

Community-Based Decisions and Setting Priorities in Abandoned Mine Remediation
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This presentation will provide a good segue from the last panel discussion on risk assessment by discussing challenges in the ways decisions are made for mine remediation. Factors that contribute to community confidence in scientific approaches to monitoring and assessment, and criteria used for setting and implementing remediation goals. Remediation and maintenance of abandoned mines is a long term and expensive endeavour. It is not glamorous, but it is critically important work and the discussions we are having here will improve the guidance and direction of the many choices we are faced with in these endeavours.

First let me tell you a risqué story, well, given that it occurred in the Yukon during the late Victorian era, it is not surprising that it was risqué for the times. It was August 1896, and George Carmacks had been prospecting for 10 years with little success. This time he was guided by two Tagish First Nation men, their English names were Skookum Jim and Dawson Charlie- they were brother and nephew of George's wife Kate. They took him to Rabbit Creek where it was said the gold was so thick it looked like a cheese sandwich. The creek was re-named Bonanza Creek and by the end of August was completely staked. The news didn't get out to southerners until the steamship Excelsior pulled into San Francisco with George, Kate and \$1/2 million of Yukon gold. The Klondike gold rush happened two years after the original find and long after those heading north would be able to find any ground left to stake.

This is the less often heard version of this story. At the time, George and Kate had a 3-year-old daughter. When they went to San Francisco media scandalized the family and ran racist accounts of their activities. George, embarrassed, soon denied his 13-year marriage, and left Kate without even financial support to return to the Yukon with their daughter. George re-married and when the daughter was 16 he arranged to have her taken from her school and brought south without her mother's knowledge- they never saw each other again.

I am describing this story because it highlights the types of community experiences of mining that may not be readily apparent or easily defined. There is a broad recognition that the harmful impact of mining on the health of environment and communities does not cease when the mine stops operating. Severe impacts to human mental, physical and spiritual health, cultural traditions, subsistence food harvest, and an increase of social problems like substance abuse and domestic violence, do not vanish with the company. Many factors that change community health have generally fallen outside the boundaries of the way mine clean-up decisions are currently made. I believe that we have a responsibility to consider health in its broadest terms when determining remediation criteria.

The World Health Organization defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity." Mining developments affect all levels of individual and community health. Standard risk assessments do not account for psychosocial health influences that are hard to place a number on, such as stress, violence, addiction or poverty. These effects, however, make an important contribution to the overall state of health for an individual and a community. In addition, risk assessments may not paint a complete and accurate picture of the threats to ecosystems- an issue of extreme importance to the north, First Nation and subsistence communities live more closely to the land than the urban and suburban populations used to develop the risk models. Local and traditional knowledge of how health has changed is not a component of typical risk assessment processes. The state of health that is described by risk assessments is consequently a physiological representation lacking the broader health context of mining communities and their environment.

If we set aside the social aspects of health as outside the purview of abandoned mine considerations- and let me be clear that that is not what I am advocating- we are still left with analysis and remediation decisions, and consequently health outcomes, being determined based on insufficient or inaccurate data. Standard risk assessment approaches have not been effective for efficiently targeting means to improve community health.

For example, risk assessments assume that some level of exposure from a particular substance is without lethal risk and attempt to define that level. Risk assessments define the level of harm that is acceptable. For mining communities that are actively experiencing chronic health problems that may be related to numerous contaminants and cumulative effects, this approach is not an effective tool to make sound decisions to improve the health of mining-affected communities. The health outcome of "being alive" is not the same as "thriving". We need to implement new precautionary approaches, such as the hazards-based methods being used in Europe that aim for higher health goals.

Research related to mining contaminant exposures has generally focused on workplace health and safety. This means the data is primarily from white men of working age with weekly 40 hour work place exposure. The health of the diverse range of individuals found within a community, of women, elderly, children or people with sensitivities, are only accounted for with safety factors that have generally not been ground-truthed with real data. Communities experience long term exposures to low concentrations and complex mixtures of contaminants, this has not been well characterized. For small communities it can be difficult to get statistically significant results by standard methods even though there may be distinct patterns of health effects. Because of these considerations, risk assessments are an imprecise and potentially misleading tool for predicting the long term impact to the health of a community. A new approach for choosing remedial options based on community health priorities is needed to increase community confidence in these decisions.

Communities increasingly require accessible methods to analyze and address the myriad of critical community health issues they face. Practical methods for a hazard-based community health analysis aimed at improving health need to be developed. Establishing direct and irrefutable causation of health effects is a challenge, however, establishing the probable cause of health effects can be undertaken using a weight-of-evidence approach. A range of qualitative and quantitative information can be used together to get a full picture of individual and community health and the health of those at greatest risk can be more adequately assessed. In this way, compelling links between cause and effect provide not only information on health effects but also a focused analysis that gives direction to choose appropriate remediation options and improve the health of mining-affected communities.

Remediation and maintenance of mine sites has been, and will continue to be, very expensive. We all know how daunting the bills are. Sound decisions for remedial options must be made based on community priorities. Priorities should be set with both a short and a long term view. In the short term, a critical assessment of what key remediation choices will have the greatest impact to immediately improve human and environmental health- sometimes these choices are not financially onerous and can make a big difference. In the long term, decisions should be made based on consideration of ecological health, site stability and financial analysis that are not based in engineering timelines- these mines will be around much longer than 30-40 years!

Communities are often divided in their opinions on the benefits and impacts from the local mining operation. However, one of the galvanizing issues can be concern for the health of their family, community and future generations. The role of communities to decide their own health futures must be clearly mandated to set criteria for making decisions at abandoned mines that are based on community priorities.

I am reminded of traffic in India- if you've never been there, imagine what you've heard about it and multiply by a risk factor of 100. To deal with this problem, they put traffic lights at intersections but people would still drive like crazy ignoring the lights. Then they installed little cement pedestals at the intersections and a person stands on these, in a haze of exhaust and chaos, and directs traffic- miraculously the drivers pay attention. I think we are at a time when we can humanize the way that decisions that are being made around abandoned mine clean-up, communities can begin to fulfill the role of traffic sentry in the many choices of direction that need to be made.