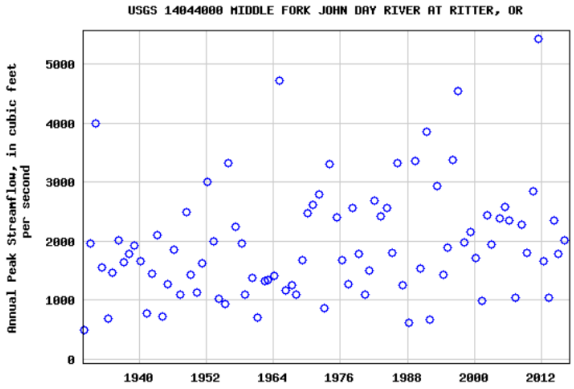
GALENA AQUATIC RESTORATION PROJECT

QUESTIONS RAISED DURING MEETING 1:

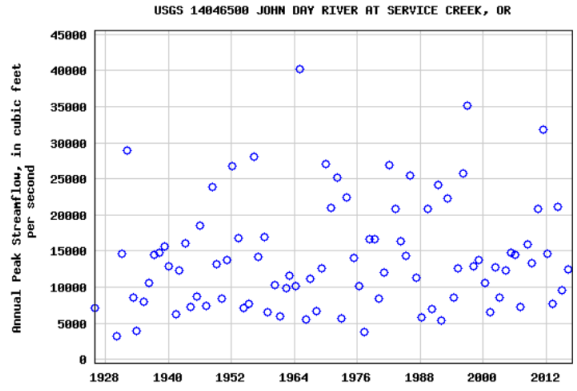
THE FOLLOWING IS A SUMMARY OF QUESTIONS ASKED AT MEETING 1 THAT WE DIDN'T PROVIDE RESPONSES TO AT THE MEETING BUT CAN ANSWER NOW. AS DISCUSSED AT THE MEETING, SOME QUESTIONS WERE ASKED THAT WE CAN ONLY ANSWER WHEN WE ARE FURTHER IN THE PROCESS. QUESTIONS ARE IN THE ORDER POSED DURING THE MEETING.

How far downstream from Galena is the gage that recorded the high flow hydrograph in the Objectives Presentation?

- The Middle Fork John Day River stream gage is at Ritter, approximately 26 miles below Galena on the Middle Fork John Day River. The Service Creek gage, approximately 54 miles below Galena on the mainstem John Day River showed the same high peak.
- Peak Flow Chart for Ritter gage:



Peak Flow Chart for Service Creek gage:



How would the project affect potential for flooding of Galena, as well as upstream and downstream of Galena. Did you consider ice damming potential? Or potential for areas to dry up?

- The velocity of flood events on the Middle Fork would decrease due to increasing the channel length. Also, restoring river access to its floodplain would increase the inundation area or water storage zone of the floodplain. This would occur immediately adjacent to the stream channel that is proposed for restoration. The closest house in Galena is more than 2,000 feet downstream from the proposed tailings treatments. The proposed tailings treatments would not increase the potential for flooding of private property in the Galena area.

  As a component of project design, the design engineer will determine the sites hydrology, and build a surface and hydraulic model of the project reach. The hydrologic analysis reveals the size and frequency of river levels at the project site. A hydraulic model is then built for existing and proposed conditions so that the effects of the restoration project on water surface elevations (including flooding) can be determined. A work product from this modeling is a map depicting water inundation levels. This will identify areas that will likely become wetter or drier as a result of the project. Risks including ice damming potential increasing from the proposed project will be assessed later in the design process by the project team including the project engineer.

  Additionally, the design drawings will be stamped by an engineer licensed in the State of Oregon. The practice of engineering is governed by the state with specific standards for professional conduct that include provisions to hold paramount the safety, health and welfare of the public (ASCE 2013).

Spot temperatures with a thermometer showed the tailings actually cool the water by one degree. Check your science to make sure the project doesn't actually increase water temperature. How is the project going to meet the Water Quality Recovery Plan? And when?

- Spot measurements can be informative, but may not capture water temperature fluctuations when solar radiation is highest, or when streamflows are the lowest. This is part of the rationale why we deploy probes that record water temperatures hourly and can be retrieved afterwards. The Department of Environmental Quality (DEQ) provides guidance on how and where to deploy these types of probes and for using laboratory grade thermometers for testing and conducting mid-season audits on our water temperature devices.
- We deployed continuously recording water temperature probes (data logged each hour) throughout the reach. We observed a different trend of water temperatures when temperatures are most lethal to fish, on July 23, 2013, with an increase in warming of 1.3 degrees Fahrenheit on the day of the seven day average daily maximum.
- The Oregon Department of Environmental Quality has jurisdiction on establishing water quality impairments (303d list) and developing corrective plans (Total Maximum Daily Load) as part of the Clean Water Act. The project planning area was listed as 303d for water temperatures. After being 303d listed, a Total Maximum Daily Load (TMDL) was developed. The dredge tailings along the Middle Fork were identified as a water temperature issue and a single, restorative alternative, was created to evaluate the departure in conditions in channel form (width/depth), shade providing vegetation and hyporheic flow in the TMDL. The TMDL also addresses restoring riparian plant communities to their natural potential vegetation types. Oregon

Department of Environmental Quality modeled restoring the tailings exclusively covered by this project. They evaluated riparian vegetation, channel form and meandering of this segment of river and documented a decrease by 3 degrees Fahrenheit in the 7-day average daily maximum, positively affecting stream temperatures for approximately 4 miles downstream from restoring riparian and hydrologic function.

- The National Forests within the John Day River Basin completed a Water Quality Recovery Plan in September of 2014. This project is in direct alignment with the watershed restoration components of the John Day Basin Water Quality Recovery Plan.

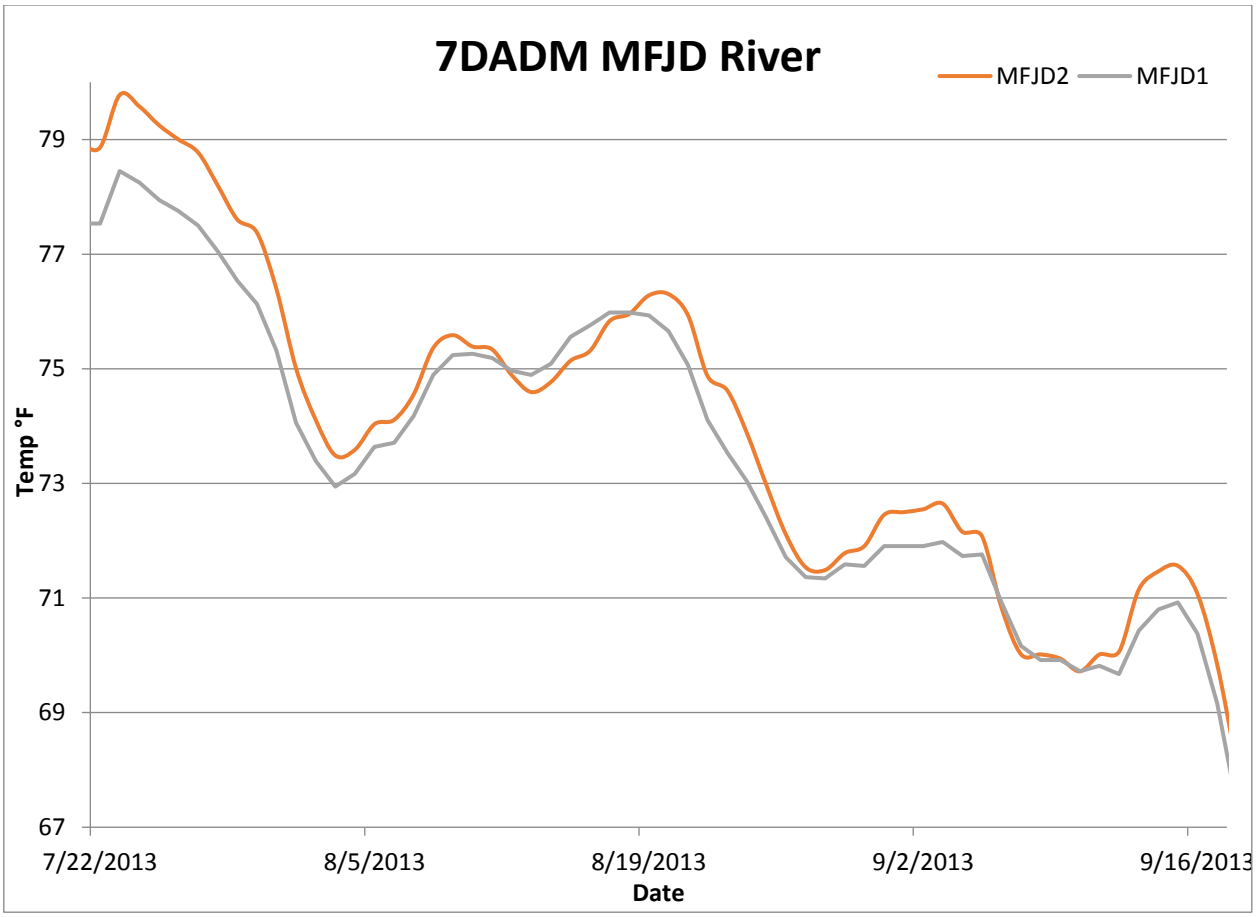
For the DEQ study in 2012, what were the models that were used? Was it a local model or a projected modeling system from elsewhere (such as New Mexico)?

- HeatSource was the model used by DEQ to support the water temperature analysis of the Total Maximum Daily Load. HeatSource is a computer model used by DEQ to simulate stream thermodynamics and hydrology. It was developed in 1996 at Oregon State University in the Bioresource Engineering and Civil Engineering Departments. More information can be found http://www.oregon.gov/deq/wq/tmdls/Pages/TMDLS-Heat-Source-Review.aspx with additional subject matter expert reviews. The TMDL planning team relied heavily on vegetation community information that was developed locally for these subbasins.

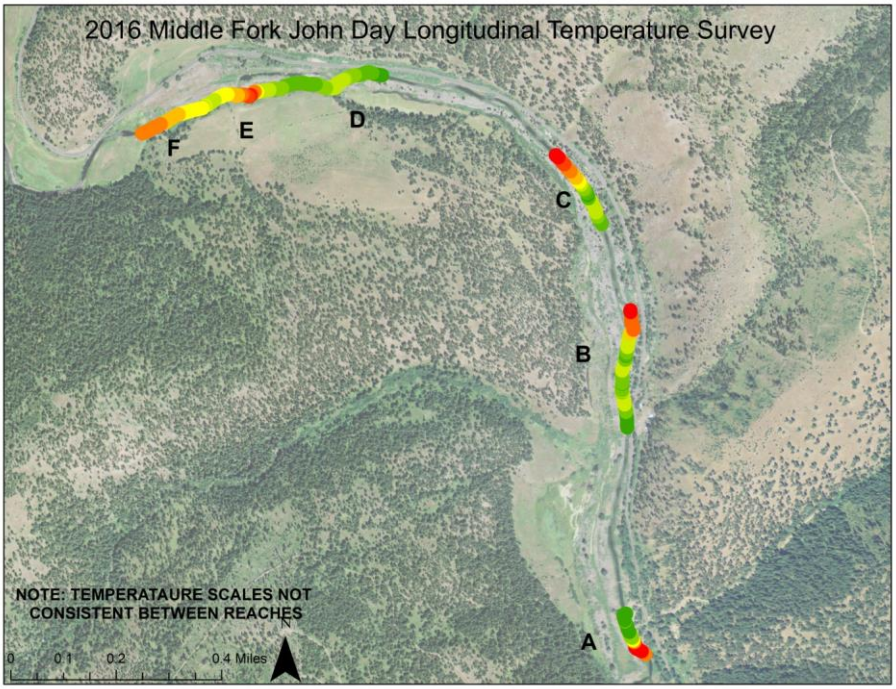
Does water temperature continue to fluctuate? Or is it seasonal? Basically what are the water temperature trends being seen?

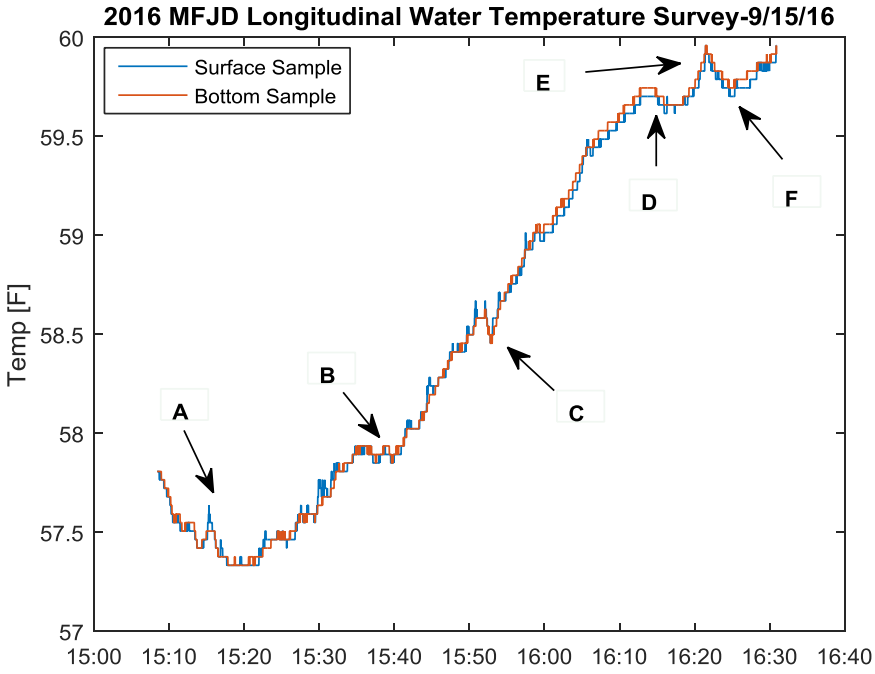
- The USFS continuously monitored water temperatures in the Middle Fork John Day during 2013. There were two sites cited in 2013 along the Middle Fork John Day River. MFJD1 is across from Bear Creek and MFJD2 is approximately 2/3rd's through the reach.

- *Water temperatures warmed up as you move downstream through the tailings reach for all times during the period of record, except for about 1 week in later August. It's not clear why it's cooler downstream during that week period. The warmest periods of record indicate a 1.3 degree increase in water temperatures as you move downstream.*



- The Freshwater Trust had also monitored water temperatures longitudinally in October of 2015 and September of 2016. They illustrated that Bear Creek is not biologically connected to Middle Fork, yet it is hydrologically connected through the dredge tailings. In areas where the surface water mixes with the Middle Fork, you can observe slight cooling. This may help explain the observations observed by Brooks Smith and Jim Sproul.





Some restoration is needed, and there's lots of science backing restoration, but please make clearer – what techniques would be used and what actions taken? What would need to be accomplished to restore resources? What mitigation measures would be used and how effective are they, especially for short term sediment? What studies can you share with similar techniques and successful outcomes?

- We will spend time during the second meeting sharing more information on what actions may be taken to restore river processes. Generally, mine tailings would be contoured with equipment to provide for floodplain patches that are well connected to the river channel so that they are wetted by approximately annual high flows. The river and sidechannels may be altered to restore a variable pattern down the river valley similar. Bear Creek would be adjusted to connect with the river in historical location. A larger portion of the floodplain would be inundated with water and would decrease the magnitude of flooding within the project area and downstream through this increase in storage. Existing vegetation would largely be retained, and additional riparian vegetation would be planted throughout the project area. Whole trees would be placed in jams or clusters in the channel and floodplain using materials from the Big Mosquito planning area to provide stability and fish habitat. All materials (wood, rock, gravel) would mimic natural stream system materials. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to accomplish work. All mine tailings located within existing claims would not be moved outside of the claim boundary.
- Mitigation measures are required for projects like this by state and federal regulatory agencies, and those measures are recognized by the agencies as being effective in addressing the short term impacts which are far outweighed by the long term benefits to the resources they regulate. Examples of mitigation measures would likely include actions like working during the summer when impacts are lowest on fish, maintaining fish passage, constructing channel features during dry conditions where possible, using the smallest piece of equipment that is suitable for the job, and generally implementing common sediment control measures for stream restoration projects.
- Studies using similar techniques with successful outcomes include ongoing monitoring of multiple similar projects which we will discuss at the second meeting, including Wychus Creek, Deer Creek, Camp Creek, and Resurrection Creek. One scientific paper that outlines well the techniques and principles these projects follow is a publication by B. Cluer and C. Thorne (2013) titled ‘A Stream Evolution Model Integrating Habitat and Ecosystem Benefits’.

Where are we moving the tailings to?

- What happens to the tailings depends on a number of variables, including the size of the cobble, how intermixed the cobble is with smaller sizes of stream sediments, where the tailings are on the floodplain, and other variables. The tailings are preferably not moved off-site and instead graded into floodplain and channel features. Multiple mine tailings restoration projects have planned to do extensive sediment sorting and grading and hauling of oversize sediment to storage areas, but found such work unneeded as the tailings are less uniform than they appear. On some mined sites there is a surface layer of large cobble, with a somewhat graded mix of sand, mixed gravel sizes, and mixed cobble sizes beneath. A mix of small, medium, and large substrate keeps the water on the surface. If it is all large cobble, there will be more water

table/water surface interaction, with the potential for the river to stop flowing on the surface for short stretches. If the project site has the normal mix of sediment sizes in a somewhat patchy matrix below the surface cobble layer, then the tailings can be graded to floodplain or channel surfaces without need for hauling cobbles. There may be a need to bring in finer soil from an adjacent source if substrate lacks enough fine sediment to re-establish vegetation on the floodplain. Grading of sediment is unlikely to be needed at this project site. The engineering firm may recommend that some test pits be dug to sample the different sediment layers at varying depths.

The County Road is vital, will the road remain open? Will anything be done to reduce the stability of the road?

- *The project will be designed and construction logistics will be planned to not impact traffic on County Road 20 (Upper Middle Fork Rd). The road will be used for heavy equipment access but will not be closed. Impacts to the road and road bed, including road stability, will be assessed as part of project design. As described in the question regarding flood risk above, a hydraulic model will be built for existing and proposed conditions that depict changes in water surface elevations in response to proposed restoration work. The project team will not advance project work that knowingly reduces the stability of the road.*

  Additionally, post project monitoring will allow us to evaluate the river and floodplain response to restoration work, and adaptively manage changes in risk to the road bed and road. Monitoring will occur seasonally at varying river levels so the project team can evaluate project performance and changes over time.

Aquatic restoration projects some folks have seen are great for fish, but they don't LOOK great. Using the techniques planned, what would it look like, especially floodplain reconnection.

- A lot of good things don't look or feel great in the short-run. It is in the long-run that they bear fruit and pay off. Like pulling a tooth, having a baby or doing a vegetation fuels reduction project (logging), restoration work can be a bit uncomfortable or painful in the short-run. Restoration work still involves heavy equipment and disturbance. Over time, however, the lush cottonwood and willow and other restoration benefits take root and flourish. In this instance short term (1 to 5 years) impacts are likely to include some bare surfaces and immature vegetation that provides little shade and cover. In the longer-term (5 to 10+years) the results are likely to include establishment of vegetation on surfaces that have been bare for decades, and growth of vegetation to older and larger sizes that look more natural. We will show pictures during Meeting 2 for discussion as well as examples from other projects.

Are the benefits of this project worth the cost? Is an economic cost vs. benefits analysis available?

- *The cost of the project has not been determined. MNF and TFT will receive initial construction cost estimates at the completion of 30% designs, which should be completed in late summer 2017.*
- *The project will receive cost-benefit analysis as part of the project funding process which will likely begin in early 2018 following completion of 75% design. Project funding will be sought via competitive grants from entities like BPA and OWEB that fund salmon and steelhead habitat restoration work. BPA has fiduciary responsibilities to federal rate payers and OWEB to the State of Oregon. Both entities have expert project review teams who will look closely at cost-benefits and will only award funding if benefits outweigh costs. Our initial analysis of cost benefits looking at analogous projects and the habitat and biological benefits we seek to achieve in this projects make us believe the benefits will outweigh the costs.*
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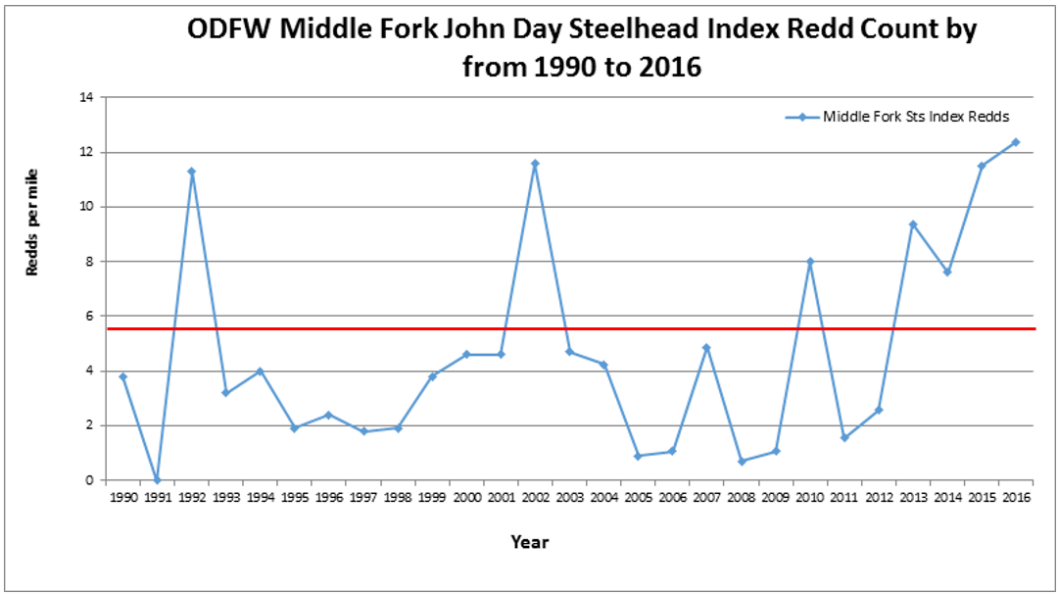
Aren't the the fish migrations reestablished? Are we trying to restore steelhead redds only in Bear Creek, or the River as well? What is the redd count above the tailings and below? Basically what are the fish data trends showing?

- Fish migrations are still occurring, but salmon and steelhead numbers are approximately 12 percent of historical abundance in the Middle Fork John Day River. For steelhead, spawning and rearing occurs in the River and nearly all tributaries that flow year round, where Chinook spawn and rear in the River and only a handful of large tributaries. Bear Creek would provide key habitat for both steelhead and Chinook if these species could access these 4 miles of stream. ODFW has surveyed Bear Creek for redds in the past and have found none. We are trying to restore redds in both Bear Creek and the River – the project area has a low percent valley slope compared with other river reaches, which under normal conditions would have lots of gravels that would produce high numbers of fish. The ODFW surveys of the River and tributaries were standardized in 1964 and show wide variability due in part to variable ocean conditions, spawning conditions, and other factors. Fish data trends show a slight recent uptick for steelhead - redd counts were below objectives for 20 of the past 27 years but have met objectives for the past 4 years. However, 2017 will likely be a very low redd count year.



Redds per mile for steelhead in the Middle Fork John Day River from 1990 – 2016.

Where is mercury in the river? Where did it come from and how to avoid releasing it into the water? What about other contaminants?

- Placer mining is the mining of stream bed (alluvial) deposits for minerals. Mercury has been used historically in placer mining operations around the world. We do not know how much mercury may have been used for placer mining on the project site, or how carefully it was saved and reused. Elemental mercury spilled on site would likely have broken into beads, which generally would work their way down through alluvial gravel deposits until being stopped by a bedrock or false bedrock layer.

  When Northeast Oregon Forest Service Mining Geologist Greg Visconty was asked about the probability of contamination from hazardous heavy metals, he gave the following response. "It is highly unlikely that there are any hazardous materials in placer tailings. Mercury was not used in the actual mining of placer gravels, but was used extensively in processing (milling) the concentrates from the mining efforts. The common practice was (and still is) to concentrate the "free" heavy black sands and gold in a washplant and discard the washed rocks into the placer tailings that you have. The concentrates were then removed to another machine (like a cement mixer) and mercury was added, collected, and processed. The mercury we see in our streams and rivers today is usually the result of spillage and naturally occurring liquid mercury - not uncommon in your area.

  The Oregon Department of State Lands, Oregon Department of Environmental Quality, Environmental Protection Agency and Army Corps of Engineers have regulatory authority of the bed and banks of the Middle Fork John Day River and will require project permits prior to the

beginning of project work. Permit requirements from these agencies will, in part, inform the threat of mercury to aquatic and human health and any testing/mitigation requirements.