

Friends of Admiralty Island

4/09/2021

Our Mission

Celebrate, promote, and protect, the Wilderness and National Monument values of Admiralty Island and honor those who have worked so tirelessly to advocate for and maintain its protection.

“We have been on this island for 10,000 years. We consider it sacred ground, and many have spilled their blood to protect it. When the tide is out our table is set. The island is our dish – it holds our food. We invite others to come and share, but don’t come and break our dish.”
Matthew Fred 1924-1999, Deisheetaan (Raven-Beaver) Chief, Angoon.

“Admiralty Island, in my opinion is one of the most valuable landscapes on Earth.... I have never found a better representation of a North Pacific temperate rainforest ecosystem that is still largely intact and maintains all of its post Pleistocene flora and fauna”. John W. Schoen, Ph.D. Wildlife Ecologist.

Mining in Admiralty Island National Monument

Congress set the bar high - Greens Creek mine in Hawk Inlet is permitted to mine in Admiralty Island National Monument until 2095. In allowing this development Congress declared the mine must not cause “Irreparable Harm to the National Monument.”

What we discovered - Friends of Admiralty have concluded that toxic metals from the stored mine tailings are finding several paths into the marine, freshwater and upland food chains. We have come to this conclusion after public financed extensive science testing of marine sediment, tissue, and water in 2015, 2016, 2020, and 2021. In addition, the Forest Service estimates that some 125 tons/yr. of tailings, is windblown as fugitive dust throughout the uplands and water. This, by itself is a major source of significant contamination.

Every Hawk Inlet station we sampled showed elevated levels of toxic metals compared to the premining baseline study. Crabs, butter clams, cockles, and blue mussels showed elevated levels of arsenic, cadmium, copper, lead (except butter clams), nickel (except cockles), and selenium, compared to seafood data for the same species elsewhere in Alaska.

Our 2020-2021 shell testing and dating project indicates a consistent level of lead loading over 6,000 years – this contamination can be called “sourced as Natural Background.” Live shells and those collected over the 35 years of the life of the mine indicates a dramatic increase in lead and other contaminants. The isotopic fingerprint of lead in these samples match the tailings and ore body whereas the lead found in premining shells do not. The increase in lead, we contend can only be attributed to mine operation.

We Concluded

The tailings represent irreparable harm to the marine, freshwater, and upland ecosystems and to the Monument at large.

A choice – Hecla Greens Creek Mine Manager of Government and Community Relations has stated publicly that if their mining causes irreparable harm they will lose the right to operate the mine.

The State of Alaska, Hecla, and others have stated that Greens Creek is a model mine. They further claim increases in toxins is not mine related, but due to natural leaching from the surrounding mineralized area.

We have demonstrated through our testing that this opinion is not supported by science. We have demonstrated the mine is a direct cause of increased levels of toxins.

The Forest Service, the mine's primary permitting agency has some reservations on the environmental and legal implications of the mine as currently operated. In 2013 the Forest Supervisor denied the mine's request for a 30–50-year tailing's pile expansion and agreed to a modest 10-year expansion because of a lack of solid analysis of tailing's projected impacts and other data.

The mine is now proposing to limit the tailings footprint but stack tailings higher. This seems like a very bad idea given the increased height could increase instability and increase the wind-blown fugitive toxins.

Friends of Admiralty's Position A Paradigm Shift – We do not want to see the mine closed but want to see the mine become the actual green model for mining in rainforests with high-value marine, freshwater, and upland habitat and not cause irreparable harm.

The tailings are the key. We believe they represent irreparable harm forever. They are currently the primary source of toxins entering the food chains. Stored on site the Forest Service has correctly stated that the tailings and discharge water will have to be monitored and treated forever. The only option we envision is to remove the tailings.

Friends of Admiralty had a sample of Greens Creek tailings tested, using geo-polymers to determine their suitability in creating cement/concrete. Initial results indicate the tailings exceeded the qualities of Portland Cement.

Demonstrating that the tailings have value and can be repurposed we are petitioning the Forest Service to develop and consider an alternative that removes the tailings from Hawk Inlet in response to the mine's current request to increase tailings storage.

REPURPOSING MINE TAILINGS

Geopolymers as a Substitute for Cement:

A consultant tested the Greens Creek tailing's and determined that using geopolymers the tailings exceeded the performance of Portland cement. This is a strong indication that these Tailings are suitable to be converted into marketable building materials as well as being encapsulated in place.

Geopolymer, is the name given to a group of alkali activated alumino-silicate binders that are formed by reacting certain silica-rich and alumina-rich materials that result in a mixture of compounds that harden into a strong matrix similar to but exceeding common cement. Geopolymers can be mixed with aggregates including crushed waste rock to produce high strength and non-leachable concrete.

Geopolymers are green materials that can serve as environmentally friendly construction materials and contribute to sustainable development.

Concrete made with cement binders like OPC have become the primary global building material, but the carbon dioxide emissions of the construction industry where concrete is the main material are tremendous, accounting for 5% to 7% of the global total of GHG emissions.

All OPC used in the Pacific NW including Alaska is imported, primarily from South Korea and Canada.

Comparison of Geopolymers and OPC by Physical Characteristics*

Characteristic	OPC	Geopolymers
Compressive Strength in psi	3,000-7,000	7,000-16,000
Bending Tensile Strength in psi	250-1,000	300-2,900
pH Tolerance	6.5-14	3 to 14
Salt Tolerance	No	Yes
Maximum Structural Temperature (degrees F)	1,500	2,000-2,700
Curing Time (demolding)	1-2 days	3 hours -3 days
Curing Time (High Strength)	28 days	3 days
Curing Temperature Range (degrees F)	5-420	-50 to 200
Bonds to Itself	No	Yes
Bonds to Reinforcement	No	Yes
Shrinks Upon Drying	Yes	No
Coefficient of Thermal Expansion	0.000012	-0.000001
Absorbs Water	Yes	No
Formable	Yes	Yes

*Mix designs will yield different results

As the chart shows, geopolymers are fire resistant, corrosion resistant, permeation and frost resistant. Geopolymers do not react with acids at room temperature and can be used to make acid-resistant materials. Geopolymer concrete has high mechanical strength. Geopolymers are suitable binders to immobilize toxic metals and will not leach. The lifetime of concrete structures built of geopolymers are over 1000 years compared with a 50 to 70-year life of structures built with OPC-based concretes.

Other Applications:

1. Immobilization and encapsulation of hazardous waste including acid generating mine tailings and waste rock.
2. Low permeability barriers or linings for secure landfills to protect ground water for long periods of time and to create covers or caps over existing tailings to prevent fugitive dust emissions or intrusion of rain water.
3. Construction of low permeability tailings dams and in-situ treatment of tailings to solidify them to enable mining in environmentally sensitive areas or areas with high precipitation.
4. Construction of low permeability, corrosion and heat resistant structures such as fuel tanks, chemical storage or incinerators.
5. Pumpable products for grouting and underground mine wall stabilization taking advantage of the properties of rapid setting, high early strength, low permeability and acid resistance which are particularly important for massive sulfide mines where acid mine drainage can be a major problem.

Geopolymers and the Greens Creek Mine:

In the mining industry landfill is still the most widely used technique for disposing of waste products. The threat to other local and regional natural resources, such as fresh water and food security, is very real and when better technology exists, it must be investigated. The physical stabilization of large amounts of wastes such as mine tailings, is increasingly becoming an environmental, social and political necessity.

As of this writing Greens Creek's Tailings pile contains about 10 million tons of tailings. The storm and ground water contacting these tailings will require active water treatment forever. Despite active measures to prevent fugitive dust, it is estimated that over 100 tons of dust is spread into the Monument lands and waters each year. Hecla must maintain a \$98 million financial assurance to fund closure and water treatment after the mine closes. The mine has the right to mine until the year 2095.

According to our testing, the tailings produced by Greens Creek, about 420,000 tons per year, are uniquely suitable for the production of geopolymer cement and concrete. Utilizing these tailings in construction materials, roads and bridges and in hundreds of other applications will provide a cheaper source of environmentally friendly materials, create local jobs and protect the National Monument and local fisheries. It will remove the tailings from the national Monument, prevent harm and show that it may be possible to envision zero-waste mining without increasing the cost of extracting minerals.

To solve the other impacts of mining on our public lands and to encourage a collaborative partnership with the mining industry and communities, the Foundation will create a living laboratory in Hawk Inlet funded by the sale of these products. Taking this step with the mining industry will go a long way to help gain social license for other mining projects near communities or sensitive lands and waters.

Hawk Inlet and the Greens Creek tailings are both unique opportunities for progress in developing solutions to lower the detrimental impacts of mining in Alaska and elsewhere while growing and diversifying the local economy for the future.