



Mercury Remediation

One engineer's view

This is a sanity check!

Frederick Dill, resident of New Almaden

Who am I?.. Frederick Dill

- PhD, Electrical Engineering
 - Carnegie Institute of Technology .. 1958
- Leader in R&D at IBM for 45 years
 - President of IBM Academy of Technology (1993)
 - Finished career with Hitachi Global Storage
 - Worked on technology for manufacturing disk drives
- Fellow of IEEE
 - President of Electron Devices Society (1980)
 - Member of IEEE Board of Directors (1989)
 - Recipient of the first IEEE Nichizawa medal (2002)
- Member of National Academy of Engineering (1990)
- Many patents, publications, etc,
- Well known for breadth of interest.
- Resident of New Almaden for a dozen years

Our coastal mountains

- The California coastal range is relatively new (last million years)
 - It seems to be mostly shallow ocean bottom with low temperatures of consolidation
 - Stable mercury (sulfide) was deposited within cracks
 - It is still there because it is chemically and geologically stable
- Most of the land up-thrust has been eroded away leaving the hills with deep steep valleys.
 - Much of the mercury has long been deposited in the ocean and bay in this area.
 - This is stable until chemical or biological attack (the latter is the most common).
 - In the sulfide form it is stable enough to not be a threat to living organisms.
- Mercury in soil is pervasive in the bay area. Only traces are due to mining activity which took mercury from the deposits and at reasonably high efficiency removed it for uses elsewhere.
- The land in the bay area and in New Almaden is well within the EPA allowances for being safe to build homes on and to live in.
- All this however does not mean that there is no contribution from the coastal mountains to mercury contamination in fish in the bay or ocean and resulting contamination of other wildlife feeding on fish.

Mercury pathways

- Mercury in sulfide or oxide forms is relatively safe for mankind. It does not have significant biological activity
 - This is the mercury found in New Almaden
- Mercury in water soluble forms produced by humans with chemistry or by certain bacteria or algae is dangerous to humans.
 - This is what is concentrated up the food chain by carnivores (largely of fish)
 - It is common in large ocean fish and in fish in the bay and streams feeding it on smaller fish which get it from chiefly algae.
 - It is also common in products produced by man such as early water based paints that contaminate land fills with soluble mercury compounds on old sheet rock
- The aerobic transport of mercury (mostly volcanic and coal burning origin) has made mercury hot spots in many regions where there is little mercury in the local geology.
 - Hot spots in Georgia and Connecticut are not related to mines or geology
- Most of the mercury in bay and off-shore sediments is geologic.
 - The spent ore being removed is not a significant increment over the natural mercury which occurs from erosion of the coastal range
- The pathway from oxide or sulfide to soluble is either specific biologic activity or industrial chemical activity and not past mining

Epidemiology

- At this point the measures for mercury contamination are not related to humans
 - Fish and wildlife measurements show presence of soluble mercury
 - These apparently are not killing off any species
 - Total mercury in sediments measures chiefly stable mercury
 - Biologic conversion sites are not being identified or monitored
- Mercury in humans is not monitored
 - There is no evidence of an epidemic of human damage
 - Talk about “fisher folk” who catch and eat contaminated fish is only a story and not evidence
 - No one has actually measured the mercury in those families or that of non-fishing neighbors
 - No one has offered a “fish exchange” to provide mercury free fish in exchange for catch which is contaminated
- There seems to be no epidemic of mercury poisoning
 - This not so for lead, asbestos, and many other toxics

Summary

- The proposed “total mercury” allowed in stream sediments is 150 times smaller than the EPA limit for a safe building lot.
- All remediation to date and all that is proposed for Los Alamitos creek is strictly cosmetic. It does not remove the majority of the mercury from the sediment or prevent continuing in-flow of sediment above the limit proposed
- Human consequences must be identified and the risk evaluated. So far we have no identified human risk
- The TMDL needs to focus on toxic mercury and not on what is almost entirely geologically stable