circumstances? This study indicates that, on a community level, neither Falconbridge nor Hanmer shows preventable sources of environmental arsenic exposure, and in particular, not a soil-related risk of elevated inorganic urinary arsenic"

If the average Canadian whose "arsenic exposure in general in Canada is close to or above the toxicological boundaries of increased cancer risk." and "much of our ordinary arsenic intake as Canadians will be calculated as an increased risk." and Sudbury citizens consume the average food basket as the Canadian general population but we have the highest arsenic study, then how could the answer read "neither Falconbridge nor Hanmer shows preventable sources of environmental arsenic exposure."

What is not asked or answered is why the Falconbridge study shows the residents had the highest levels of arsenic of the five contaminated site studies and the Sudbury study conclusion is "it is not from the soil", then how are the residents getting more arsenic into their system then other Canadians.

**Final observations and recommendations of this observer:**

By the time the unions reached the table as observers the course forward was set. The questions we would have liked to be part of the study did not get included. By narrowing down questions you can reach pre-concluded answers.

We only viewed a small fraction of the actual work process and material at the TC public meetings and observed no working committee meetings.

This studied was aimed at future risk as reflected in the first SSS conclusion;
"1. Based on **current conditions** in the Sudbury area, the study predicted little risk of health effects on Sudbury area residents associated with metals in the environment."

This study is in no way associated to the previous 100 years of health risks and exposures from the 100 million tons of pollutants our historical Sudbury citizens faced and the effects it might have caused, which citizens personally live with today.

The people who did the science provided 100% accuracy to what they were instructed to do.

The support staffs to the TC committee, the observer, secretary, chair, and others were accountable to their given tasks.
The five active TC committee's representatives from Vale Inco, Xstrata (Falconbridge), Ministry of Environment, The Sudbury District Health Unit and the Greater City of Sudbury defended the positions of those they represented, and some showed resentment to the presence of the unions.

The towns and city continues to be polluted with fugitive chemicals of concern and sulfuric acid from the three smelter sites, from uncontrolled emissions from converter isles, furnaces, unprotected custom feed, and tailing waste and slag piles, exported by vehicles, wind and the rain off the mining properties.

The towns and city land has the historical fallout of 100 years.
The study showed the 100 million tons of historical pollutions that fell from the sky has filtered into the ground and lays buried just below the surface, or settled on bottom of water covered areas, some of which has reached the water table and in disturbing it increases your contact with it.

The two companies, while voicing their strongest future commitment, must be keep accountable for the past and daily pollution output by stack, converters, furnaces, mines, slag on and off the property, tailing ponds, custom feeds, cottrell and smelter dust stockpiled in the open and exposed to wind and rain. Some of these stockpiles have been placed outside, unprotected in the last seven years while the study was taking place.

While re-greening is happening, that the companies increase their accountable for the rehabilitation of past contaminations of mine sites, tailing ponds, slag piles and dead land now, the sooner the better, not at the end of mine life closure plan.

Today's citizens should rejoice in the fact their children face a much cleaner future (approximately 10% of stack emissions and unknown amount of site fugitives) than what their parents faced in the past.

Citizens must become aware of the personal hygiene information distributed by the Ministry of Environment and the Sudbury District Health Unit regarding the chemicals of concern found in the soil, home dust and food, especially arsenic, lead and nickel.

The Unions will continue to work in making the companies improve the dust control and other Heath and Safety elements in the mines, mills, smelters and refinery on behalf of the citizens they represent in the workplace, which will reduce the public's exposures from fugitive emission contamination and increase the life of the employees.

The companies must provide funding to the Sudbury District Health Unit for a truly independent "Health Audit of the Citizens of Sudbury", re the high numbers of cancers, diseases and shortened life span.

In conclusion I would like to relate the value of the study in comparison to real life situations.

If all risk assessments were viewed as well groomed dogs at the New York world dog show, the Sudbury Risk Assessment would win first place, but in answering the relationship of the 100 years of pollution and the real health questions about our citizens this Sudbury Health Risk Assessment will be as productive as sending a neutered dog to stud a breeding farm.

Like a good illusionist who has mesmerized the audience and in pulling down the curtain, it has made the elephant disappear and replaced it with a mouse.

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## Response:

Dear Mr. Grylls,

Thank you for your detailed submission and continued interest in the Sudbury Soils Study. A large part of your submission provides background to the study and we do not feel a response is necessary. Where possible we have attempted to provide responses to a number of your comments below.

- It is stated on page 4 of under "what is risk assessment" that a study of this type must take into account all factors, such as age, duration of exposure, that might affect how people respond to chemicals. The Sudbury human health risk assessment (HHRA) absolutely did take into account all factors that would affect how a person is exposed, and may respond to a chemical in the environment, including sex, age, duration of exposure and most sensitive toxicity endpoint.

- As you are well aware, occupation was not included in this study. Worker and occupational exposure are covered within the companies by the Joint Occupational Health and Safety Committees. Any current worker has medical services available that includes biological monitoring for nickel, lead and arsenic if they wish to assess on-site exposure.

- The Technical Committee and study authors remain confident that the Sudbury HHRA set new standards within Sudbury by examining, for the first time, exposure of residents to several metals that are referred to as the Chemicals of Concern (COC) namely arsenic, cobalt, copper, nickel, lead and selenium.

- Neither the Technical Committee nor SARA can speak to the Coniston operation or the pyrrhotite plant at Falconbridge and why they were eventually decommissioned.

- There is reference to the period in late 2003-early 2004 when union representation was included in an "observer" capacity at the Technical Committee. Also, that union representatives did not "trust" the companies as part of the process and that "real" health studies should be undertaken for the life long residents of Sudbury.

  The Technical Committee has responded to the Union representatives that the Sudbury soil study was comprised of 2 risk assessments (HHRA and ERA), and not biological monitoring studies. The risk assessments were designed to determine the risk level in the general community. If the risk assessments determined that further work was necessary, including the possibility of biomonitoring or medical intervention, both Xstrata Nickel and Vale Inco have remained committed to the role of helping to manage the risks.

- The possible interactions between the COC are discussed in detail in the HHRA Technical Report, Chapter 6.4. Our evaluation of possible interactions and cumulative effects of the COC represents the state of the art science with respect to these matters.

- Historical emissions of SO2 and metals were extensively researched and are documented in detail in Chapter 3, Volume I of the Sudbury Soils Study. The data clearly show that emissions have been reduced by over 90-95% in the past 30-40 years. Therefore, inhalation exposure to these emissions has also declined, but it is not possible to estimate with any degree of certainty what the actual exposure concentrations were 40 years ago, for air, water, food, dust or any of the other exposure pathways taken into consideration in the HHRA. The risk assessment can only address known, current, exposure conditions.

- Page 6 of your submission under "Sudbury Soil Study Report" makes the following statement: "The report indicates the citizens of the area are still being negatively affected by lead and nickel". This is incorrect. The report makes no such statement. The conclusions of the report indicate there is elevated risk of health effects from lead in the environment, and nickel in air. However, the risks are minimal and unlikely to be measurable in any person.

- On page 7, the last paragraph under this section there are two statements: "respiratory inflammation and respiratory cancers cannot be ruled out. The companies need to do more pollution control". These are indeed conclusions of the study. Based on the findings of the HHRA, the companies, and Vale Inco in particular, have made renewed efforts to reduce emissions that contain nickel and the other COC.

- On page 8 of your submission, the final paragraph under "Falconbridge Arsenic Human Health Study" there is a statement "the Falconbridge study shows the residents had the highest levels of arsenic of the five contaminated sites studied and….. how are the residents getting more arsenic into they system than other Canadians". This is incorrect.

The study showed that arsenic levels in soil were higher in the community of Falconbridge, but the study demonstrated unequivocally that arsenic was not getting into the residents of Falconbridge at levels different than the reference community of Hanmer, or different than other residents of Canada for which data are available.

- Falconbridge Limited (now Xstrata Nickel) acted responsibly on the matter of arsenic. The Smelter's General Manager, David Rae, specifically posed the question to SARA Scientists (with others present) whether arsenic was felt to be elevated potentially at concentrations whether in their professional opinions, might lead to elevated "risk". SARA concurred that arsenic likely would generate a need for further investigation, prompting the company to coordinate the Urinary arsenic study with the Falconbridge Citizens' Committee. The study was coordinated by a third party firm, with the guidance of medical surveillance, and the results peer reviewed by Dr. Lee from the University of Alberta. Dr. Lee is considered an authority on the bio-monitoring for and exposure to arsenic.

- The results were positive for the citizens of Falconbridge and the matter of Canada Mortgage and Housing commission (CMHC) no longer insuring mortgages was subsequently reversed in their letter of November 25, 2008.

- Page 5 of your submission makes reference to the process of lead being selected as a COC. Indeed one of the companies, Vale Inco, had concerns about lead being considered as a COC. However, lead was added as a COC following a formal assessment by the SARA group. The Technical Committee (TC) had requested that SARA review the existing data base and make a recommendation based on the COC criteria. The TC, including Vale Inco, accepted the SARA recommendation. This in itself is an example of how the decision making process within the Sudbury Soils Study was rigorous, transparent and was not influenced by any one member of the TC.

- "Cleaning of the TC minutes" referenced in the correspondence has not occurred. Highlights and key decisions are summarized by administrative support personnel in a concise document and placed on the website. This is undertaken to provide the public the necessary key points, without the need to place TC minutes on the website.

- There is reference to the different agencies at the TC table and conflicting mandates within the group. Where consensus decisions are made, all members of the group remain challenged to represent their organizations while maintaining the consensus model of the Technical Committee. One thing is clear, however, is that all TC members were looking for the same thing: a defensible, transparent, and credible risk assessment that would, if nothing else, NOT underestimate risk.

- Another matter expressed is the May 13th reference to Mr Homer Seguin. Mr Seguin has been to the TC, a number of PAC meetings, "Have your say" sessions, and has challenged Ron Brecher's objectivity as a Technical Advisor as well as company involvement at TC beyond paying the invoices.

Through all of these examples, TC members have been respectful of Mr Seguin, allowing him every opportunity to ask questions and to comment on matters related to the process surrounding the Sudbury soil study. He has also resolved to "agree" to "disagree" on the matter of both companies at the table.

- Page 9, second last paragraph includes a statement about re-greening and keeping the companies accountable for the rehabilitation of mine sites and not at the end of the mine life closure plan. In response the companies have reiterated their commitment to re-greening and rehabilitation beyond on-site requirements under their closure plans. Both companies are working with the City of Greater Sudbury to develop a risk management framework that will address restoration of the natural landscape as one outcome of the Sudbury Ecological Risk Assessment (ERA). The details of this framework will be released when the ERA results are made public. There will be opportunity for the public and interested stakeholders to review this framework and provide input to the proposed concepts.

- Page 10, third paragraph states: "the companies must provide funding to the Sudbury District Health Unit (SDHU) for a truly independent "Health Audit of the Citizens of Sudbury" regarding the high numbers of cancers, diseases and shortened life span.

  The SDHU has provided the following response on this matter:

  The HHRA is based on very solid science that has been rigorously reviewed by leading risk assessment experts, as well as Ontario government agencies whose mandate is to act in the best interest of the public. The Sudbury & District Medical Officer of Health Dr. Penny Sutcliffe stated that she supports the results of the HHRA. She was involved in the study for several years and she had a fully independent statutory duty to protect the health of community members. The HHRA predicted minimal to negligible risk for Greater Sudbury residents of health effects associated with metals in the environment based on current environmental conditions in the Sudbury area. Based on the completed HHRA and recently reviewed health profiles of the Sudbury community a human health study is not warranted at this time.

  Additional information on CGS community health can be found at the SDHU web site under Health Status http://www.sdhu.ca/content/resources/folder.asp?folder=4201&parent=15&lang=0 and Cancer http://www.sdhu.ca/content/resources/folder.asp?folder=10110&parent=15&lang=0 .

  Should any individual feel that he or she has a personal health concern they are advised to see their family physician or primary health care provider. The HHRA findings do not point to the need for community-wide blood lead level testing. There may be other valid reasons (e.g. to further scientific knowledge, to investigate individual exposure concerns) to test blood lead levels. However, knowledge of community blood lead levels is not required in order to evaluate the potential for health risks to residents of the Sudbury area from exposure to lead in soil, air, drinking water and food that may be related to mining and smelting operations.

Sudbury Soils Study | Étude des sols sudburois
metals • health • environment
métaux • santé • environnement

# Sudbury Soils Study:
# Human Health Risk Assessment Public Comment Period

(May 19 to Nov 1, 2008)

**Comment:** 40
**Submission Date:** October 31, 2008
**Name:** Joan Kuyek
**City:** Sudbury, ON
**Affiliation:** Community Committee on the Sudbury Soils Study

**Comment regarding the Sudbury Soils Study Human Health Risk Assessment:**

***Submitted English and French versions on the Environmental Defence Reports***

***Please see attached***

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# Sudbury Human Health Risk Assessment Briefing

September 22, 2008

Prepared by Environmental Defence

ENVIRONMENTAL | DEFENCE
317 Adelaide Street West Suite 705 • Toronto Ontario Canada • M5V 1P9 • tel: 416.323.9521 fax: 416.323.9301 • www.environmentaldefence.ca

September 22, 2008

The following report was commissioned by Mine-Mill Local 598CAW and Local 6500 Steelworkers in July 2008, to review the Sudbury Soil Study Human Health Risk Assessment.

Environmental Defence is a national non-profit organization that seeks to connect Canadians with key environmental, human health, and pollution issues. We focus on creating hard-hitting campaigns that result in real change and educate the public on issues such as, climate change, clean air and water, and toxic chemicals.

Since 2005, Environmental Defence has been testing the bodies of Canadians for measurable levels of pollutants as part of its Toxic Nation campaign. The testing of Ontario political leaders – Premier Dalton McGuinty, Progressive Conservative Leader John Tory and NDP Leader Howard Hampton revealed high levels of toxic chemicals from sources such as consumer products and industrial processes. The Toxic Nation campaign continues to undertake research and advocacy to strengthen pollution laws across the country.

The following review was undertaken by Dr. Kapil Khatter, acting for Environmental Defence. Dr. Khatter is a family physician and environment and health expert who has
led chemical-related policy work at Environmental Defence. He has a Master's degree in Environmental Studies and has sat on a number of working groups tasked with providing expert advice to Health Canada and Environment Canada. He has scientific and policy expertise related to the environment and health, with a unique perspective that comes from being a physician.

For the past couple of years, Dr. Khatter has worked on the review of Canada's national pollution law, the Canadian Environmental Protection Act, and on the federal government's Chemicals Management Plan.

## Key points

1. Lead contamination was found to be above safe levels in four communities. The consultants' recommended target soil lead levels for clean up, but recent research shows that some children may be harmed at these levels. In addition, lead is a probable carcinogen with no known threshold and therefore even the recommended maximum levels of exposure may increase cancer risks.

2. Air levels of nickel are higher than recommended exposure limits for non-cancer and cancer effects in three communities. The assessors dismissed the risk saying the assessment had a margin of safety. The margin of safety is meant, however, to compensate for the gaps and uncertainties inherent in the assessment and it does not mean that there is no significant risk.

3. Both soil and inhaled arsenic levels are significantly increased throughout most of the Greater Sudbury Area (GSA). Urinary arsenic levels were not found to be higher than in control communities because purchased food is the main source of exposure. There are still concerns that inhaled arsenic and specific types of ingested arsenic may put GSA residents at increased risk.

4. Food grown in the GSA tended to have higher levels of lead, nickel and arsenic, sometimes more than 10 times the levels store-bought food. These higher levels are a concern for those eating local food as they increase these residents overall exposure level.

5. The assessment excludes the extra risk to workers living in the GSA who have occupational contact with the metals of concern in addition to the exposure non-workers get. The assessment assumes that it is acceptable to expose workers to greater levels of risk.

6. The risk assessment cannot demonstrate that no harm is occurring; it can only estimate the level of risk. The assessors have inappropriately decided what that acceptable level of risk should be. This is a decision the community should make.

## The assessment

The Sudbury Human Health Risk Assessment was undertaken by the Sudbury Area Risk Assessment Group (SARA) starting in 2003. It was based on soil sampling data from the Sudbury Soils Study funded by the Ontario Ministry of the Environment (MOE) and local mining companies. The metals chosen for the human health assessment were those found to be contaminating the entire Greater Sudbury Area, to be above MOE soil guidelines, and those that at least in part come the local mining and smelting operations.

Communities of interest (COIs) were chosen from within the soil study area, including Sudbury Centre, Falconbridge, Coniston, and Copper Cliff. Hanmer was used a control community, considered unaffected by the emissions, as well as residential Toronto.

The study attempted to look at all sources residents might have of the metals under study, including through air, food, water, etc. The assessors also attempted to evaluate the impact on different age groups within the air and specifically at the risks to hunters/anglers and First Nations

individuals. New research was undertaken to fill some of the data gaps that existed. A food consumption survey, air level monitoring, drinking water sampling, an indoor dust survey and testing of local food levels were done.

This briefing note is an evaluation of the human health risk assessment and the conclusions made. The results presented focus on lead, nickel and arsenic, the three metals that have cancer-causing potential and that are not essential in the human diet.

The case for the other three metals is more difficult to make. Although selenium exposure is high, the majority of it comes from food bought at the grocery store. And it is not clear at what point healthy amounts of selenium become harmful ones. Cobalt may actually be carcinogenic, and nickel exposure may make people sensitive to cobalt. It is difficult, however, to determine how much cobalt is too much given the state of the science.

The assessors did not find a significant increased risk of exposure for First Nations populations or for non-First Nation hunters or anglers as contamination of game and fish as not a major source of exposure. The note will therefore not focus on these populations.

## The results

**Lead.** Maximum soil levels for lead were above recommended soil exposure limits in Copper Cliff, Coniston, Sudbury Centre and Falconbridge. The potential exposure from skin, oral and inhaled sources was found to be above regulatory safe limits for non-cancer effects. Though lead is considered a “probable carcinogen,” a risk assessment was not done for lead’s cancer-causing effects because its carcinogenic effects are poorly understood.

The consultants’ analysis of an appropriate soil level for lead concluded that 400 micrograms per gram would be protective of human health. They recommended blood lead testing as a way of gathering more accurate information about lead exposure.

**Nickel.** Levels of inhaled nickel were higher than non-cancer exposure limits at the Copper Cliff, Falconbridge and Sudbury Centre West monitoring stations (particularly Sudbury Centre West). Inhaled nickel is considered to be carcinogenic as well, but there are insufficient data to know how cancer-causing oral or skin-absorbed nickel is. Nickel is also a sensitizer and a significant percentage of the population reacts to nickel but there was no evaluation done of how local nickel pollution impacts this.

The levels of inhaled nickel exceeded benchmark regulatory standards for both cancer and non-cancer endpoints. The assessors, however, dismiss the excess exposure as unlikely to cause harm given the margin of safety built into the assessment.

**Arsenic.** Arsenic intake, both orally and through skin, was above non-cancer exposure limits for all areas except Sudbury Centre. Falconbridge had particularly high soil arsenic levels with the mean residential concentration being 18 times that of those in Hanmer.

The risks of cancer from arsenic inhalation for all of the communities being studied were found to be greater than the accepted regulatory one in a million risk. The cancer risks ranged from 1.3 in 10,000 in Coniston to 2.5 in 10,000 in Falconbridge, compared to their calculation of the typical Ontarian risk at 5.5 in 100,000 (4-5 times as high). It is unclear whether there is a non-cancer risk from inhaled arsenic as these risks were not calculated because there are no regulatory standards.

The risk from arsenic exposure was considered to be unimportant based on the additional Falconbridge arsenic study which found comparable urinary levels with those of residents of Hamner. This is likely because the majority of ingested arsenic comes from store-bought food though there may be differences in the type of arsenic. Increased risks from inhaled arsenic may not be represented by urine levels if the arsenic stays in respiratory tissues the way nickel does.

## Assessment choices

There are a number of findings that the assessors felt unconcerned about because of the margin of safety built into the assessment. Nonetheless, in doing the assessment there were many gaps and assessment choices that decrease the margin of safety and make the assessment less likely to find a problem. These include:

1. Removing the "outliers" in the soil measurements. In evaluating the soil concentrations of the metals in various locations, the assessors decided to ignore the highest readings out of statistical convention. Presumably this is to keep results that are inaccurate or not representative of the normal range of concentrations out of the calculations. What this does however, is leave out the most contaminated spots, where the risk would be highest.
2. In determining what contribution mining and smelting makes to the soil levels of metals in the area, the assessors subtracted the expected background concentrations, or the concentrations that would likely be there if there was no additional pollution. The background concentrations used were not averages though, they were the 98$^{th}$ percentile, or almost the maximums found. This would underestimate the amount that local industry contributes.
3. The Ministry of the Environment required the consultants to use the existing standards of typical regulatory agencies like Health Canada and the Environmental Protection Agency no matter how old they are. They were not allowed to use newer data that may show more of a risk. (On the other hand, they could not use new data that pointed to more confidence in safety either). In the worst case, the lead standard used was developed in 1996 while it is clear that recent evidence points towards a stricter safe level.[1]
4. Lead is a considered a "probable carcinogen" by the US EPA and the International Agency for Research on Cancer. There remains, apparently, a lack of understanding of lead metabolism and carcinogenicity. As a result, the assessors decided not to include lead's risk "as a carcinogen for oral or inhalation exposures" in the assessment.
5. The assessors point to the lack of research on the interactions between metals and with other pollutants, but conclude that synergistic interactions (interactions which enhance effects rather than just adding to them) have been rarely found at the levels of exposure seen. They then leave the potential for multiple exposures to different metals out of the assessment. This has the potential to greatly underestimate risk assessments if there are additive or synergistic interactions not accounted for. Lead and arsenic for example, may be more than additive when affecting the nervous system.

[1] *The MOE's recommended intake for lead is based on this out of date health standard for lead. According to the assessment, the US EPA believes that lead's effects may happen at levels so low that there is likely no safe threshold.*

6. The assessment takes a route by route approach to each of the metals. In other words, inhaled nickel is compared to standards for inhaled nickel; ingested nickel is compared to standards for ingested nickel. Each of these standards, however, is developed without accounting for additional exposures through other routes. The assessors do not look at how the total exposure from all routes may cause risk and therefore the risk may be underestimated.

## Other comments

The assessors contradict themselves when establishing 400 micrograms per gram of soil of lead as an acceptable level for the GSA. The assessment explains that even 5 micrograms per decalitre of lead in children's blood has not been established as safe and that there is emerging evidence that lower levels may cause harm to development. For instance, a recent study in *Environmental Health Perspectives* reported that children with a blood lead level greater than 2 microgram per decalitre had a four fold increased chance of having attention-deficit hyperactivity disorder.[2]

They also present evidence that soil levels as low as 75 micrograms per gram of soil could result in 5% of children reaching that 5 micrograms per decalitre level. Still, they base their recommendations for soil levels on existing international standards that do not reflect what we know now about lead. Based on their own evidence, their recommended level of 400 micrograms per gram would expose well over 5% of GSA children to potentially harmful levels of lead.

The drinking water in Falconbridge was switched from an old well to a newer deeper well in the summer of 2005. The new well's lead levels are "greatly decreased" from the levels in the older well and those are the data used in the assessment (though little sampling has been done so far). Nevertheless, Falconbridge residents would have bone levels of lead affected by the older well levels. At times of life when bone is breaking down, these bone levels can affect health, by increasing blood pressure for instance (pregnancy, menopause, aging). The assessment of current and future lead exposure should take into account the impact of past exposure.

The Agency for Toxic Substances and Disease Registry in the United States estimates that 10-15% of the American population have become sensitized to nickel (have skin reactions). One would guess that Canadian levels are not that different. The assessors were unable to determine a threshold for nickel sensitization. Instead, the risk of sensitivity to nickel as a result of pollutants is ignored as a reason to limit nickel pollution.

Based on comparisons to the Canadian diet study, food grown in many parts of the GSA had levels of lead, arsenic and especially nickel sometimes greater than ten times higher than typical Canadian levels. This did not show up as an important risk because the food eaten in the area comes primarily from elsewhere. The risk could change dramatically for anyone growing and eating a large percentage of their own food.

[2] *Braun JM, Kahn RS, Froehlich T, et al. Exposures to environmental toxicants and attention deficit hyperactivity disorder in US children.* Environmental Health Perspectives *2006;114:1904-9*

At a minimum, the recommendations based on the assessment should alert residents to the high levels of contamination in locally grown food so that they know the potential risks of garden grown vegetables and can choose to minimize their exposure. A ban on growing local vegetables might be considered given their level of contamination. Given there is no known safe level of lead for children, feeding them vegetables with ten times the normal levels of lead seems a poor health choice.

As with much of human health risk assessment in Canada, workers' exposures are excluded as a source of risk. There is no attempt in the assessment to determine the risks of environmental exposure to workers who also have occupational exposures. Their combined exposure makes them a vulnerable population and in need enhanced protection. Instead, the assessment states that: "different levels of 'acceptable' risk are assumed for employees in the workplace compared to a resident of the general Sudbury population"[3] In other words, it is considered acceptable for workers in the GSA to have increased risks of illness from metal exposure.

The consultants' conclusions go beyond the science to subjective opinions on whether the risks are low enough. The documents themselves state that: "the selection of an acceptable risk level is predominantly a policy-based, rather than a science-based, decision," and that "an alternate acceptable risk level may be appropriate"[4]

A few pages later, however, they write that: "Where estimated risks … are less than the acceptable level, it can be concluded that no observable adverse health effects would be expected to occur including sensitive subpopulations or groups." [5] This is not accurate. Even low risk does not mean no risk, nor does it mean that no one gets harmed. This is especially true for carcinogens that may not have safe thresholds. In addition, these are "risk estimates" and so are not assurances that there are no health effects, only probabilities. The assessors' conclusions therefore go beyond what a risk assessment can and should do. They decide the acceptable level of risk for the community, which should be a community decision. And they propose to assure residents that no harm at all is occurring, which the assessment can not do.

[3] *Page 6-12*
[4] *Page 4-116*
[5] *Page 4-119*

# Notes sur l'Évaluation des risques à la santé humaine

22 septembre, 2008

Préparé par Environmental Defence

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Le 22 septembre, 2008

Le rapport qui suit a été commandé par la section locale Mine Mill 598 des TCA et par la section locale 6500 des Métallos en juillet 2008, afin de réagir à l'Évaluation des risques à la santé humaine, un des rapports produits dans le cadre de l'Étude des sols de Sudbury.

Environmental Defence est un organisme national à but non-lucratif qui tente de rapprocher les canadiens aux enjeux cruciaux liés à l'environnement et la pollution. Notre emphase est sur le développement de campagnes efficaces qui mènent au vrai changement et qui éduquent le public sur des problèmes comme le changement climatique, l'assainissement des airs et des eaux, et les substances chimiques.

Depuis 2005, et dans le cadre de sa campagne intitulée 'Toxic Nation', Environmental Defence mène aussi des tests auprès de citoyens canadiens afin de mesurer les niveaux de polluants dans leur système. Par ailleurs, les résultats des tests menés sur les chefs politiques de l'Ontario – notamment le Premier Ministre Dalton McGuinty, le Chef du Parti conservateur John Tory, et le chef du Parti Néo-démocrate Howard Hampton, ont révélé des niveaux élevés de substances toxiques émanant de certains produits de vente aux consommateurs et de processus industriels. La campagne Toxic Nation continue à mener de la recherche et du travail de représentation pour renforcer les lois régissant la pollution dans notre pays.

Le document suivant a été produit par le Dr. Kapil Khatter, à titre de Environmental Defence. Dr. Kapil Khatter est un médecin de famille et un expert de l'environnement et de la santé qui formule des politiques de travail liées à l'utilisation de produits chimiques pour Environmental Defence (www.environmentaldefence.ca). Il possède une maîtrise en études environnementales et a siégé dans plusieurs groupes de travail fournissant de l'expertise à Santé Canada et Environnement Canada. Il a une expertise scientifique et en formulation de politiques reliée à la santé et l'environnement, avec une perspective unique provenant de sa formation comme médecin de famille.

Récemment, le Dr. Khatter a dévoué quelques années à la révision de la loi nationale sur la pollution du Canada, ainsi que la Loi canadienne de protection environnementale et le Plan de gestion des substances chimiques du gouvernement fédéral.

**Points essentiels**

1. La contamination par le plomb dépasse les limites de sécurité dans quatre communautés d'intérêt. Pour l'assainissement des sites contaminés, les consultants ont recommandé des niveaux cibles de plomb dans le sol; toutefois les recherches récentes indiquent que, à ces niveaux, la santé de certains enfants peut être endommagée. De plus, le plomb est vraisemblablement un carcinogène pour lequel il n'y a pas de seuil connu, par conséquent même le niveau d'exposition maximum recommandé peut augmenter les risques de cancer.

2. Les niveaux de nickel dans l'air sont plus élevés que les limites recommandées d'exposition en ce qui concerne les effets en matière de cancer et autres maladies dans trois communautés d'intérêt. Les évaluateurs n'ont pas pris le risque en considération sous prétexte que l'évaluation a une marge de sécurité. Toutefois la marge de sécurité sert à compenser les écarts et incertitudes de l'évaluation, et ne signifie pas qu'il n'existe pas de risque significatif.

3. Les niveaux d'arsenic dans le sol et par inhalation sont élevés de façon significative dans la région du Grand Sudbury. Les taux d'arsenic dans l'urine ne sont pas plus élevés que dans les localités de contrôle du fait que les denrées alimentaires du commerce sont la source principale d'exposition. Mais il reste des préoccupations sur l'arsenic inhalé, et des types précis d'arsenic ingéré peuvent représenter un risque accru pour les habitants de la région du Grand Sudbury.

4. Les produits de l'agriculture de marché dans la région du Grand Sudbury tendaient à avoir un contenu plus élevé en plomb, nickel et arsenic, parfois dix fois plus que les mêmes produits dans le commerce. Ces niveaux plus élevés préoccupent les personnes qui consomment les aliments produits localement, du fait de l'augmentation du niveau total d'exposition.

5. L'évaluation exclut les risques supplémentaires encourus par les personnes travaillant dans la région du Grand Sudbury et ayant des contacts avec les métaux en question au cours de leur travail, ceci ajouté à l'exposition générale dans la population. Dans l'évaluation, il semble acceptable d'exposer ces travailleurs à des niveaux plus élevés de risques.

6. L'évaluation du risque ne peut pas prouver l'absence de conséquence nocive, elle peut seulement estimer le niveau de risque. Les évaluateurs ont décidé, à tort, le niveau acceptable de risque, alors qu'il s'agit d'une décision qui doit être prise par la collectivité.

**Évaluation**

L'évaluation du risque à la santé humaine à Sudbury a été entreprise par le groupe SARA en 2003. Elle se base sur les données d'échantillonage des sols de l'étude des sols à Sudbury, financée par le Ministère de l'environnement de l'Ontario (MEO) et par les compagnies minières locales. Les métaux sélectionnés pour l'évaluation de la santé humaine sont ceux qui ont été jugés comme contaminants dans la région tout entière du Grand Sudbury, dépassant les directives sur les sols du MEO, et en partie du moins, proviennent de l'exploitation minière et des activités de fonderie.

Les communautés d'intérêt (CI) ont été choisies à partir de l'étude des sols, en particulier le centre de Sudbury, Falconbridge, Coniston et Copper Cliff. Hanmer a été utilisée comme communauté de contrôle, et considérée comme n'étant pas affectée par les émanations, tout comme les quartiers résidentiels de Toronto.

On a entrepris dans l'étude d'examiner toutes les sources des métaux étudiés auxquels a été exposée la population, et comprenant l'air, la nourriture, l'eau, etc. Les évaluateurs ont également essayé d'en évaluer l'impact sur différents groupes d'âge et sur les chasseurs, pêcheurs et les membres des Premières Nations. De nouvelles recherches ont été entreprises pour combler les lacunes : enquêtes sur la consommation alimentaire, niveaux dans l'air, prélèvements d'eau potable, poussières dans la maison et produits alimentaires cultivés localement.

La présente étude est une analyse de l'évaluation du risque à la santé humaine et de ses conclusions. Nos résultats se concentrent sur le plomb, le nickel et l'arsenic, trois métaux qui ont le potentiel de causer le cancer et qui ne sont pas essentiels à la nutrition humaine.

Il est plus difficile de traiter le cas de trois autres métaux. L'exposition au sélénium est élevée, mais elle a pour origine les aliments du commerce, et le point auquel le sélénium devient nocif n'est pas clairement établi. Le cobalt peut être effectivement carcinogène, et l'exposition au nickel peut rendre susceptible au cobalt. La recherche actuelle ne permet pas de déterminer ce qui constitue un excès de cobalt.

Les évaluateurs n'ont pas trouvé de risque accru significatif d'exposition pour la population des Premières Nations, ni pour les pêcheurs et chasseurs (autochtones ou non), du fait que la contamination du gibier et du poisson n'est pas une source d'exposition importante. Par conséquent, la question n'est pas abordée dans le présent document.

**Résultats**

**Plomb :** à Copper Cliff, Coniston, Sudbury (centre) et Falconbridge, les niveaux maximum de plomb dans le sol dépassent les limites recommandées d'exposition. L'exposition potentielle par la peau, ingestion ou inhalation se trouve au-dessus des limites réglementaires de sécurité concernant les effets autres que le cancer. Le plomb est considéré comme « carcinogène probable » mais une évaluation du risque n'a pas été effectuée du fait que les conséquences carcinogéniques sont mal connues.
En matière de niveau acceptable de plomb dans le sol, les consultants ont conclu que 400 microgrammes par gramme ne serait pas nocif pour la santé humaine. Ils ont recommandé des analyses du plomb dans le sang en vue de rassembler des données plus précises sur l'exposition au plomb.

**Nickel :** les niveaux d'exposition au nickel par inhalation étaient plus élevés que les limites d'exposition ayant des effets nocifs autres que le cancer dans les stations de surveillance de Copper Cliff, Falconbridge et Sudbury (centre, en particulier dans l'ouest)). Le nickel inhalé est considéré comme étant carcinogénique, mais les données sont insuffisantes dans le cas du nickel absorbé par ingestion ou par la peau. Le nickel est également un sensibilisateur et un pourcentage significatif de la population réagit au nickel, mais aucune évaluation des effets de la pollution par le nickel n'a été faite.

Les niveaux de nickel absorbé par inhalation dépassaient les points de référence des normes réglementaires à la fois pour les résultats indiquant une cause de cancer ou autre problème de santé. Les évaluateurs ne prennent pas en compte l'exposition excessive et considèrent leur nocivité peu probable du fait de la marge de sécurité incluse dans l'évaluation.

**Arsenic** : l'absorption d'arsenic, tant par ingestion que par la peau, dépassait les limites d'exposition ne causant pas le cancer dans tous les lieux étudiés, excepté Sudbury (centre). Falconbridge avait des niveaux particulièrement élevés d'arsenic dans le sol, la concentration moyenne résidentielle étant 18 fois plus élevée que celle de Hanmer.

Les risques de cancer par inhalation d'arsenic dans toutes les localités étudiées étaient plus élevés que le risque, accepté dans les réglements, de 1 sur 1 million. Les risques de cancer variaient de 1,3 sur 10 000 à Coniston à 2,5 sur 10 000 à Falconbridge, de 4 à 5 fois plus élevés que le chiffre typique calculé pour l'Ontario de 5,5 sur 100 000. Le risque de maladie autre que le cancer, par inhalation d'arsenic, n'est pas clairement établi et n'a pas été calculé du fait qu'il n'y a pas de normes réglementaires.

Le risque provenant d'exposition à l'arsenic a été considéré comme peu important à cause de l'étude supplémentaire sur l'arsenic à Falconbridge, où l'on a trouvé des résultats d'arsenic dans l'urine comparables à ceux des habitants de Hanmer. La majorité de l'arsenic provient des produits alimentaires dans le commerce, bien qu'il y ait peut-être différents types d'arsenic. Des risques accrus causés par inhalation de l'arsenic ne sont peut-être pas représentés par les niveaux dans l'urine si l'arsenic, comme le nickel, se fixe dans les tissus du système respiratoire.

**Conclusions des évaluateurs**

Un certain nombre de conclusions n'est pas considéré par les évaluateurs à cause de la marge de sécurité incluse dans l'évaluation. Néanmoins de nombreuses lacunes et décisions font baisser la marge de sécurité, par conséquent l'évaluation découvre moins de problèmes, par exemple :

1. Exclusion des valeurs aberrantes dans les mesures du sol. Pour les concentrations de métaux dans le sol dans diverses localités, les évaluateurs ont décidé d'exclure les résultats les plus élevés selon la pratique statistique courante, afin d'exclure des calculs les résultats erronés ou non représentatifs de l'étendue normale des concentrations. Mais cela exclut également les lieux les plus contaminés, où les risques sont les plus élevés.

2. Pour déterminer l'importance de l'exploitation minière et des opérations de fonderie sur les niveaux de métaux contenus dans les sols de la région, les évaluateurs ont soustrait les concentrations normales de base, autrement dit les concentrations qui existeraient s'il n'y avait pas de pollution supplémentaire. Les concentrations de base n'étaient pas des moyennes, mais bien le 98$^{e}$ percentile, ou presque le maximum, ce qui permet de minimiser la contribution de l'industrie locale.

3. Le Ministère de l'environnement de l'Ontario a recommandé aux consultants d'utiliser les normes existantes des organismes de réglementation comme Santé Canada et l'Agence de protection de l'environnement, même si elles sont vétustes. Il n'a pas été permis d'utiliser des données plus récentes qui pourraient signaler un risque plus élevé. Par contre, on ne pouvait pas non plus

utiliser de nouvelles données qui auraient pu augmenter le degré de confiance dans la sécurité. Dans le pire des cas, la norme utilisée pour le plomb a été établie en 1996, alors que les études récentes indiquent clairement un niveau plus strict de sécurité.[6]

4 Le plomb est considéré comme « carcinogène probable » par l'Environment Protection Agency des Etats-Unis, et le Centre international de recherche sur le cancer. Il reste cependant un manque de connaissance du métabolisme du plomb et de son caractère carcinogène. C'est pourquoi les évaluateurs ont décidé de ne pas inclure dans l'évaluation le plomb en tant que « carcinogène à la suite d'exposition par ingestion ou par inhalation ».

5. Les évaluateurs insistent sur l'absence de recherche sur les interactions entre métaux et avec d'autres agents pollueurs, mais ils concluent que les interactions synergistiques (interactions qui en multiplient les effets au lieu de simplement s'y ajouter) se trouvent rarement aux niveaux étudiés d'exposition. Ils excluent donc de l'évaluation le potentiel d'expositions multiples à divers métaux, ce qui a le potentiel de minimiser sérieusement l'évaluation des risques d'expositions multiples à différents métaux si les interactions synergistiques supplémentaires ne sont pas prises en considération. Le plomb et l'arsenic en conjonction par exemple, peuvent avoir un rôle plus complexe lorsque ces métaux affectent le système nerveux.

6. L'évaluation adopte une méthode au cas par cas pour la voie d'exposition à chacun des métaux. Autrement dit, le nickel par inhalation est comparé aux normes du nickel par inhalation; le nickel par ingestion est comparé aux normes du nickel par ingestion. Chacune de ces normes est établie sans tenir compte de l'exposition supplémentaire provenant d'autres voies. Les évaluateurs ne considèrent pas l'exposition dans sa totalité, provenant de toutes les voies susceptibles de causer des risques, ce qui mène à la sous-estimation des risques.

**Autres commentaires**

Les évaluateurs se contredisent lorsqu'ils établissent 400 microgrammes de plomb par gramme de sol comme étant un niveau acceptable pour la région du Grand Sudbury.
Il est expliqué dans l'évaluation que même 5 microgrammes de plomb par décalitre de sang chez les enfants n'est pas reconnu comme étant sans danger; de nouvelles études montrent que des niveaux moins élevés peuvent endommager le développement. Par exemple, une étude récente publiée dans *Environmental Health Perspectives* indique que chez les enfants ayant un niveau de plomb dans le sang ne dépassant pas 2 microgrammes par décalitre, il y a quatre fois plus de chances de déficience de l'attention et d'hyperactivité.[7]

[6] *L'absorption de plomb recommandée par le Ministère de l'environnement de l'Ontario se base sur cette norme désuète pour le plomb. Selon l'évaluation, l'Environment Protection Agency des Etats-Unis est d'avis que les effets du plomb peuvent se produire à des niveaux tellement bas qu'il n'y a vraisemblablement pas de seuil.*

[7] *Braun JM, Kahn RS, Froelich T et al, Exposures to environmental toxicants and attention deficit hyperactivity disorder in US children*. Environmental Health Perspectives *2006:114:1904-9*

Les évaluateurs présentent aussi la preuve qu'un niveau dans le sol aussi peu important que 75 microgrammes par gramme de sol peut causer chez 5% des enfants un niveau de 5 microgrammes par décalitre de sang. Cependant leurs recommandations de niveaux dans le sol se basent sur les normes internationales existantes qui ne correspondent pas à ce que nous savons maintenant au sujet du plomb. Selon leur propre évidence, le niveau recommandé par eux de 400 microgrammes par gramme exposerait plus de 5% des enfants de la région du Grand Sudbury à des niveaux de plomb potentiellement nocifs.

La source d'eau potable fournie à Falconbridge par un ancien puits a été remplacée par un nouveau puits plus profond au cours de l'été 2005. Les niveaux de plomb de l'eau du nouveau puits « ont beaucoup diminué » et ce sont les données utilisées dans l'évaluation, même si peu de tests ont été effectués jusqu'à présent. Néanmoins, la population de Falconbridge a sans doute un niveau de plomb dans le système osseux, provenant du niveau de plomb dans l'eau de l'ancien puits. A un âge où l'ossature est fragile, ce niveau de plomb peut affecter la santé, par exemple en augmentant la pression sanguine (grossesse, ménopause, vieillissement). L'évaluation de l'exposition aux niveaux actuels et futurs de plomb doit également prendre en considération l'impact de l'exposition passée.

Aux Etats-Unis, à l'Agency for Toxic Substances and Disease Registry, on estime que de 10% à 15% de la population américaine est devenue sensible au nickel (réactions cutanées). Vraisemblablement au Canada les niveaux ne sont pas très différents. Les évaluateurs n'ont pas été capables de fixer un seuil de sensibilisation au nickel. Ils laissent tout simplement de côté le risque de sensibilisation au nickel résultant de la pollution comme raison valable pour limiter la pollution par le nickel.

Selon des comparaisons faites dans une étude du régime alimentaire des Canadiens, la plupart des produits agricoles de la région du Grand Sudbury avaient un contenu en plomb, arsenic et surtout en nickel, parfois de dix fois plus élevé que les niveaux canadiens typiques. Ceci n'a pas été indiqué comme facteur important de risque, du fait que la nourriture consommée à Sudbury vient surtout d'autre part. Mais ce risque pourrait augmenter de façon dramatique pour les personnes qui produisent et consomment une partie importante de leur nourriture.

Au minimum, les recommandations basées sur l'évaluation pourraient alerter la population sur les hauts niveaux de contamination des légumes cultivés localement, faire connaître les risques potentiels des légumes cultivés dans les jardins, et permettre de minimiser cette exposition. L'interdiction de cultiver des légumes dans la région pourrait être envisagée, étant donné leur niveau de contamination. Comme il n'existe pas de niveau de plomb qui ne soit pas nocif pour les enfants, les nourrir avec des légumes contenant plus de dix fois le niveau normal de plomb n'est pas un choix raisonnable en matière de santé.

Comme pour la plupart des évaluations de risque à la santé humaine au Canada, l'exposition des travailleurs et travailleuses a été exclue en tant que source de risque. Il n'y a dans l'évaluation aucune tentative pour déterminer les risques d'exposition à l'environnement des travailleurs qui, en plus, sont exposés dans leur travail. Ces expositions combinées les rendent plus vulnérables et une protection accrue est donc nécessaire. Cependant on lit dans l'évaluation que « des niveaux de risque 'acceptable' sont tolérés pour les employés sur le lieu de travail, niveaux qui diffèrent de ceux du reste de la

population de Sudbury ».[8] Autrement dit, on considère acceptable pour les personnes travaillant dans la région du Grand Sudbury d'encourir des risques accrus de maladie causée par l'exposition aux métaux.

Les conclusions tirées  par les consultants dépassent la démarche scientifique pour devenir des opinions subjectives sur la question de savoir si les risques sont suffisamment bas. Dans les documents, on indique que « la sélection d'un niveau acceptable de risque est essentiellement une décision basée sur la règlementation plutôt que sur la science » et « un autre niveau acceptable de risque peut être utile ». [9]

Néanmoins on lit dans les pages suivantes : « Lorsque les risques estimés … sont plus bas que le niveau acceptable, on peut en conclure qu'aucun effet observable nuisible à la santé ne pourrait se produire, y compris sur les sous-groupes ou populations sensibles ».[10] Ceci est inexact :  risque peu élevé ne signifie ni absence de risque, ni que personne n'est affecté, ce qui est particulièrement vrai quand il s'agit de carcinogènes n'ayant aucun seuil de sécurité. De plus, il s'agit d'« estimation des risques ». Il n'est donc pas assuré qu'il n'y a pas d'effets sur la santé, rien que des probabilités. Les conclusions des évaluateurs dépassent le cadre d'une évaluation des risques, car ils décident pour la collectivité le niveau acceptable de risque, lorsque cette décision doit être prise par la collectivité. Ils se proposent d'assurer à la population qu'aucune conséquence nocive n'est présente, ce qu'une évalation de risque ne peut pas accomplir.

[8] *page 6-12*
[9] *page 4-116*
[10] *page 4-119*

## Response:

**Key Point #1**

The weight-of-evidence approach for lead incorporated the most recent scientific and regulatory information to establish a Sudbury-specific soil risk management level. As part of the assessment, the most sensitive toxicological endpoint was selected for evaluation (*i.e.*, neurological impacts in children). As noted in the HHRA report, while they have classified lead compounds as a probable human carcinogen, the U.S. EPA has determined that an estimate of carcinogenic risk (such as through the use of a slope factor) would not adequately describe the potential risk for lead compounds. This information was considered as part of the weight-of-evidence evaluation in the current assessment.

**Key Point #2**

The SARA Group did not dismiss all airborne nickel risks saying the assessment had a margin of safety. As noted on page 5-35 of the HHRA report, "while the predicted risks at the Copper Cliff and Sudbury Centre West stations are of potential concern, it is the opinion of the SARA Group that the potential risks around the Falconbridge monitoring station are marginal given the degree of safety built into the assessment." This section concludes by stating, "the above weight-of-evidence evaluation indicates the calculated risk to airborne nickel exceeds regulatory benchmarks for both cancer and non-cancer health effects in the community of Copper Cliff and western end of Sudbury Centre. This information, as well as other elements of the weight-of-evidence evaluation, can be used as a basis to make informed risk management decisions on addressing potential health risks related to airborne nickel in the GSA." Based on these recommendations, Vale Inco has undertaken a number of significant actions intended to reduce fugitive dust emissions from the Copper Cliff facility.

**Key Point #3**

As noted in Figure 5-7 of the HHRA report, the primary differences in exposures to arsenic between Hanmer and Falconbridge were higher exposures *via* drinking water and soil/dust consumption (purchased supermarket foods would be consistent between the communities). However, despite these higher exposures in Falconbridge, analysis of the urinary arsenic of Falconbridge residents showed similar levels to that observed in Hanmer. This indicates that while exposure may be theoretically higher in Falconbridge (due to higher soil and drinking water concentrations), arsenic from these sources are not being absorbed into the body. In fact, urinary arsenic concentrations in the residents of Falconbridge (and Hanmer) are similar to those observed in other studies of "unimpacted" communities (*i.e.*, no mining) in North America. This information is outlined in detail in Chapter 3.9 and Appendix N of the HHRA report.

**Key Point #4**

While some foods grown in the Greater Sudbury Area had higher levels of certain COCs, others had lower. The results also demonstrated that metal levels in commercially grown produce by local farmers tended to be lower than in produce grown in residential gardens. This can be related to the fact that

commercial operations were generally further distant from the city with lower soil metal levels. While the higher concentrations of COC (compared to those found in typical Canadian produce) are a concern, these concentrations were considered as part of the human health risk assessment. The results of the assessment indicated that there were no unacceptable risks arising from these foods, and that it is safe to eat any fruits and vegetables grown in Sudbury.

**Key Point #5**

The assessment does not assume that it is acceptable to expose workers to greater levels of risk. Based on agreement of the Technical Committee, the implications of occupational exposures were deemed beyond the scope of the current study. Worker and occupational exposure are covered within the companies by the Joint Occupational Health Committees. Any current worker has medical services available that includes biological monitoring for nickel, lead and arsenic if they wish to assess on-site exposure. The Technical Committee and study authors remain confident that the Sudbury HHRA set new standards within Sudbury by examining, for the first time, exposure of residents to several metals that are referred to as the Chemicals of Concern (COC) namely arsenic, cobalt, copper, nickel, lead and selenium.

**Key Point #6**

While a risk assessment estimates the level of risk, the thresholds for acceptable risk have been established by regulatory agencies such as the Ontario Ministry of the Environment, Health Canada, and the U.S. Environmental Protection Agency. These were not established by the SARA Group or the Technical Committee. The results of the HHRA are provided to the risk managers to assist in their decision making process.

**Assessment Choices**

1. Only one lead sample (outlier) was removed from the calculation of the 95% UCLM (Upper Confidence Limit on the Mean) for lead in Falconbridge. It was a duplicate sample that was well outside the range of the original sample, as well as all other collected in the surrounding area. It should be noted that the inclusion of this outlying data point would not have significantly changed the 95% UCLM (as it was only one sample among many). Furthermore, a Soil Risk Management Level (SRML) was recommended for lead, and this value was not calculated based upon the soil concentrations included in the data set for any of the COI (*i.e.*, it was based on a weight-of-evidence approach). As such, removal of this one outlier from the Falconbridge data set did not influence the prediction of potential risk in maximal soil exposure conditions in the GSA, or the establishment of the SRML to be used by the risk managers to establish next steps for the Sudbury Soils Study.

2. No, the SARA Group did **not** subtract the expected background concentrations from the measured Sudbury-specific concentrations. Evaluations of risks arising from background exposures were only used in the assessment for comparative benchmark purposes. In no way were they used to try to isolate concentrations of the COCs arising specifically from company operations. This was not the objective of this community-based risk assessment.

3. No, the MOE did not require use of specific standards in the assessment. The SARA Group evaluated all available standards and selected the most appropriate for the purposes of the assessment. While members of the Technical Committee, such as the MOE, provided their recommendations on various approaches and assumptions used in the assessment, ultimately the SARA Group made selections. In the case of the lead Toxicity Reference Value (TRV) selected for the assessment, the MOE recommended TRV is actually the most protective TRV available (*i.e.*, the US EPA and Health Canada TRVs are less conservative).

4. A detailed discussion of the potential carcinogenicity of lead is provided in the detailed toxicological profile (see Appendix A4 of the HHRA report). The possibility that lead could have carcinogenic health implications was considered in the assessment. However, the risk of exposure to lead causing development health effects in children is a much more sensitive (i.e., occurs at lower concentrations) than the possibility of causing cancer. As a result, protection of sensitive children was selected as the appropriate endpoint to prioritize for the assessment, rather than the less sensitive carcinogenic endpoint.

5. As noted in Section 6.4 of the HHRA report, the TRVs selected for use in the current assessment are based upon the most sensitive endpoints for each COC. There is no evidence in the scientific literature of additive (or synergistic) effects related to any of these endpoints. However, as noted in this section (as well as the uncertainty discussion in Chapter 7), the scientific literature of metal-to-metal interactions is quite limited and inadequate for quantitative or even qualitative incorporation into the HHRA.

6. The risk assessment fully considered the potential cumulative exposure over a lifetime, as well as from all relevant exposure pathways (i.e., air, home garden food, water, soil, indoor dust, sediment, supermarket foods, wild berries, fish, wild game, etc.). Where exposures from the various pathways resulted in similar toxicological impacts, these risks were added together. For example, risks related to all exposures to lead (*i.e.*, inhalation, oral and dermal) were added together to predict the total risk to this COC. This is the standard and appropriate approach used in all human health risk assessments of this type.

**Other Comments**

- Results of the IEUBK modeling was considered as part of the weight-of-evidence approach. The IEUBK model is conservative, and is not intended by the U.S. EPA to be applied on a community-wide risk assessment. As such, it would be inappropriate to base the establishment of the SRML entirely on the results of the IEUBK modeling.

- The assessment was designed to evaluate current “present-day” exposures to the COCs within the GSA. It was not intended to be a historical evaluation of risk. Regardless, exposure to lead in drinking water within Falconbridge only represented approximately 3% of the total estimated daily intake of lead for that COI. If one assumed the residents continued to be exposed to those concentrations measured in the old well, the predicted HQ for the preschool child would change from 0.91 to 0.96, based on the 95% UCLM. This would not be a significant change, nor would it affect the ultimate SRML selected through the weight-of-evidence approach.

- The risk of sensitivity to nickel was not ignored in the HHRA. The potential for nickel dermatitis was evaluated as part of the HHRA. Please refer to Section 6.6 for further details. As noted in the report, there are no acceptable published thresholds for nickel dermatitis, and this uncertainty is noted within the risk assessment.

- The results of the HHRA clearly indicate that exposure to existing concentrations of the COCs in Sudbury produce does not result in adverse health risks to Sudbury residents. Given the well known benefits to consuming local fruits and vegetables, it is irresponsible to recommend a ban on growing local vegetables. Risk management recommendations, including the washing and peeling of fruits and vegetables, to reduce overall exposures to the COCs have been made by both the Sudbury & District Health Unit and the Ministry of the Environment to reduce overall exposures to COCs. This advice is consistent with that given by other many jurisdictions.

- It was not "considered acceptable for workers in the GSA to have increased risks of illness from metal exposures". As noted clearly in Chapter 1 of the HHRA, risks related to occupational exposures were considered beyond the scope of the current study.

- Regulatory agencies, such as the Ontario Ministry of the Environment, Health Canada, and the U.S. EPA, have established protocols and thresholds to denote levels of acceptable risk. The SARA Group has not decided the acceptable level of risk for the community. Rather the SARA Group used acceptable risk benchmarks established by the MOE in their guidance documents to quantify the potential risk to Sudbury residents. This information, as well as all of the other data collected by the SARA Group, is then used by the risk managers to evaluate what next steps may be necessary in the Sudbury Soils Study.

## Réponse :

**Point essentiel n$^{o}$ 1**

Pour ce qui concerne le plomb, l'approche du poids de la preuve (ou de la valeur probante de la preuve) a intégré les renseignements scientifiques et réglementaires les plus récents de manière à établir la concentration de plomb spécifique aux sols de Sudbury, pour les besoins de la gestion du risque. L'évaluation a retenu comme critère de jugement toxicologique le critère le plus sensible (soit celui des effets neurologiques chez l'enfant). Comme on peut le lire dans le rapport de l'ERSH, bien que l'Agence de la protection de l'environnement des États-Unis (EPA) ait classé les composés à base de plomb parmi les substances probablement cancérogènes pour l'être humain, cette agence a déterminé qu'une estimation du risque cancérogène (par exemple, celle qui est obtenue avec le facteur de pente) ne rendrait pas fidèlement compte du risque potentiel présenté par ce genre de composés. Cette information a été prise en considération dans la méthode du poids de la preuve utilisée dans l'évaluation actuelle.

**Point essentiel n$^{o}$ 2**

Le groupe SARA n'a pas fait l'impasse sur tous les risques pouvant être liés au nickel atmosphérique lorsqu'il dit que l'évaluation comportait une marge de sécurité. Comme on peut le lire à la page 5-35 du rapport de l'ERSH, « [Traduction libre]... bien que les prévisions de risques aux stations de Copper Cliff et de l'ouest de Sudbury-Centre puissent susciter des préoccupations, le groupe SARA estime que les risques potentiels aux abords de la station de surveillance de Falconbridge sont marginaux étant donné le degré de sécurité inclus dans l'évaluation. » Cette même section du rapport se termine ainsi : « [traduction libre]... l'évaluation effectuée selon l'approche du poids de la preuve ci-dessus indique que, en ce qui concerne la présence de nickel atmosphérique, le risque calculé dépasse les valeurs-repères inscrites dans les règlements, tant pour les effets cancérogènes que pour les autres effets sur la santé dans la communauté de Copper Cliff et dans la zone ouest de Sudbury-Centre. Cette information, ainsi que d'autres éléments de l'évaluation du poids de la preuve, peut servir de base à une prise de décision éclairée pour la gestion du risque d'effets sanitaires pouvant découler de la présence du nickel dans l'air à Sudbury et dans les environs. Sur la base de ces recommandations, la société Vale Inco a mis en chantier un certain nombre de mesures importantes visant à réduire les quantités de poussières fugitives produites à l'usine de Copper Cliff.

**Point essentiel n$^{o}$ 3**

Comme on peut le voir sur la figure 5-7 du rapport ERSH, les principales différences entre Hanmer et Falconbridge, en ce qui a trait à l'arsenic, concernaient les niveaux d'exposition plus élevés qui sont imputables à l'eau potable et à l'ingestion de terre/poussière (les aliments achetés dans les supermarchés sont comparables entre les deux communautés). Toutefois, bien que les expositions soient plus élevées à Falconbridge, les taux d'arsenic dans l'urine des habitants de Falconbridge étaient semblables à ceux des habitants de Hanmer. On peut donc déduire que, malgré une exposition théoriquement plus élevée à Falconbridge (en raison de la plus forte concentration dans le sol et dans l'eau potable), l'arsenic de ces sources n'est pas absorbé par le corps humain. D'ailleurs, les concentrations de l'arsenic dans les urines des habitants de Falconbridge (et de Hanmer) sont semblables à celles observées dans d'autres études portant sur des communautés « non touchées »

(sans exploitation minière) en Amérique du Nord. Cette information est présentée en détail dans le chapitre 3.9 et l'annexe N du rapport de l'ERSH.

**Point essentiel n$^{o}$ 4**

Alors que certaines denrées alimentaires cultivées dans les environs de Sudbury affichaient des taux plus élevés de certaines substances chimiques préoccupantes (SCP), d'autres affichaient des taux moins élevés. L'étude a également montré que les fruits et légumes cultivés par les entreprises maraîchères locales contenaient en général moins de métaux que les fruits et légumes cultivés dans les jardins familiaux. Cette différence s'explique sans doute par le fait que les entreprises maraîchères se trouvent généralement plus loin de la ville, à des endroits où le sol contient moins de métaux. Bien que les taux plus élevés de SCP (comparativement à ceux relevés dans les fruits et légumes cultivés ailleurs au Canada) soient préoccupants, ils ont été pris en compte dans l'évaluation du risque pour la santé humaine. Les résultats de l'évaluation montrent qu'il n'y avait pas de risques inacceptables découlant de ces aliments et que la consommation de fruits et de légumes cultivés à Sudbury ne présente pas de risque.

**Point essentiel n$^{o}$ 5**

L'évaluation ne donne pas à entendre qu'il est acceptable que les travailleurs soient exposés à des niveaux de risque plus élevés. Selon le consensus qui s'est dégagé au sein du comité technique, il a été considéré que la question des expositions professionnelles sortait du cadre de la présente étude. L'exposition des travailleurs et des employés est une question qui est prise en charge par les sociétés minières par les soins de leurs comités mixtes de la santé au travail. Chaque travailleur présentement en activité peut se prévaloir de services médicaux qui incluent des dosages biologiques de ses taux de nickel, de plomb et d'arsenic, s'il désire obtenir cette évaluation sur le lieu de l'exposition. Le comité technique et les auteurs du rapport demeurent convaincus que l'ERSH de Sudbury a permis d'établir de nouvelles normes à Sudbury en examinant pour la première fois l'exposition des habitants à plusieurs métaux qui sont désignés substances chimiques préoccupantes (SCP), en l'occurrence l'arsenic, le cobalt, le cuivre, le nickel, le plomb et le sélénium.

**Point essentiel n$^{o}$ 6**

Une évaluation des risques a pour objet d'estimer le niveau de risque, mais ce sont les organismes à vocation réglementaire comme le ministère de l'Environnement de l'Ontario, Santé Canada et l'agence de protection de l'environnement (EPA) des États-Unis, qui ont établi les seuils de risque acceptable. Ces seuils de risque n'ont pas été établis par le groupe SARA ni par le comité technique. Les résultats de l'ERSH sont transmis aux responsables de la gestion du risque pour les aider dans leur processus de prise de décisions.

**Les choix opérés dans le cadre de l'évaluation**

1. Seulement un des échantillons analysés pour le plomb (résultat aberrant) a été soustrait du calcul de la borne supérieure de l'intervalle de confiance (*upper confidence limit on the mean (UCLM))* à 95 %, pour ce qui concerne le plomb à Falconbridge. Il s'agissait d'un résultat en double qui s'écartait de beaucoup de la fourchette normale de l'échantillon originel, comme de tous les autres échantillons qui avaient été prélevés dans la zone environnante. Il convient de préciser

que l'inclusion de cette valeur aberrante n'aurait pas entraîné de modification sensible de l'UCLM à 95 % (car il ne s'agissait que d'un échantillon parmi de nombreux autres). Qui plus est, un taux-seuil de plomb dans le sol a été recommandé pour la gestion du risque (TSPS-GR); ce taux n'a pas été calculé d'après les concentrations de plomb dans le sol incluses dans les jeux de données relatifs à aucune des SCP (il a été produit par l'approche du poids de la preuve). De ce fait, l'élimination de cet unique résultat aberrant du jeu de données sur Falconbridge n'a pas eu d'influence sur la prédiction du risque potentiel dans les conditions maximales d'exposition au plomb présent dans les sols de la région de Sudbury, ni sur l'établissement du TSPS-GR qui doit être utilisé par les gestionnaires du risque pour déterminer les prochaines étapes de l'étude sur l'état des sols de Sudbury.

2. Non, le groupe SARA **n'**a **pas** soustrait les concentrations de fond, ou concentrations qui existeraient normalement, des concentrations mesurées qui sont spécifiques à Sudbury. Les évaluations des risques découlant des expositions naturelles ont été utilisées seulement dans l'évaluation dans le but d'établir les valeurs-repères comparatives. Celles-ci n'ont d'aucune façon été utilisées pour tenter d'isoler des concentrations de SCP rattachées spécifiquement aux activités des sociétés minières. Ce n'était pas là l'objectif de cette évaluation objective basée sur l'ensemble de la communauté.

3. Non, le MEO n'a pas exigé l'emploi de normes particulières dans l'évaluation. Le groupe SARA a évalué toutes les normes disponibles et sélectionné celles qui convenaient le mieux aux objectifs de l'évaluation. Même si des membres du comité technique, comme le MEO, ont fait leurs recommandations sur diverses approches et hypothèses utilisées dans l'évaluation, c'est en dernier ressort le groupe SARA qui a fait les choix. Dans le cas de la valeur toxique de référence (VTR) qui a été choisie pour le plomb, le MEO a recommandé une VTR qui est de fait la VTR la plus protectrice de la santé qui soit disponible (les VTR retenues par l'EPA des États-Unis et par Santé Canada sont moins sévères).

4. Une discussion détaillée de la carcinogénicité potentielle du plomb est fournie dans le profil toxicologique détaillé (voir l'annexe A4 du rapport de l'ERSH). La possibilité que le plomb ait un effet cancérogène a été prise en compte dans l'évaluation. Toutefois, le risque qu'une exposition au plomb entraîne des conséquences sur le développement de l'enfant est un critère de jugement beaucoup plus sensible (ce risque apparaît à des concentrations plus faibles) que la possibilité de causer le cancer. En conséquence, c'est la protection des enfants sensibles qui a été retenue comme critère de jugement prioritaire dans l'évaluation, et non le risque cancérogène, lequel est moins sensible.

5. Comme il est indiqué à la section 6.4 du rapport de l'ERSH, les valeurs toxiques de référence (VTR) qui ont été retenues pour la présente évaluation sont basées sur les critères de jugement les plus sensibles relatifs à chaque SCP. La documentation scientifique ne livre aucune donnée permettant de démontrer des effets additifs (ou synergiques) reliés à l'un ou l'autre de ces critères de jugement. Comme il est indiqué dans la section 6.4 (ainsi que dans la discussion concernant l'incertitude au chapitre 7), la documentation scientifique sur les interactions entre les métaux est très restreinte et inadéquate pour être intégrée de façon qualitative ou quantitative dans l'ERSH.

6. L'évaluation du risque a pris pleinement en compte l'exposition cumulative potentielle sur toute une vie, ainsi que l'exposition provenant de toutes les voies d'exposition pertinentes (l'air, les aliments cultivés dans les jardins familiaux, l'eau, la poussière intérieure, les sédiments, les aliments vendus dans les supermarchés, les petits fruits sauvages, le gibier, etc.). Lorsque les expositions par ces différentes voies entraînent des effets toxicologiques similaires, ces risques ont été additionnés. Par exemple, les risques reliés à toutes les expositions au plomb (par voies respiratoire, orale et cutanée) ont été additionnés pour prédire le risque total d'exposition au plomb. C'est l'approche standard appropriée qui est utilisée dans toutes les évaluations du risque pour la santé humaine de ce type.

**Autres remarques**

- Les résultats de la modélisation par l'IEUBK ont été pris en compte dans l'approche du poids de la preuve. Le modèle IEUBK est conservateur; il n'a pas été conçu par l'EPA des États-Unis pour être appliqué dans une évaluation portant sur toute une communauté. De ce fait, il serait inapproprié d'établir un taux-seuil pour la gestion du risque entièrement fondé sur les résultats de la modélisation IEUBK.

- L'évaluation avait pour objet d'évaluer les expositions aux substances chimiques préoccupantes (SCP) dans le Grand Sudbury « en l'état actuel des choses ». Elle n'entendait pas être une évaluation historique du risque. Quoi qu'il en soit, l'exposition au plomb par l'intermédiaire de l'eau potable à Falconbridge ne représentait approximativement que 3 p. 100 de la quantité totale estimative de plomb ingérée quotidiennement. Dans l'hypothèse où les habitants continueraient à être exposés aux concentrations de plomb mesurées dans l'ancien puits, le quotient de danger (QD) prédit pour les enfants d'âge pré-scolaire passerait de 0,91 à 0,96, sur la base d'une UCLM à 95 p. 100. Ce changement ne serait pas important; il ne modifierait pas le TSSGR-plomb ultime qui a sélectionné au moyen de l'approche du poids de la preuve.

- Le risque de sensibilisation au nickel n'a pas été ignoré dans l'ERSH. Le risque de dermite due au nickel a été pris en compte dans l'ERSH. Vous voudrez bien trouver plus de détails à ce sujet dans la section 6.6 du rapport. Comme on peut le lire dans le rapport, il n'existe pas de seuil de risque acceptable en ce qui concerne la dermite due au nickel, et ce facteur d'incertitude est dûment signalé dans l'évaluation du risque.

- Les résultats de l'ERSH indiquent clairement que l'exposition aux concentrations de SCP existantes dans les fruits et légumes produits à Sudbury ne se traduit pas par un risque d'effets néfastes sur la santé des habitants de Sudbury. Sachant qu'il est bon pour la santé de consommer des fruits et des légumes locaux, recommander l'interdiction de cultiver des légumes dans les jardins de la ville et des environs ne serait pas une mesure responsable. Des recommandations, comme le lavage et l'épluchage des fruits et des légumes, font partie des recommandations émises tant par le Service de santé de Sudbury et du district que par le ministère de l'Environnement pour réduire l'exposition globale aux SCP. Ces conseils sont semblables à ceux qui sont donnés par les autorités sanitaires de nombreuses autres régions.

- Le rapport ne dit pas que l'on « considère acceptable que les travailleurs de Sudbury et de la région encourent des risques plus élevés de maladies à cause de leur exposition aux métaux ». Comme il est écrit dans le chapitre 1 de l'ERSH, il avait été décidé que les risques liés aux expositions en milieu de travail ne rentraient pas dans le cadre de l'étude actuelle.

- Les organismes à vocation réglementaire, comme le ministère de l'Environnement de l'Ontario (MEO), Santé Canada et l'EPA des États-Unis, ont établi des protocoles et des seuils pour désigner les niveaux de risque acceptable. Le groupe SARA n'a pas décidé du niveau de risque acceptable pour la communauté. Il s'est borné à utiliser les niveaux de risque acceptable que le MEO a établis en tant que valeurs-repères dans ses documents d'orientation, pour quantifier le risque potentiel pour les habitants de Sudbury. Ces renseignements, ainsi que les autres données recueillies par le groupe SARA, sont ensuite utilisés par les responsables de la gestion du risque pour évaluer les prochaines étapes qui pourraient être nécessaires dans l'Étude des sols sudburois.