



Reclaiming the Sierra

Gold Country
Community Summit
on Mining Impacts

Presented by The Sierra Fund
November 8-9, 2010
Miners Foundry, Nevada City, California

WORKSHOP NOTES

Research around Human Exposure to Mining Toxins City Hall, November 8, 2010, 2:30 pm

Notes taken reflect the best effort to capture what was said in presentations and in the discussion time following. They are presented here in order to encourage further discussion about these matters. These notes do not necessarily reflect the views of The Sierra Fund staff, board or funders.

Fraser Shilling of UC Davis facilitated this discussion and Perry Myers of the Department of Toxic Substances Control, Bob Brodberg of the Office of Environmental Health Hazard Assessment, and Carrie Monohan of The Sierra Fund presented.

Fraser Shilling of UC Davis reported that mining toxins present respiratory hazards, water quality hazards, and fish contamination among other things. It is important to conduct continuous exposure assessments and to apply these activities with broader ethnic coverage. We need to use human and wildlife exposure to mine ways to diminish exposure to toxins.

Bob Brodberg of the Office of Environmental Health Hazard Assessment (OEHHA) presented information about fish advisories and postings. Data are key to advisories. In order to develop advisories, OEHHA needs data. In this area, six to eight water bodies were surveyed for mercury levels. OEHHA wrote a report about the data. In 2008, the advisory protocol was updated, and advisories were subsequently updated in 2009, adding some data from a study completed by the Water Board. The San Francisco Bay advisory is being completed now.

In this area, advisories existed on the Bear River, Deer Creek, Scotts Flat, and the South Yuba. These were removed in 2009. Englebright, Lower Feather, and another were added. This is because of the change in protocols to establish advisories. To issue an advisory, data must be of known and demonstrated quality, and it must be of a certain level of detail. The fish data samples need to be species that people eat, and at least 9 to 12 fish of legal size need to be sampled for a small water body. For larger water bodies, it is better to have more samples. OEHHA has a general protocol for sampling and

analysis (posted on the agency's website). PCBs are an issue in some water bodies, but mercury is of most concern in the Sierra.

Governmental agencies work with OEHHA to provide good data. USGS and consultants have provided fish data, and also the US EPA in Southern California.

The Surface Water Ambient Monitoring Program (SWAMP) is a model for design and quality rules as they relate to data gathering. Each lake is different, so it is best to contact OEHHA if you are going to take samples. OEHHA evaluates the collected data.

Advisory criteria have been developed for a number of chemicals in fish as well, including mercury, selenium, DTDs, toxophane, and others. Advisory tissue-level documents are starting points, and then summaries of data and evaluations are completed. Sometimes brochures are made. OEHHA develops fact sheets, informs counties, and publishes advisories in the back of Fish & Game booklets (booklets people receive when they apply for fishing licenses). Advisories can also be found at www.oehha.ca.gov/fish.html.

OEHHA does not post signs about fish contamination or advisories. It is not in the agency's mandate, nor does it have the resources to do so. There is no requirement that anybody post signs.

OEHHA's overall message is for people to eat fish lower in mercury and other contaminants and higher in omega-3s.

Perry Myers of the Department of Toxic Substances Control discussed an arsenic study that his department is conducting.

An Arsenic Relative Bioavailability Study is underway. Arsenic has become more of an issue recently. DTSC's goal is to make sure that cleanups meet the law. Although arsenic has often been the driver for cleanups, not a lot of research about arsenic has been done.

DTSC's study is to develop lab methods that are relatively cheap that can verify the bioavailability of arsenic and why it is bioavailable. The project uses a tool that allows them to measure and map arsenic levels. The study is being conducted through USGS. It will result in a database of how chemical bonding works and what effects are in the soil.

The idea is that if material is not bioaccessible, there may be no reason to do a cleanup in that area. The project is hoping to determine the effects, so that a guidance document can be prepared. This could eliminate the expense of cleanup.

Project samples from Empire Mine were collected in 2009. For these samples, 2,700 lbs of soil were collected. Arsenic ranged from below 10 to above 1,000 ppm.

Arsenic is a nation-wide problem. In fact, it's an international problem and this project was invited to present findings in Italy. Everyone is looking at bioavailability. The project has been presented by Dr. Valerie Mitchell at the annual meeting of the Society of Toxicology in 2010. T. Burlak is working with Charlie Alpers of USGS and studying arsenic as well.

[Note to readers: for technical details on this project, see Mr. Myers' PowerPoint Presentation.]

Carrie Monohan of The Sierra Fund discussed the organization's work around this topic.

In the Sierra, human exposure research is about fish and dust. The Sierra Fund began an Initiative to address mining impacts four years ago. The human health aspects focused on mercury in fish, and also dust with heavy metals. The Sierra Fund completed two pilot studies—one on Abandoned Mines and Trails, and an Angler Study. These studies are not the “last word” for the research that needs to be done, but they brought to light a lot of good information.

As far as mercury is concerned, it is important to note that methylmercury is the problem (not elemental mercury or quicksilver). Methylmercury is the form that can be absorbed into the body, it is “bioavailable.”

The Central Valley Regional Water Quality Control Board's 303(d) listing identifies impaired water bodies for contaminants, including mercury. The Office of Environmental Health Hazard Assessment also lists water bodies that have contaminants in fish. The two types of listings can be confusing since in some case water bodies are listed as impaired, but do not yet have a fish advisory. In 2003, an interim fish advisory was issued, and then in 2009 four water bodies were dropped from it—as a result of lack of data, not because anything had been cleaned up.

When The Sierra Fund first started work on this issue, everyone said, “No one eats the fish up here. This isn't worthwhile.” So TSF completed surveys of anglers in the Sierra. Questions were asked like, “Are you going to eat the fish and/or feed it to your family?” The survey also asked about serving size, which allowed analysis of the surveys to compare reported consumption with fish advisories. TSF completed 151 surveys, but they analysis has not yet been released publicly.

Angler surveys were conducted at local reservoirs, such as Rollins, Upper Scotts Flat, Camp Far West, and others. Of those surveyed, when asked, “Are you going to eat the fish you catch today?” 47 percent said yes. Of those who said yes, 73 percent were going to feed the fish to their families. This is important as it leads to sensitive populations (women and children). Half of all those surveyed had fed sport fish to their kids in the last year, and 52 percent showed women who ate sport fish. Further, 5 percent of pregnant women had eaten sport fish.

The survey found that a majority of people were catching brown or rainbow trout. Brown trout are a predatory fish, so it contains more mercury than rainbow. The survey also asked about bass (large-mouth and others) and other types (crawfish, etc). In total, 92 percent of people surveyed said they eat fish they catch (not just fish they caught that day, but fish they had caught within a year). From this, TSF calculated the amount of mercury per day was being consumed—in many people, this was well above recommended levels.

Metals in dust were the other focus of another TSF study. During mining activities, more waste rock was brought up than gold—the rock that was mined was pulverized by stamp mills. Heavy metals in the rock were then spread over the surface around the mine site.

To look at this issue, TSF completed the Recreational Trails and Abandoned Mines Assessment. They looked at the map of abandoned mines and compared it with recreational trail maps—as a result, 13 sites were chosen at which to take samples. Surface samples were taken to determine potential for exposure. For example, the Foresthill OHV area is a public recreational site, and there are abandoned mines in the area. The study found high levels of metals and naturally occurring asbestos.

The study arsenic, lead and other elements. The study did consider asbestos, because even though it is naturally occurring, it was likely disturbed by mining. Analyzing the results was complicated since every agency has a different level for “How high is too high.”

TSF's next steps are: to conduct follow-up sampling (need more information about recreational sites), fish consumption advisory signs (these are not difficult, they can be posted easily), and dust exposure signs could also be created (NOA= naturally occurring asbestos).

TSF's goal is to find long-term solutions, to have a safe, healthy place to live in the long run. Mercury is no longer a non-point source—removal is possible.

It is important to remember that as far as contamination from mining activities is concerned, what was once remote is not any longer—it is in our backyards.

Discussion and Questions

- Is it a good idea to post fish advisories?
 - It's worth a try. Logically, it makes a lot of sense. The challenge is how long it stays up since a lot of places are not carefully monitored. People use signs for target practice. Kiosk version of that as well.
 - If you're going to post, the best thing is to do an evaluation of results of posting. I did a survey, and received mixed information. Some people said, “we did it, we tried it and it didn't work so we stopped.”
- Question for Perry, you used a size class of 25 microns...when is it dust? When is it something you can inhale?
 - Inhalation is not our focus at the moment. Mostly we were looking at ingestion. Typically it wasn't the inhalation pathway that was the concern, but accidental ingestion. Inhalation could be an offshoot of the study.
 - Our plan is to start with the soil samples at Empire Mine and see if it extrapolates into the rest of Nevada County. Perhaps move into Southern California. We're stretched on resources, of course. Chapman University is also looking at samples.

- How is it that those four waterways were dropped from the advisory listing?

Bob Brodberg: It's fish data needed for the advisory, not water data. We need to catch and test actual fish--Even samplers don't always have a great day catching fish. Sometimes they get to “cheat” and use electroshock or nets to get samples. .

Carrie Monohan: OEHHA changed their standards for what constituted “enough data.” Their requirements became more stringent. There weren't enough fish to make an advisory after the standards were changed—that's why they were dropped.

Bob: OEHHA analyzed the data we had from 2003 and tried to come up with advisories that made sense for the data. We tried to look at how we could extrapolate and didn't feel comfortable with

that. There were data gaps, places where sample sizes were too small. In 2009, we beefed up the standard for data. A problem for collecting data is that if you lower your standards, you won't get the data.

Rick Weaver: Data from 2003 was collected at a watershed scale and was collected on public lands, BLM and Forest Service, and others. This was a well-funded study. We didn't know how many fish were going to be required to meet protocols.

Bob: It was a screening study--280 water bodies were looked at—and it wasn't in-depth enough. One or two fish species were used indicators of water quality. Charlie [Alpers]'s study was the same. We didn't have a hand in the beginning of Charlie's study but we got the data at the end.

Rick: At Bullards Bar, no fish were collected or sampled. We're just starting to get information on the Middle and North Forks of the American River.

Bob: I wish there was a way to coordinate the data being collected and ensure that it meets multiple purposes. There is data collected to answer FERC questions, to answer 303d water quality questions, and if there is money and time left, then extra sampling can be completed. Not often. There are more water bodies than resources available.

Carrie: We do need to prioritize. We know where we need to collect data—water bodies where hydraulic mining was done. It's not hard or that expensive to collect fish data. Clearly, it's not just a question of whether people are fishing up here—we know they are. And people don't know that there are a lot of fish advisories out there.

Bob: We don't issue fish consumption advisories based on hydraulic mining site, we need to do it based on data. What we're trying to do is to get data for the fish tissue and use it as a basis to come up with what we feel is the best advice. What we want is to get the message to people: eat these fish rather than those fish.

- There is a development in Amador County on a very small mining site. They sampled mercury levels and found them to be below toxic levels. A friend of mine took a bucket and collected water from a nearby stream. He found a huge ball of mercury. Where is mercury enough to be considered toxic? Cyanide is on a lot of sites also. Is cyanide bound or does it dissipate? Why isn't anyone talking about it?

Carrie: Cyanide does have a short life. Cyanide leaching is happening now, and that could be a real problem. Mercury is likely bound to small particles, clay and silt that get moved by turbid water. What we call the "Nugget effect" is where mercury is not distributed homogeneously. Toxicity is different—that is about methylmercury in fish. Methylmercury allows for mercury to cross the blood/brain barrier. Elemental mercury in soil or water is not the focus. Since the exposure pathway to human beings is through fish consumption, The Sierra Fund is trying to get signs developed and posted. Nevada Irrigation District is interested in the issue as well so we are working together.

- Fraser: My study has found that signs don't work. We've had a decade-long discussion on signs. People list peer-to-peer information sharing as being more effective.

Carrie: And health-care providers also.

- What is the schedule on the arsenic study?

Over next six months we're hoping to kick into gear.

- If sign is reaching just one person, then it's worth it. Especially if people are new to the area. There is a supposition that the state protects us. Therefore, there is a supposition that if something is not signed, then it's safe. I don't like this data that says that people don't listen to signs. I don't believe it. If you're talking to repeat fisherman, maybe. But if you caught out-of-towners or visitors, I think you'd find a lot more people who are eating the fish and would look at signs.

Fraser: Some people use signs. A lot of people don't. We can't just make signs a part of our educational policy, and then walk away from the problem. It's just one tool. The problem has been that it's become the only tool. It's more expensive to develop effective pathways. Let's not just stop at the cheapest solution.

Audience member: Be careful not to fall into the "boy who cried wolf" syndrome. Levels of postings have to be valid—let's be gung-ho when we're certain and cautious when we're not.

Carrie: This is a local problem. It's our problem. The mercury came from this area and it's ending up in the downstream areas. The public right to know is important. We shouldn't wait to study the heck out of it. People should know about it.

- Can't fish advisory information be included in the fishing license?
 - It is. But the information is tiny and often outdated and placed at the back of a brochure.
 - The information is supposed to be available, but it's not effectively communicated.

