

Selenium in the Elk Valley Overview of Presentation and Notes at the Elk River Alliance Selenium Dialogue

Sunday April 7, 2013 at the Fernie Arts Station

Facilitation and Presentation by Stella Swanson, Chair of the Elk River Alliance and former Chair of the Strategic Advisory Panel on Selenium Management

- A brief Review of the Selenium issue in the Elk River Valley
- An opportunity to discuss selenium in the Elk River with a wide audience
- Selenium- occurs naturally in the valleys and rocks
- We all need it, but is only required in small amounts
- Dietary selenium comes from nuts, cereals, meat, mushrooms, fish and eggs
- Toxicity – tolerable upper intake level of about 400 ug/day – after that selenosis (tired, cranky, nails brittle, hair falling out. Would have to eat over 1kg/day to exceed the tolerable upper intake level
- Selenium deficiency causes white muscle disease
- Concentration increases from water to algae (100-1000X) after that it levels off
- Selenium accumulation happens more in standing water than in flowing water
- Ponds create conditions that accumulate selenium faster
- With oxygen and water, selenium emerges from the waste rock via seeps and streams
- Selenium seeps out the bottom of the rock pile. One main driver is snow melt in the spring
- The more rock, the more selenium. Selenium and waste rock are highly correlated
- Selenium levels in the Elk River are generally between BC Aquatic Life Guideline and sometime above drinking water guideline
- Bio accumulates in fish, also in humans, but humans can excrete it
- Take home message: selenium levels increasing (between 8-10% per year), higher levels closer to mines
- Can go into ground water and surface water, can stick around in sediments and can get into the food chain
- Main receptors: animals that are directly in aquatic habitat. Eg. American dippers, osprey, heron, river otter, beaver,
- 4ug/kg acceptable in animals
- Have tissues been sampled in local animals? No one knows right now
- Effects on fish or birds (especially reproduction - the most sensitive endpoint)
- Concentration of selenium in fish reach levels that produce consumption restrictions
 - There are consumption guidelines

- There is no requirement to sample for selenium.
- Concerns raised about groundwater supplies for drinking water (well from the ski hill). Would fall under RDEK jurisdiction
- Elk River Alliance should monitor spring water for coliforms
- The last time that samples were taken to test for Selenium levels in Fernie was 2009.
- Main effect is on embryos – fish, birds
- Field biologists haven't seen evidence of this yet, but we have to get on top of it now
- Are selenium concentration safe for people?
 - Interior health has concluded drinking risks are low but EC recommends further work on this issue
- It is safe to swim, tube, canoe, and kayak etc
- Sparwood levels in the drinking water have not exceeded guidelines, but have been up to 70% of guidelines – investigating this
- Upper Fording river and Elko reservoir exceed “screening values for high intake consumers” – MOE is calling for a human health risk analysis
- Montana Study – seems to have effects on algae in Michel Creek and Corbin Creek
- So far the aquatic life in Elk River still contains a wide variety of aquatic life, including types that are known to be very sensitive to pollution (eg. Winter stoneflies)
- Teck is completing the analysis of its own study- results to be released in summer 2013
- Cutthroat trout
 - In still water – areas such as the Fording River Oxbow and Elko Reservoir have concentrations in the their eggs at or close to MOE recommended safe level. The problem is when bacteria can create the type of conditions that accumulate selenium
- Chad Wilkinson in 2009 reported that the highest cutthroat densities were in tributaries in Michel Creek
- Study of population of cutthroat upstream of Josephine Falls – one year of studies completed. Put radio tags on the fish – abundance of healthy fish. There will be open houses to explain the results of these
- Scientists will continue to debate about what selenium concentrations should be used as benchmarks and the extent needed to cause effects on aquatic life
- But Selenium is increasing- so let's get on with reducing levels!
- Advisory panel recommends: create conditions that immobilize selenium inside of the waste rock dumps
 - Cover waste rock with soil and plants, put waste rock into old pits
 - Encourage growth of microbes that reduce Se inside the dumps via new dump design
- Water treatment: treat mine effluent waters with active or passive treatment (use of bacteria, wetlands, etc. but also low in oxygen so have to re oxygenate
- Water Management: reuse Se impacted water, divert clean water around rock drains, divert clean run-on water away from dumps
 - \$600M over 5 years for selenium reduction (mostly active treatment, but also other options as well)
 - Teck's model predicted decreases by 2040. Still higher than aquatic health guidelines

- Rely on active treatment, working on rapid transfer of technology from research to practice
- Bottom line: how well do active water treatment plans work – hopefully some of the other ideas can also be implemented because they are expensive, have materials left over (nitrate and phosphorous). Don't want to put all your eggs in one basket?
- Questions:
 - Nic Milligan – will contact FAR for well concentrations. Post on Elk River Alliance Website
 - Testing blood for Selenium levels? This is a possibility if you are really concerned.
 - How do selenium concentrations decrease downstream? By dilution from unimpacted tributaries.
 - Teck – applying best technologies that are available today and looking into other technologies
 - Do projections of Selenium decreases include expansions? Yes they include all current planned expansions.
 - Are other coal mining companies such as Bingay Creek part of the Selenium discussion? – less waste rock because underground mine, so less Selenium
 - If selenium is high enough, there will be deformities (we don't know when we would start to see these deformities)
 - If we find fish with deformities could be from various things, but what should we do with it? Take a photo, make a note of it, tell MOE
 - All of us are responsible for keeping an eye on the river
 - Elk River Alliance is a place to start to bringing concerns
 - Cumulative impacts when many watersheds are coming together – eg. Martin Wheeler expansion
 - Mining underground is a possibility, but not currently feasible for Teck
 - Teck has deployed covers in Alberta, because it is the law. Can look at understanding the results before they are deployed.
 - How is Teck going to keep us all informed? Have to keep communities of interests informed. We need to do this more... short coming of Teck's communication. They are now going to try to set up meetings like this in all of the communities.
 - Limits being proposed by Teck that they feel are safe for specific species present in Fording River. Proposing 43ug/kg. Species in Elk River 15ug. Koocanusa 2ug.
 - We all need to have a say in the guidelines.
 - There is only so much Teck can do... No penalties so far
 - Fishing guide on the river feels troubled that there are no repercussions for mining companies. Insulted that Teck can move forward without repercussions and that we only having this meeting as a result of Study from Montana. He recognizes the economic opportunities, but also worried about the future.
 - Elk River Alliance is currently monitoring Alexander Creek and Lizard Creek.
 - Could look into monitoring creek more impacted by mining
 - September 2012 – access effluent from tailings pond. What are the repercussions? Were they fined? Follow up on that.

- Fly fishing operations – is the mine going to devalue fly fishing operations? Is Teck going to support us when we loose our jobs? Interesting to see what happens with fees. What is Teck telling us to tell our guests?
- Formal feedback mechanisms (email, phone number). Work with communities to address this issues
- Aquatic Effects Monitoring Program – discussing data. Dialogue with fishing guides. How can Teck work with fly fishing guides to set up monitoring programs?
- How would people like to be informed? More meetings? Emails? Newsletters? Every option.
- BC Minister of Environment – goal to have more involvement from Provincial Government. Mostly under no travel orders. Many people at DFO are out of a job. Need to provide leadership on this issue. There is lots of leadership from municipal people.
- Water treatment plants: West Line Creek- June 2014 fully up and running, Fording Creek 2016, Elkview 2017. Only able to treat 1/3 of water at spring melt (important part?). But able to treat all of it at low flow times when there is the highest
- MLA is not present at the meeting, neither were any representatives from the paper/media
- Line creek phase 2- watershed currently unaffected by mining (Dry Creek), is it feasible to capture 99.3% of water.