

**A WORKSHOP TO EXPLORE PERSPECTIVES ON RISK ASSESSEMENT
FOR ORPHANED AND ABANDONED MINES**

Final Report



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Executive Summary

This report captures the proceedings of the National Orphaned/Abandoned Mines Initiative (NOAMI) workshop on different perspectives related to the risk assessment process at orphaned and abandoned mines, held on November 13th and 14th in Vancouver, BC. Approximately 100 participants attended the workshop from Aboriginal groups, non-governmental and academic organizations, the mining industry, private consultancies, and federal, provincial and territorial governments.

The objective of the workshop was to explore and understand the different perspectives related to the risk assessment process at orphaned and abandoned mines. The workshop format consisted of presentations and plenary discussions clustered around the themes of Human Health Risk Assessment, Ecological Risk Assessment, and Geotechnical/Safety Risk Assessment. Three case studies helped explore both the positive and negative aspects of risk assessment at contaminated sites.

Central themes that emerged throughout the workshop included:

- Trust and transparency in the risk assessment process
- Concern about the impartiality of risk assessors
- The value of spending more time planning and scoping risk assessments
- The value of involving those who will be potentially impacted in the process to address the “power differential”
- Seeing risk assessment as a tool or step in an overall risk management process or decision
- Communication - challenges and recommendations including the use of translators in aboriginal communities
- Community engagement throughout the risk assessment process particularly in sampling and monitoring
- The use of generic versus site specific standards and guidelines
- The value and challenges in using and communicating the bioavailability/bioaccessibility in risk assessment
- The need to listen to different perspectives

Résumé

Ce rapport constitue les actes de l'atelier tenu par l'Initiative nationale pour les mines orphelines ou abandonnées (INMOA) les 13 et 14 novembre, à Vancouver, en Colombie-Britannique, pour examiner les diverses perspectives liées au processus d'évaluation du risque aux mines orphelines et abandonnées. Une centaine de personnes ont participé à l'atelier. Ces personnes représentaient des groupes autochtones, des organismes non gouvernementaux et académiques, l'industrie minière, des firmes d'experts-conseils, le gouvernement fédéral et des gouvernements provinciaux et territoriaux.

L'atelier avait pour but d'examiner et de comprendre les diverses perspectives liées au processus d'évaluation du risque aux mines orphelines et abandonnées. L'atelier a consisté en des présentations et en des discussions en séance plénière inspirées des thèmes suivants : l'évaluation du risque pour la santé humaine, l'évaluation du risque écologique, et l'évaluation du risque pour la sécurité du à des considérations géotechniques. Trois études de cas ont aidé les participants à étudier les aspects positifs et négatifs de l'évaluation du risque à des sites contaminés.

Des thèmes centraux se sont imposés tout au long de l'atelier, notamment :

- la confiance et la transparence dans le processus d'évaluation du risque;
- l'inquiétude au sujet de l'impartialité des responsables de l'évaluation du risque;
- la valeur de consacrer plus de temps à la planification des évaluations du risque et à la détermination de leur portée;
- la valeur de faire appel aux personnes qui seront éventuellement touchées dans le processus pour traiter la question de « l'écart de pouvoir »;
- le fait que l'évaluation du risque est un outil ou une étape dans un processus ou une décision visant à gérer le risque dans son ensemble;
- les défis en matière de communication et des recommandations dans ce domaine, dont le recours à des traducteurs dans les communautés autochtones;
- l'engagement des collectivités à toutes les étapes du processus d'évaluation du risque, particulièrement à celles de l'échantillonnage et du suivi;
- l'utilisation de normes et de lignes directrices qui soient générales versus particulières à des sites;
- la valeur et les défis de l'utilisation et de la communication de la biodisponibilité/bioaccessibilité dans le cadre d'une évaluation du risque;
- la nécessité d'écouter les différents points de vue.

Introduction

About this Report

This report captures the proceedings of the National Orphaned/ Abandoned Mines Initiative (NOAMI) workshop on the different perspectives related to risk assessment at orphaned and abandoned mines, held on November 13th and 14th, 2008 in Vancouver, BC. The report includes summaries of workshop presentations and plenary discussions. This report is posted on the NOAMI website (www.abandoned-mines.org) and a CD-ROM containing this report, the full presentations, and relevant papers and information has also been published.

About NOAMI

Created in 2001 based on recommendations put forth at a multi-stakeholder workshop on abandoned mines, NOAMI is administered by an Advisory Committee that takes direction from Mines Ministers and reports back to them via the Intergovernmental Working Group on the Mineral Industry (IGWG). The NOAMI Advisory Committee's role is to assess key issues regarding orphaned and abandoned mines in Canada and put forward recommendations to Mines Ministers. NOAMI is guided by a work-plan that was endorsed by Mines Ministers in 2003, and outcomes of this workshop will assist NOAMI in identifying areas for future work and future recommendations to Mines Ministers.

Workshop Introduction

Gregg Stewart opened the workshop by welcoming delegates and reviewing the background of NOAMI, its current function and governance structure, and its positive international profile. Elder Jerilyn Sparrow provided the opening ceremony and welcomed delegates to the traditional territory of the Musqueam people. Larry Pederson, Deputy Minister of BC Ministry of Agriculture and Lands, welcomed delegates to British Columbia. He highlighted the BC government's work to address environmental challenges, and provided a few key examples of the provinces' strategies and initiatives, particularly around mine remediation.

Michael van Aanhout, Workshop Facilitator (Stratos Inc.), reviewed the workshop objective and agenda, encouraging everyone to participate in an open and constructive manner. Workshop delegates then introduced themselves.

Keynote Address

Beth Power, of Azimuth Consulting Group Inc., provided the keynote address. Her presentation focused on the concept of risk and the factors that affect risk perception.

Concept of Risk

Ms. Power reviewed the common, iterative steps in a risk assessment (RA) process. She spoke to the factors that influence the perception of risk, and how two modes of thinking (experiential and analytic) can create polarized views of risk at mine sites.

The 'what', 'why', and 'when' of RA was reviewed, and it was noted that the risk process – from risk assessment to risk management and then to risk communication – involves a shift from science to also consider policy and other factors.



Ms. Power highlighted the key types of risk, categorized under human health, ecological and geotechnical risks, and observed that cumulative and 'less technical' aspects of risk (e.g., community pride) are usually considered during the risk management process.

Risk Assessment at Orphaned/Abandoned Mines (OAM)

OAM sites are often physically, chemically, and socially complex environments. Ms. Power provided three key factors for this complexity: location away from urban areas (although there are notable exceptions), lack of regulatory oversight in mine operation and closure because mine operation pre-dated regulations, and the lack of a single responsible party.

Risk Assessment versus Risk Management

The key difference between RA and risk management is that RA identifies a problem, while risk management is the decision making process of what to do about the problem. Risk management is a balancing act that should involve structured decision making that involves all perspectives. Ms. Power suggested that using RA and risk management at more sites would result in a better net reduction of risk, rather than focusing on getting one site "right" (i.e., "making 100 decisions and getting one wrong" vs. "making one really good decision"). She also spoke to the importance of trust in RA and risk management processes and that fostering trust requires transparency, open communication, sharing of values, and sufficient time for good process.

Group Discussion

There was a discussion about the impartiality of risk assessment practitioners. Some participants had the perception that risk assessors are motivated to screen out risks. Ms. Power replied that there are processes that should be in place to ensure external peer review of consultants' reports and that there is a code of practice that practitioners follow.

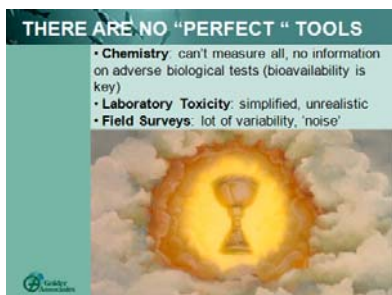
Opening Panel

Why Conduct / Believe Risk Assessment?

Peter Chapman, Golder Associates, discussed why risk assessment should be used and why it should be believed. He began his presentation with an overview of RA, stating that it is a framework for gathering data and evaluating the sufficiency of that data for decision-making. Dr. Chapman noted that transparency in the RA process is created through the right framework.

RA is used to retroactively assess, predict risk and to compare/rank risk. It is used to focus on the big picture. Dr. Chapman provided a brief history of RA. He noted the key differences between Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA): HHRA is concerned with the protection of all individuals of one species, whereas ERA is concerned with the protection of populations and communities of many species.

In risk-based decision-making the important decision is how much contamination is too much. In determining this, one needs to find out what is important to stakeholders (stakeholder was used as a general term – Dr. Chapman noted that First Nations are not considered 'stakeholders'). Assessment endpoints (what is to be protected) and measurement endpoints (what is actually measured) have to be linked, or there will be problems in the RA process.



Dr. Chapman noted that there is no perfect "holy grail" tool for determining risk; we must use what is available in a weight of evidence approach (which uses, for example, chemistry, laboratory toxicity and field survey data). RA should be believed because the process uses a transparent framework that is repeatable, it is linked to the real environment, it recognizes and documents uncertainty, and it incorporates different lines of evidence (including Traditional Ecological Knowledge [TEK]).

Group Discussion

A participant took exception to the inclusion of First Nations in the 'stakeholder box', and noted that TEK should not be considered as an afterthought, but that respect is required. Dr. Chapman stated that he did not consider First Nations as stakeholders, nor did he intend to imply that TEK was not a valuable line of evidence.

It was noted by a participant that the easiest way to be transparent in the risk assessment process is to document all of the steps taken so that the work can be duplicated by others. Dr. Chapman agreed.

Communities' Experiences with Risk Assessment

John Jackson, Great Lakes United, described the problems that citizens experience when risk assessments are used in their communities. His presentation focused on problems with both the content of risk assessments and on the ways in which these assessments are communicated to the public.

Mr. Jackson began his presentation by noting that risk assessment cannot be separated from risk management. He used a quote by the former head of the U.S. EPA, William Ruckelshaus, to illuminate why suspicion surrounding RA is founded on its history: “RA data can be like the captured spy; if you torture it long enough it will tell you anything you want to know”.

When the range of uncertainties in a RA process is not presented to communities, there is not a clear definition of risk. This results in lost credibility and trust. Mr. Jackson stated that there are different definitions of acceptable risk, and CCME guidelines do not necessarily constitute levels of ‘acceptable risk’ for communities. He noted that RA is used as an excuse not to act; it is used to take risks off the ‘risk list’ even if the community wants them to remain.

Risk communication is not a discussion among equals – there is an aura of scientific certainty around RA. It is insulting to communities when everyday risks (e.g., driving) are compared to contaminated site risks (e.g., toxicity from tailings).

The RA process can be improved if remediation options are presented early in the process and community members are part of meaningful decision-making. Community participation can lead to innovative solutions. Resources are required for participation.

Group Discussion

A delegate asked Mr. Jackson whether RA is used to delay decisions. There was an exchange concerning the reporting of emissions from mines under the National Pollutant Reporting Inventory.

Abandoned Mines – Doing Nothing is Not an Option: The Impact of Doing Nothing on Aboriginal Communities

Chief Glenn Nolan, Missanabie Cree First Nation, spoke about the impact of OAM sites on First Nation communities.

Many of the members of the Missanabie Cree First Nation continue to use the land and the waters in the manner of their ancestors - to hunt and gather, fish and travel. They can use common sense to assess risks when using the land (e.g., trapping), but they do not have the knowledge to assess the risks associated with OAM (e.g., when playing on tailings piles).

First Nation communities across Canada are affected by the legacy of mine sites. Action is required to improve the lands and we all need to work together to achieve this.

Chief Nolan suggested five actions to improve the lands for generations to come:

- Create consistent legislation to address the issue nationally.
- Inform and educate the local communities of the issues – use language that is meaningful and take the time to do it right.
- Work with local communities to monitor and plan for remediation.
- Draft procurement policies for community benefit.
- Establish long-term monitoring.



Group Discussion

A delegate asked Chief Nolan whether there have been any noticeable effects to the land of the Missanabie Cree First Nation. Chief Nolan responded that there have not been any outward physical changes to animals and fish in his territory, but he knows of other territories with these symptoms. However, his community is advised not to use the sweet grass that was planted on a remediated site.

There were several questions about the best way for companies/practitioners to communicate with affected communities. Chief Nolan suggested the following:

- Have a policy on engagement.
- Go into the community as early as possible, explain why you are there and make community members part of the planning process – this will help build trust and will help ensure the future success of the project.
- Do not use jargon.

British Columbia Ministry of Environment's Approach to Mine Site Risk Assessment and Risk Management under the *Environmental Management Act*

John Ward, BC Ministry of Environment, provided an overview of the BC Ministry of Environment's approach to mine site risk assessment and risk management under the *Environmental Management Act* (EMA).

Dr. Ward reviewed the key features of the Ministry's contaminated sites legislation and regulations. He noted that there are 9366 contaminated sites on the site registry, and of the 126 sites remediated in 2007-2008, 35 used a risk-based approach.

Dr. Ward provided an overview of the use of risk-based remediation quality standards and the approach to establishing standards. Deterministic, screening level, and stochastic are the three types of risk assessment allowed under BC regulations. In BC, the use of risk-based standards has increased since 2004.

Dr. Ward reviewed remediation liabilities and the classification of 'responsible persons' under the EMA. The provisions for mines in the EMA are specific to core and non-core areas of mines. EMA includes provisions for transfer agreements and indemnification.

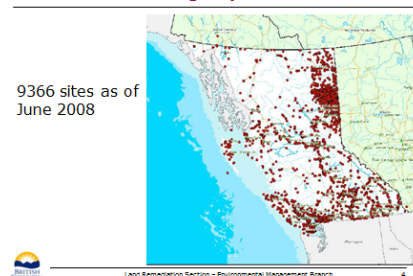
The presentation included two examples of the use of risk assessment in BC: Trail and Sullivan mine. Dr. Ward concluded his presentation with how to find more information. (For general queries email: site@gov.bc.ca; Website: www.env.gov.bc.ca/epd/remediation/)

Group Discussion

According to Dr. Ward, the increase in risk-based assessments is due to greater comfort in the approach and cost-effectiveness.

There was concern that the contaminated sites inventory does not include historic OAM and that people have to pay to use the inventory. It was clarified that there is a separate historic mine sites database.

Sites on the Site Registry



A delegate raised a concern that there is no mandate in BC to share decisions about land status. It was suggested that a section be included in the EMA on joint decision making about sites.

Plenary Discussion

Michael van Aanhout reviewed the main themes from the opening panel presentations and group discussions: trust; independence/impartiality of risk assessors; use of TEK in decision-making; and, lack of community involvement in creation of CCME standards. Several of these themes, and others, were explored during the plenary discussion:

- Transparency and trust go hand in hand.
- Risk assessors need to be able to communicate at the community level, since it is difficult for community members to understand technical information.
- Community members should be engaged in sampling and understanding the contamination around them, which will increase ownership of issues.
- A panel member noted that we are all trying to do the best we can, and that inclusive decision-making establishes equality.
- Cumulative impacts are of great concern: it was noted that the science around the interrelationship of metals is very limited and people who live near orphaned/abandoned mines are exposed to a number of contaminants.
- The screening process is seen as a process for removing risks before there is enough information to truly know if they should be taken off the table.

A question was posed to the panel members: do you think RA does or should play a role in remediation of mines? If yes, what is the role? Two panel members replied yes, while two said yes with caveats:

- The remediation process has to start with all of the options; RA can be used to help inform decisions. It is essential to know the full extent of what communities are dealing with (i.e., contamination).

Human Health Risk Assessment (HHRA)

Human Health Risk Assessment at Federal Contaminated Sites: Abandoned Mines

Sanya Petrovic, Health Canada, provided an overview Health Canada's role as an Expert Support department under the Federal Contaminated Sites Action Plan (FCSAP).

Ms. Petrovic reviewed the objectives of the FCSAP, and presented a map of the national distribution of FCSAP projects. As an Expert Support department, Health Canada provides guidance, training and advice on HHRA, it peer reviews HHRAs, and it ranks sites for human health risks.

Ms. Petrovic spoke to the development of site specific guidelines, and the information that is identified in a HHRA (e.g., who goes to the site?, for how long?, what do they do there?, etc.). Health Canada provides technical reviews of risk assessments, and identifies whether all exposure pathways are considered in RAs.

Several guidance documents are currently available:

- Federal Contaminated Site Risk Assessment in Canada (2004)
- Addressing Psychosocial Factors Through Capacity Building: A Guide for Managers of Contaminated Sites (2005)
- Improving Stakeholder Relationships: Public Involvement and the Federal Contaminated Sites Action Plan: A Guide for Site Managers (2006)



Additional guidance documents are set to be published in 2009.

Group Discussion

A delegate observed that the sites that become a priority for remediation are those that have public involvement; i.e., RA occurs because communities get involved and push for change. Ms. Petrovic added that public involvement is important.

Meaningful Exposure Assessment

Mike Dutton, Vale Inco Ltd., provided a technical presentation about the use of bioaccessibility in risk assessment.

Bioaccessibility as a proxy for bioavailability is used routinely in Europe, but has inconsistent regulatory acceptance in Canada. Mr. Dutton proposed that this inconsistency must change. He argued that bioaccessibility is a valid approach that should be used for RA at contaminated sites. He presented the conditions that should be used for bioaccessibility extractions, and discussed the potential application of site-specific bioaccessibility and/or bioavailability (i.e., tiered approaches).

To Summarize...



- Further refinements (e.g. linking bioaccessibility and bioavailability) will require validation via animal models (Tier 2)
- Requirement for validation of a Tier 2 approach should not hinder the more conservative Tier 1 application of relative bioaccessibility for ingestion of chemical from incidental soil ingestion.
- Tier 1 approach is parsimonious and precautionary but does not give as large a correction as would be the case with bioavailability.
- Meaningful exposure assessment tools such as bioaccessibility must be incorporated into the Canadian regulatory regimes.

Group Discussion

There was a discussion about how to communicate this technical information to communities. A participant suggested that risk assessors work with linguists to create a glossary of terms in aboriginal languages.

Towards a New First Nations Framework for Human Environmental Health Impact Assessment

Professor Laurie Chan, University of Northern British Columbia, presented a new framework for Human Environmental Health Impact Assessment (HEHIA) that respects and integrates First Nations' concept of well being and determinants of health. The framework for HEHIA considers multiple health determinants, such as biological factors, physical environment, culture, and socio-economic status, is a more holistic approach for determining health impacts. Exposure to chemicals is only one factor in determining health.

Dr. Chan presented three research objectives and the following key questions:

- What are the key concerns about the abandoned mines' impacts on health?
- What does the community think that are important to their health?
- What do we need to measure? Who should measure them and how do we measure them?

Research Objectives



- To develop a First Nation Driven/Relevant Human Health Impact Assessment Model (s)
- To define what are the appropriate/relevant determinants of health that needs and can be measured
- To blend traditional knowledge and Western science through collaborative processes

The key questions are posed in interviews and workshops with First Nation communities who have agreed to participate in the research (Takla Lake First Nation is the only one at this time). These research findings will be used to develop a new health impact assessment model, which will be validated with and reported to the community.

Group Discussion

A participant asked whether the new framework could be integrated into conventional RA. Dr. Chan replied that it is the research goal but it will be very challenging.

Dr. Chan is waiting for confirmation from two additional First Nation communities about participating in the research.

Orphaned, Abandoned and Closed Mines: BC Community Perspectives

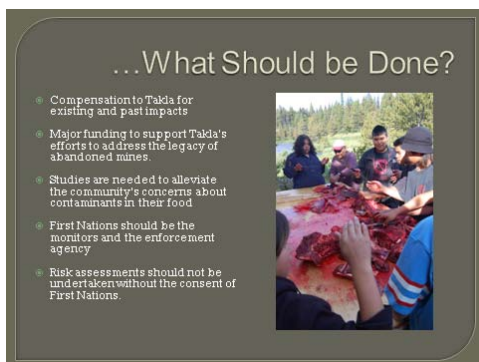
Margo French, Takla Lake First Nation, and Amy Crook, Centre for Science in Public Participation, spoke about the ongoing impacts of OAMs on First Nation communities and the power differential between communities and "the people who try to fix things".

Ms. French discussed the history and legacy of impacts at Baker Mine and the Bralorne-Takla Mine. She noted that there has been no remediation, and no known environmental assessment or cumulative impact assessment at Baker Mine. Funds for remediation are not available because Baker Mine is still considered an operating mine – this regulatory limbo is a problem.

The Bralorne-Takla mine has not been remediated; however, it is currently undergoing a risk assessment commissioned by B.C.'s Ministry of Agriculture and Lands. There is currently no equal decision-making authority to decide a number of important issues, like the terms for risk assessment design.

Ms. French stated concern about the toxicity of animals – Takla Lake First Nation people use all parts of the animal, but they cannot eat everything because they worry about the toxicity of certain parts.

The Health Land Healthy Future (HLHF) project, funded by Health Canada in partnership with UNBC, is a project that is implemented and directed by Takla Lake First Nation and Tsay Keh Dene. It consists of three Phases of testing animals, plants, soil and water for contaminants.



Ms. French provided a number of different steps that should be taken to improve First Nation involvement and to improve the lands around OAM.

Amy Crook observed the power differential between communities and "the people who try to fix things". She noted that the power differential causes mistrust, disbelief, and anxiety. People come into the community, take information, go away and do something in a black box, and come back with an answer. How do we fix that paradigm? Communities need to be consulted.

Group Discussion

It was suggested that the cumulative impacts from multiple sources (e.g., old mines, new mines, pesticides, railroads) need to be considered in a holistic way.

A delegate noted that Margo's work (with the HLHF project) is very important, because it is the First Nation communities that are impacted by contamination. He/she thought it upsetting that many First Nation communities do not have this capacity. The HLHF is also beneficial for increasing trust in local foods (through the sampling program).

Bioavailability of contaminants from soil and tailings: Can it be included in a risk assessment? Should it be included in a risk assessment?

Mark Richardson, RiskLogic Scientific, discussed the reliability/validity of bioaccessibility assay results, problems to avoid and issues to address when measuring bioaccessibility, and some scientific efforts underway in Canada to expand scientific and regulatory understandings of bioaccessibility/bioavailability.

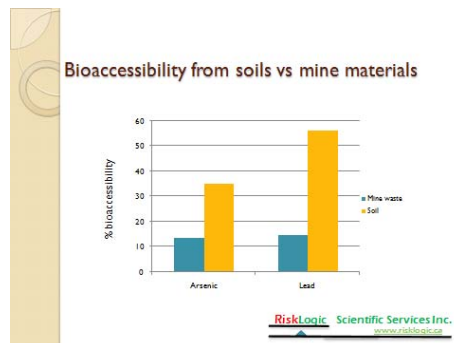
Dr. Richardson began his talk by addressing issues that had been raised earlier in the day. He noted that RA is necessary; it is one piece of the puzzle and is a way to

document logic in order to reach a conclusion. Bioavailability can be used in RA and it should be used, with additional consideration (i.e., appropriate consultation and policy decisions).

Dr. Richardson provided definitions of bioavailability, bioaccessibility, and relative bioavailability/bioaccessibility. He presented the mathematical formulas that are used to calculate exposure and guidelines, noting the conservative nature of the calculations, particularly when bioaccessibility is assumed to be 100% (i.e., assume all of the contaminant is absorbed). Guidelines change when the relative bioavailability/bioaccessibility factor is lowered (e.g., 25%) to account for site specific background levels.

The chemical nature of contaminants from mines are in a mineral form, which is much less bioaccessible than the chemical nature of atmospheric forms (e.g., found in backyard soils).

The methods used to determine bioaccessibility are quite reliable, and using bioaccessibility methods (*in vitro*) is much less expensive than methods used to determine bioavailability (*in vivo*).



Dr. Richardson discussed a number of bioaccessibility issues under investigation (e.g., assay design) and how to obtain valid bioaccessibility/bioavailability data. He also presented several pros and cons of these methods for use in HHRA. Links were provided to Canadian organizations investigating bioavailability/bioaccessibility of contaminants from soil.

Group Discussion

A delegate observed that communities are usually consulted after completion of RAs. Stakeholders should be involved from the beginning, by use of a stakeholder committee, so that issues (like bioavailability) are introduced gradually.

Plenary Discussion

Workshop delegates delved into a number of themes related to HHRA: background concentrations of chemicals; communication challenges; use of standards; the need for a holistic health framework; the Sudbury Soils Study; and the apparent disconnect between scientists and communities.

Background concentrations and communication challenges

- Mines are located where background levels of metals are high. CCME generic guidelines are irrelevant in many cases because background levels are considerably higher. It is a challenge to communicate this issue with communities. The incremental risk above background has to be communicated.
- It is difficult to explain to people that their risk perception is wrong, because perception of risk does not just go away. The perception of risk is more important than the actual risk. It is vital to be able to communicate what the real risk is.
- It was suggested that risk assessors use community allies – if they understand the issues and are part of the team then community trust will build.

Standards / Guidelines

- Comfort levels differ with respect to standards. One delegate mentioned her/his discomfort with current standards, while another stated that there is an incredible amount of information on how standards were set. It was noted that the guiding principle “if you take care of the land, the land will take care of you” should be acknowledged when developing standards.

Holistic health framework

- The psychological impacts of living near contaminated sites should be better documented. The workshop should have included participation by health care workers who can speak to the non-toxicological impacts of living near contaminated sites.

Sudbury Soils Study

- A delegate raised several concerns about the Sudbury Soils Study:
 - The studies miss important pieces of information
 - The companies who undertake the RA are the ones who pollute
 - Where did the site-specific guidelines come from?
 - There is a need for a structure that is inclusive and accommodating to communities and First Nations (to consider all uses of traditional food, including medicinal herbs)
 - The study should be undertaken by the Provincial Ministry of Environment
- In response, two delegates provided the following:
 - The Sudbury Soils Study has gone to extra lengths so that companies are not involved in “calling the shots”; there is an independent process observer
 - The Ministry of Environment and the Ministry of Health have been involved from the beginning. The project team included the Ministry of Environment and the Ministry of Health, and both organizations carefully reviewed the HHRA study
 - The study has identified health concerns
 - Two FN communities have been consulted and an investigation of traditional foods and herbs was included in the risk assessment
 - The Soil Study was undertaken voluntarily and has involved all interested agencies/groups who have a mandate in human health.

Disconnect between scientists and communities

- There is a large gap between the level of conversation among the scientists (e.g., slope of regression lines) and concerns of communities (e.g., cumulative effects). We need to figure out a way to bridge the gap between scientific issues and those of communities.
- Failure to communicate RA properly could lead to ineffective use of the tool. There is a need to train scientists better so that they can communicate scientific issues. There is also a need to train health care providers so that they can communicate risks.

Other

- There is a danger in using conservative formulas – it increases the likelihood that people will think there is a risk when there is not.
- A delegate invited everyone in the room to visit the First Nation communities located near mine sites to decide if they will drink the water and eat the food.

Ecological Risk Assessment (ERA)

Day 2 of the workshop began with a review of the workshop objective and agenda. Michael van Aanhout discussed the major themes from Day 1 and opened the floor to delegates for their reflections:

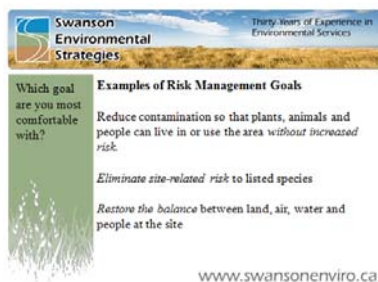
- Community sensitivities have been on the forefront for years; we need an implementation strategy to effectively deal with sensitivities.
- Cumulative effects and multiple stressors are challenging issues that need to be further explored.

Maximizing the Effectiveness of ERA: Know Your Goals and Act Accordingly

Stella Swanson, Swanson Environmental Strategies, spoke about maximizing the effectiveness of ERA by setting clear goals and measurable objectives at the start of projects.

Dr. Swanson provided a key message at the beginning of her presentation: RA allows efforts to be matched with risks. It targets efforts, leading to effective use of time and money.

Drawing on her RA experience over the years, Dr. Swanson told a story about well-intentioned risk assessors who did not assess the risks that were important to community members. The risk assessors measured the risks to mule, deer, mice and frogs, when the community was concerned about how their feelings about the land had changed. The risk assessors had not spent enough time talking with community members about why they were conducting the risk assessment, how the community felt about the site, and what the community wanted it to look like when the project was finished. Dr. Swanson's message: if we do not spend enough time talking about goals and objectives, we will all be frustrated and confused.



The discussions around risk management goals and objectives are an excellent time to engage stakeholders in a discussion of what constitutes acceptable ecological risk. It is important to obtain consensus on what is acceptable risk to ecosystems. Include dialogue about social, cultural and spiritual values. Scientists have to be aware of their own biases when they enter these discussions.

Group Discussion

Key messages from the group discussion included:

- If the project goes array because of misaligned goals and objectives, determine what the goals should have been.
- Include people on the project team with expertise in human wellness and cumulative effects.
- Communities should be involved in monitoring.
- Expect to spend two-thirds of project budget on the first stages of the risk assessment to established goals and objectives. It is cheaper to spend the time and money upfront to get the process right.
- Risk management needs to be front and centre from the beginning.

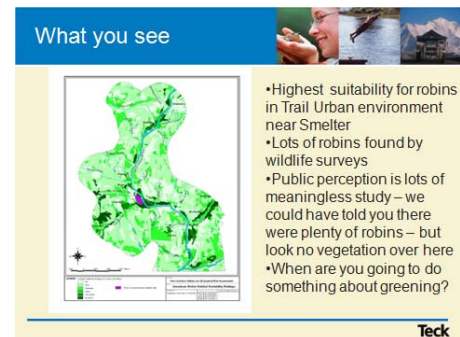
- There are instances when there is no need for a RA - you need to remediate right away, and then you use RA to tell you when you can stop.

Numbers versus What We See

Bill Duncan, Teck Cominco, discussed the use of quantitative modeling to determine exposures and risks versus the use of other information sources, such as scientific field observations and local knowledge.

He began his presentation with an overview of quantitative modeling, noting that numerical results are usually best suited for ruling out risks to some receptors (e.g., osprey) and focusing the risk assessment efforts. Quantitative modeling involves moving from more conservative assumptions to more realistic. The techniques are becoming more refined and valid, however there are still problems associated with communicating results. Undue emphasis on the results of quantitative modeling can alienate those stakeholders who may have extensive experience in the local area.

Modeling results can convey the wrong message to communities. If other birds are screened out of the analysis, but robins remain, then the message “DEAD ROBINS” may result. This result may greatly vary from what the public observes (e.g., lots of robins). It is important to define and communicate the role of modeling to the public. Local knowledge and stakeholder values can be used to ‘reality check’ the quantitative results and also to focus the detailed assessment efforts.



Mr. Duncan concluded with these observations:

- Risk assessment can be used to help determine cause and effect, but some areas are obviously impacted and can be addressed upfront
- RA may be seen as a way to do nothing, but is useful in defining the grey areas where remediation may not be required as risk benefit is low (more damage in cleaning up)
- Modeling may be best used to evaluate and rank plausible remediation

Group Discussion

Discussion focused on the barriers to communication. A delegate joked that risk assessors attend a ‘Harry Potter’ school for risk assessment, where they go to learn their craft. He/she suggested that social engagement and communication should be part of the curriculum.

Mr. Duncan was asked the following: what has been the feedback from the community of Trail and what would you have changed about the ERA? Mr. Duncan responded that the community is more interested in the riverbank greening project than the remediation that has taken place inside industrial lands. Involvement to date has been light.

Ecological Risk Assessments: Probabilities and Mushkegowuk Realities

Jennifer Simard, Mushkegowuk Environmental Research Centre, spoke about the disconnect between ERA and the realities of First Nation people.



Ms. Simard provided a history of the Mushkegowuk Environmental Research Centre, which is owned by seven First Nations in Northern Ontario. She discussed a fundamental problem about RA - RA teams only look at a snapshot of the land, while the First Nations people have seen the land for thousands of years and have knowledge of how things change over time. Different knowledge systems have things to offer. She noted that First Nations people try to be a voice for the land.

Signs posted at abandoned mines scare people away from the land, impacting families and traditions. Animals cannot read the text on the signs. Animals return to sites even if the land is not ready to take them back. First Nations people use all parts of animals, including the bone marrow that is concentrated with contaminants. ERAs do not capture behavioural changes in animals. This should be studied more.

Ms. Simard suggested using translators who have worked with the RA team and are familiar and comfortable with the issues. She also noted that the two systems – governance and governments – overlap and is there opportunity to work together. For example, First Nations people are experts in providing a good baseline study.

Ms. Simard concluded with the following: “The risk to a system as a whole must be considered—this is the very nature of the study of ecology whose definition includes the study of living organisms and their relationship to the environment”.

Group Discussion

There was a discussion about what criteria and standards to use for lands where people harvest food and it was suggested agricultural standards are most appropriate.

Plenary Discussion

Major themes that emerged in the ERA plenary discussion included: government inaction - community responsibility; mining impacts in other countries; the role of NOAMI; communication of technical issues; and barriers to remediation.

Government inaction - community responsibility

- It was suggested that governments do little to help communities deal with contamination. Communities cannot count on the government or the polluter. Communities need to undertake the sampling, documentation, monitoring etc. themselves.

Mining impacts in other countries

- A delegate was concerned about the activities of Canadian companies in other countries: do Canadian companies use the same precaution in other countries as they do here, and can we trust a company if they are not taking the same precautions in other countries?

The role of NOAMI

- It was suggested that NOAMI has a role in ensuring Canadian companies work responsibly in other countries. It was clarified that NOAMI is a forum for discussion of issues and identification of solutions towards remediation of abandoned mines in Canada. Change takes time and we should be proud of the work NOAMI is doing.

- There was also concern about the lack of mine site remediation on Mushkegowuk territory. The delegate suggested that NOAMI should change its focus from establishing a national inventory to telling the stories of communities affected by OAMs. A member of the NOAMI advisory committee clarified that NOAMI is concerned with more than the national inventory, there has been a number of important initiatives undertaken.

Communication of technical issues

- A delegate asked Jennifer Simard to elaborate on the techniques that she uses when communicating technical issues in her community. Ms. Simard provided the following techniques:
 - Reliance on people who are recognized as translators. Translators are part of the research team – they participate in weekly meetings
 - Use a visual format for communication (e.g., a video to play on community channel). The Mushkegowuk Environmental Research Centre does not publish paper reports
 - Use local radio channels and speak the local language
 - Hold call-in shows

Barriers to remediation

- There is a lack of funding to remediate all of the OAMs across Canada. A delegate suggested that mining companies that are currently operating in Canada should put money into a fund to remediate abandoned mines. Another delegate replied that this suggestion may be difficult given the current commodity prices.

Geotechnical / Safety Risk Assessment

Geotechnical engineer's perspective on how risk assessments can help us design mine closures and remediate abandoned mines

Iain Bruce, BGC Engineering, presented an overview of the use of risk assessment in the design of mine closures and the remediation of abandoned mines. He provided examples of past failures to illustrate the hazards of poor design.

Dr. Bruce began his presentation by stating that Canadian companies are "leading the pack" overseas (in terms of mining practices), and that The Mining Association of Canada (MAC) and all MAC companies support the concept of designing for closure to minimize impacts. There are positive outcomes when mines are properly designed for closure.

RA is a thought process that helps determine priority for cleanup. It is one tool that, if done properly, should provide clearer and more defensible approaches. RA does not solve problems, it identifies them. Failure modes and effects analysis (FMEA) work well at abandoned sites because the sites are complex with limited data available.



Dr. Bruce explained the six steps he generally follows to perform a RA. He emphasized that if the process is broken down into "bite sized" pieces that everyone can understand then the process will become more transparent.

To illustrate the steps taken in a RA, Dr. Bruce described several examples of past failures and the issues that cause failure (e.g., human error, biological interference). He spoke about the need to be open to all remediation options, and

provided an example of disposal of tailings in a freshwater lake as the safest disposal option.

He encouraged delegates to do an internet search on 'Multiple Accounts Analysis' (MAA). MAA is a platform to engage stakeholders that is used to assess site-specific alternatives based on both qualitative and quantitative indicators of success.

Dr. Bruce closed his presentation with an example of a remediation project in Italy that resulted in positive outcomes, due to RA. He also noted that there are preconceived ideas on both sides of the RA argument (for and against) and that everybody needs to listen.

Managing Risk at the Former Kerr Addison Mine in McGarry Township North-Eastern Ontario

Stan Kaczmarek, Ontario Ministry of Northern Development and Mines, presented on the history and the ongoing risk management issues at the former Kerr Addison Mine in Virginiatown, Ontario.


Virginiatown is located in the Township of McGarry, approximately 40 kms east of Kirkland Lake in North-Eastern Ontario. Following the sale of the Kerr Addison Mine in 1987, the site saw numerous changes in ownership until its final closure in 1996. The

last owner left a legacy of un-rehabilitated mine hazards and unpaid bills. A closure plan was developed but never accepted and no Financial Assurance was ever secured.

In an attempt to recover some of the money in unpaid property taxes, the Township acquired the mines' surface rights and the buildings on them. They later sold the buildings for scrap, making redevelopment of the site less likely. Since that time there have been concerns about impacts to infrastructure in the community (e.g., water main breaks; subsidence of highway). Surface rights have been sold to a small company, which has limited financial means; however, they are not responsible for the rehabilitation of the mine hazards on the site. Under the *Mining Act*, the rehabilitation of the mine hazards in accordance with the Mine Rehabilitation Code of Ontario is the responsibility of the Mineral Rights Holder.

Mitigating the Risk - 2

- MNDM advised Mineral Rights Holder of his obligations under the *Mining Act* and requested a schedule for the rehabilitation of the hazards on the site
- MNDM will consider issuance of a Director's Order if the owner does not take effective action
- Orders can be appealed and invariably are
- Even if an appeal is overturned and the owner is charged the rehabilitation may still not be completed
- As a last resort the Ministry can step in and rehabilitate the site and place a lien on the property for the cost of the rehabilitation



Ontario - MNDM Mineral Development and Lands Branch

MNDM commissioned a study for a preliminary geotechnical stability analysis of the Kerr Mine in 2007 and presented recommendations to the Ministry of Transport and the Township. MNDM had to work within the framework of the *Mining Act*, which impeded MNDM's ability to affect change.

Plenary Discussion

Similar themes as those identified in other sessions emerged during the geotechnical / safety risk assessment session.

- A delegate warned that caution is required when deciding on remediation actions – it is often necessary to take the time to determine all options, so that actions do not impede additional options.
- It was observed that communities often lack capacity to deal with results of RA reports. In addition, generally few community members are involved in decision-making around the RA process.
- A delegate stated that mining companies are harming indigenous communities around the world. Dr. Bruce responded that Canadian companies have often improved the safety conditions in areas where aboriginals are mining locally.
- A delegate spoke of the value of land to aboriginal communities and that this value system should be respected. He/she provided an example – if lakes are off the table (for tailings disposal), then lakes are off the table. Dr. Bruce noted that everyone is part of the decision-making process. If communities want the benefits of mines (that include schools, hospitals and a tax base), then there will be tailings. The group has to then assess where tailings go. Disposal in lakes is one option that does not have the same hazards as other options.

Case Studies

The final session at the workshop was a series of three case studies exploring lessons learned in the application of risk assessment.

Sudbury Soils Study

There were three presenters in this case study: Chris Wren, AECOM; François Dépelteau, Laurentian University; and Glen Watson, Vale Inco.

Sudbury Soils Study: Human Health and Ecological Risk Assessment - A Case Study in Science, Process and Perception

Chris Wren provided background information about the Sudbury Soils Study and reviewed the study process and organization, scope, key results, and public consultation activities.

Key messages of Dr. Wren's presentation:

- Vale Inco and Xstrata voluntarily commissioned the study. The two companies funded the study, but their participation was limited to membership on the technical committee.
- The SARA (Study Area Risk Assessment) Group is an independent affiliation of firms.
- There were checks and balances in place to ensure a transparent process. All meetings were overseen by an independent process observer. Reports were submitted to the technical committee and there were independent scientific advisors to peer review the reports. Regulatory agencies were involved the entire time.
- HHRA:
 - The objective was to focus on environmental exposure to residents (not historical impacts)
 - There was a vast amount of exposure data collected (e.g., 8500 soil samples); the study team looked at speciation (air samples) and bioavailability (particularly on soil and dust)
 - Results: no unacceptable health risks predicted for exposure to four of six chemicals of concern (COC). Exposure to lead - potential risks to young children in localized areas. Exposure to nickel - minimal risk of respiratory inflammation from lifetime exposures to airborne nickel in two areas of the community.
- ERA:
 - The objective was to characterize risks of COCs from smelter emissions to terrestrial plants and wildlife
 - The study team used a weight of evidence approach
 - Results: COCs (and other factors) are continuing to limit vegetation growth and recovery
- A lot of effort was put into community engagement and risk communication – meetings, workshops, newsletters, etc. The team also put together an information package for every doctor in the region and there was an MD on the SARA team.

Relations of Risk's Definition and (Potential) Definitional Struggles: The Sudbury Soils Study

François Dépelteau spoke about the social construction of risk perception. Social processes directly affect how different actors react to environmental risks. Various risk definitions can affect the public trust in significant ways and with important consequences for the community, governments and private businesses.

Key messages of Dr. Dépelteau's presentation include:

- Results of the soils study are not accepted by the community.
- We live in a risk society because we have to deal with invisible risk. Since we cannot see these risks we depend on experts that have the knowledge to tell us if the environment is safe. If the public does not trust scientific results, governments have to deal with concerns of the public.
- RAs are conducted in social environments. Perceptions of risk are socially constructed – they result from interactions, different world views, different agendas, etc.
- It is positive that people are able to express their concerns about the study results – it shows that we live in a democratic society.
- If there is no trust in the study results and there are no solutions to increase trust, the RA may become a 'definitional struggle'. It is hard to predict whether the Sudbury Soils Study will become a definitional struggle; however there are a few indications that it may:
 - The study is connected to strong emotions
 - Politicians are becoming interested (e.g., NDP raised questions about the study)
 - The media is supporting the recommendations by activists for more leadership
- The only way that non-scientists can believe scientists is if scientists are independent from private groups and government; it is difficult for the public to trust the results of the soils study because many think that Vale Inco and Xstrata have been involved.

Sudbury Soils Study: Industry Perspective

Glen Watson provided an industry perspective on the Sudbury Soils Study. He provided a brief overview of the background of the study and spoke to the transparency of the process.

Key messages of Mr. Watson's presentation:

- Results of the study are relatively well accepted. It is important to Mr. Watson (who lives in the community) and his company to "get it right" (i.e., study methodology and results).
- It has been a challenge to make the science understandable to the community, but the effort was made.
- HHRA results were released in 2008; ERA results are set for release in 2008, but may be released in 2009.
- The companies and the Technical Committee went a long way to ensure that the science was credible and robust. They needed the faith of the community. The study was administered by the Technical Committee and SARA reported to the Technical Committee.
- There was an independent process observer whose reports were honest and transparent.
- They are proud of the peer review function – no member of the Technical Committee was able to decide who would be represented on the peer review

- panel. The panel found the RA to be comprehensive and the overall approach appropriate.
- The study was: conservative, transparent, well documented, repeatable, based on multiple lines of evidence, and supported by scientific peers.

Plenary Discussion

There was concern from several delegates about the transparency of the soils study.

- One delegate asked the following question: what if you had found that there were considerable risks? Mr. Watson replied that industry would have had to address the risks, likely with significant changes to the operations, if not by stopping operations.
- Another delegate mentioned a poll that found that 61% of the Sudbury community do not trust the results of the soils study. He/she thought that there are some parts of the study that are not transparent and that it excludes a lot of important data (e.g., testing of some types of food).
- An external review has been conducted by Environmental Defence. A delegate hopes that the results are included in a risk management plan. Mr. Watson replied that the companies authored a Risk Management Plan to address the risks found in the HHRA and that this Plan was publicly available.

Lynn Lake

There were two presenters in this case study: Norm Brandson, N2B and Earthwise, and Mike McKernan, Tetres.

Rehabilitating the East Tailings Management Area - Lynn Lake, Manitoba

Norm Brandson presented information on the acquisition of the Lynn Lake mine site by Viridium, ensuing liability and management issues, and the process that was undertaken to help resolve the issues.

Key messages of Mr. Brandon's presentation:

- Sherritt Gordon liabilities were inherited by Viridium, which was subsequently acquired by Agrium in 1997. Agrium, a fertilizer manufacturer, was not interested in the east tailings management area of Lynn Lake. They were not aware of the full extent of liability at the time of acquisition.
- At the time of acquisition, Lynn Lake was non-operating, there was no closure plan for the site, and only a portion of records were available from Sherritt Gordon.
- There was potential for prosecution under the *Fisheries Act*.
- Viridian and Manitoba signed a Memorandum of Understanding (MOU). The 'without prejudice' agreement stipulated the following: prepare a Site Rehabilitation Plan; share costs equally; and, release of liability if terms met. It also established the dispute resolution mechanisms and the rough costs for final solution.
- The Site Management Plan was released in 2007, and two field seasons have since been conducted. There are several outstanding issues, including community health concerns, long-term site maintenance and liability issues, and regulatory uncertainty.
- Lessons learned: trust building takes time; understand the financial and reputational risks; government must be on side; communication is critical.

An Ecosystem Risk-Based Approach to Managing an Abandoned Tailings Management Area - Lessons Learned in the Lynn Lake ETMA Case Study: the Consultant's Perspective

Mike McKernan discussed the ecosystem risk-based approach that was used to manage the Lynn Lake Eastern Tailings Management Area (ETMA), and the factors that worked well and those that did not.

Key messages of Mr. McKernan's presentation:

- Site-specific guidelines were used because provincial guidelines did not account for site-specific mitigating circumstances affecting toxicity (e.g., hardness). Ecological Risk Thresholds (ERTs) were developed from site-specific exposure trials. Site specific values were higher than Canadian surface water threshold based on CCME.
- Viridian sought to meet intent of federal *Fisheries Act* and chose a risk-management approach, based on studies of ecological impact and local ecosystem health.
- Tension existed between the needs of government, the community, and the company, and this had to be resolved before development of the Site Management Plan. This was managed through a bilateral Site Management Agreement, and frequent disclosure of the status of studies and results.
- What has worked: intergovernmental cooperation; development of the Site Management Plan; modest but growing community support; the ERA; third-party endorsement of the site-specific risk-based approach.
- What has not worked: perception of risk still prevalent; lack of community engagement; no formal acceptance of ERTs by Environment Canada.
- Conclusions: site-specific risk-based studies of ecological impact and ecosystem health resulted in the first objective definition of "impact footprint" from local mining history; wide diversity of studies demonstrate that over 50 years of loadings have not significantly damaged the local aquatic ecosystem (i.e., damage is localized, of slight magnitude and appears reversible).

Plenary Discussion

A delegate stated that it is hard to believe scientists when First Nations have such recent memory of betrayal.

Yankee Girl

There were two presenters in this case study: Mark Tinholt, SNC-Lavalin, and Gerry Nellestijn, Salmo Watershed Stream Keepers Society.

Yankee Girl Tailings Remediation Project – Part 1

Mark Tinholt provided a brief background presentation on the Yankee Girl tailings remediation project:

- Yankee Girl is an abandoned mine site located in Ymir, BC. The Province is responsible for the site.
- The mine operated between 1935 and 1942. Tailings were discharged in an uncontrolled manner into the Salmo river across from the town site.
- On behalf of the Province, the Crown Land Restoration Branch of the Ministry of Agriculture and Lands initiated remediation of the abandoned mine site.
- Remediation contracts were awarded in 2007. Following detailed investigations and risk assessments, a conceptual remedial plan was developed in consultation

- with the community. Five public meetings were held between 2004 and 2007, and newsletters were published when needed.
- Assessments identified four priority risk areas.
 - There were a number of potential remedial options available. On-site consolidation and containment of reactive materials was selected as the preferred option. Construction is now substantially complete.
 - The remediated area was purposefully designed for use by the community. It is hoped that the community will take stewardship of the site.

Yankee Girl Remediation Thoughts

Gerry Nellestijn provided insight into community involvement in the remediation of the Yankee Girl mine site, and provided recommendations for greater community involvement in abandoned mine site remediation.

Key messages from Mr. Nellestijn's presentation:

- The site looks great compared to how it looked before remediation; however, it was not a perfect process.
- The Salmo Watershed Stream Keepers Society (SWSS) initiated a project in 2000 to raise awareness about the Yankee Girl tailings. Since that time they have activated/helped with Ministry sampling, published a report ("Inventory of Mine Tailings and Ponds in the Salmo Watershed"), organized public meetings and kitchen table meetings, and held a fundraiser, among other activities.
- SWSS created partnerships with many different groups.
- The SWSS consists of an informed group of members who have extensive experience in fish habitat restoration. The group wanted to be a lead partner of the Yankee Girl remediation project, but no real attention was paid by government to the request.
- There were a number of "switch points" that led to misunderstanding and community frustration: there was no community involvement in creation of newsletters and there were communication issues – it was hard for some to understand the 'restricted codes' used by the remediation team.
- Recommendations:
 - Streamline the process by incorporating work that has already been accomplished
 - Develop a simple community-based procedures manual that includes information like safety training
 - Provide support
 - Be inclusive by partnering and taking a community-based perspective
 - Take a watershed perspective
 - Develop a pilot project: develop a review/assessment 'accountability' matrix with community to assess benefits, draw backs. The matrix should lead to recommendations for future community, government, and consultant action. More contaminated sites will be addressed if communities are empowered

Part 2: A Consultant's Perspective on the Assessment of "risk" During the Yankee Girl Project: Regulatory/Objective-setting, Technical and Community Aspects

Mark Tinholt provided a consultant's perspective on the regulatory/objective-setting, technical and community aspects of the Yankee Girl project.

Key messages from Mr. Tinholt's presentation included:

- Regulatory/Objective-setting: The project was accelerated by a regulatory "Directive" from the Department of Fisheries and Oceans. It directed a Detailed Site Investigation (DSI), which was quite prescriptive and did not allow sufficient time to consult with the community. It led to a regulatory-oriented process that may not have been necessary/appropriate had there been a risk-based, multi-stakeholder objective setting exercise at the outset.
- Technical: although it was more expensive, the use of tissue sampling provided more certainty in the risk assessment, and appeared more defensible to stakeholders.
- The risk assessment incorporated "global risks" (i.e., consideration of whether the risks of implementation of a certain remediation technique may outweigh the risk that a site currently presents).
- Much effort and scrutiny went into formal risk assessment of the current site conditions - however, at the outset it was general (and easily confirmed) knowledge that risks were present that would require physical remediation. It may be more appropriate to focus risk assessment effort on a post remediation scenario when it is known how remediation will change the exposure characteristics of the site.
- Community: There were diverse community perspectives, from "do nothing!" to "do everything!" Community feedback indicates the majority of the community was comfortable with the risk management plan and communication methods.
- Lesson: Community consultation requires time and effort. It is not possible to satisfy all community members where there is extreme diversity of opinion.

Plenary Discussion

There was a question regarding liabilities associated with community participation in risk assessment and remedial work. Mr. Tinholt responded that there are barriers to community involvement because of strict rules for procurement. The Yankee Girl project team tried to increase community involvement in project work by awarding points to those bidders who included local involvement in their proposals.

Mr. Nellestijn clarified that the community never used the tailings for a beach and that the community was not opposed to the project. The sign Mr. Tinholt showed in his presentation ("Milking the Tax Payer") does not characterize the community.

Closing Remarks

Gregg Stewart provided the closing remarks for the workshop. He reviewed the objectives of NOAMI – it is not an initiative to undertake physical remedial work, but is a multi-stakeholder initiative to provide recommendations and some guidance to orphaned/abandoned mine sites in Canada. NOAMI does more than create a national inventory - five themes were decided on in 2001 and there is information available on all five themes.

Mr. Stewart stated that the workshop allowed for the sharing of different perspectives and that there are opportunities to improve approaches to RA. He reviewed a few of themes that emerged from the workshop: communication and trust; collaboration with communities and community engagement; and, building capacity through engagement and education. He concluded by stating that we should all question our assumptions and think about how we can best communicate with each other. Risk is only half of the equation – opportunity is the other.