

Summary of investigation into the potential for lead exposure through the ingestion of ground bison rib meat harvested with conventional lead-core ammunition.

Conducted by NPT Wildlife Division staff biologist David Moen MS., at the end of the Nez Perce Tribe Yellowstone Buffalo Treaty Hunt in March 2021 and presented to the Nez Perce Fish and Wildlife Commission on September 15th, 2021.

For the last few years Nez Perce Tribe conservation biologist, David Moen, MS., has taken his hunting stewardship outreach duties to Gardiner, MT, to assist tribal hunters engaged in the Yellowstone buffalo hunt and share with them about the conservation and health benefits of switching to lead-free ammunition for their harvest.

On the 26th of March, while engaged with Nez Perce hunters that were part of the Tribe's Community Buffalo Hunt, Mr. Moen joined Mr. Quincy Ellenwood in the processing a buffalo that Mr. Ellenwood had dropped after seeing it had been wounded. During their work they noticed there had been a through shot between the ribs along with one or two other random bullet wounds in the rear. After the ribs were lifted from the animal (photo below), Mr. Ellenwood voluntarily offered both sets to Mr. Moen to be radiographed (X-rayed) to see what kind of evidence of lead fragmentation, if any, could be obtained from them.



The removal of one of the buffalo's ribs with a cordless Saws-all.

Methods: The next day Mr. Moen arranged to have the ribs boned-out and the meat ground and packaged at Matt's Old-Fashioned Butcher Shop and Deli in Livingston, MT, which produced over 30 lbs. of burger meat (17 ½ 2 lb. bags).



One of the ribs being off-loaded at the butcher shop.

After returning to Lapwai, Mr. Moen had all packages of ground buffalo meat radiographed at the clinic to look for evidence of lead contamination. What was discovered far exceeded expectations.



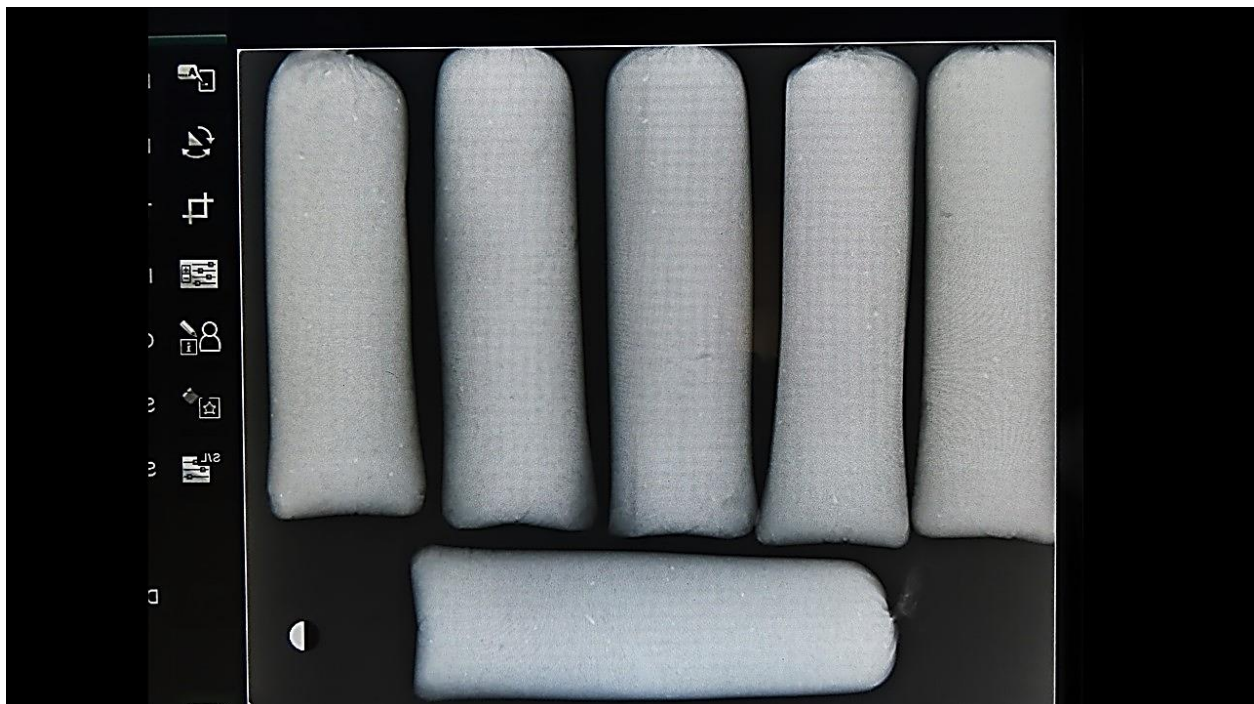
Batch Two of the ground burger bags prepared for radiographing.

Results: In all three batches, radiographing revealed that every one of the 2 lb. burger bags contained more lead fragments than could be counted. In the radiograph images below, lead fragments appear as bright white flecks:

Batch One:



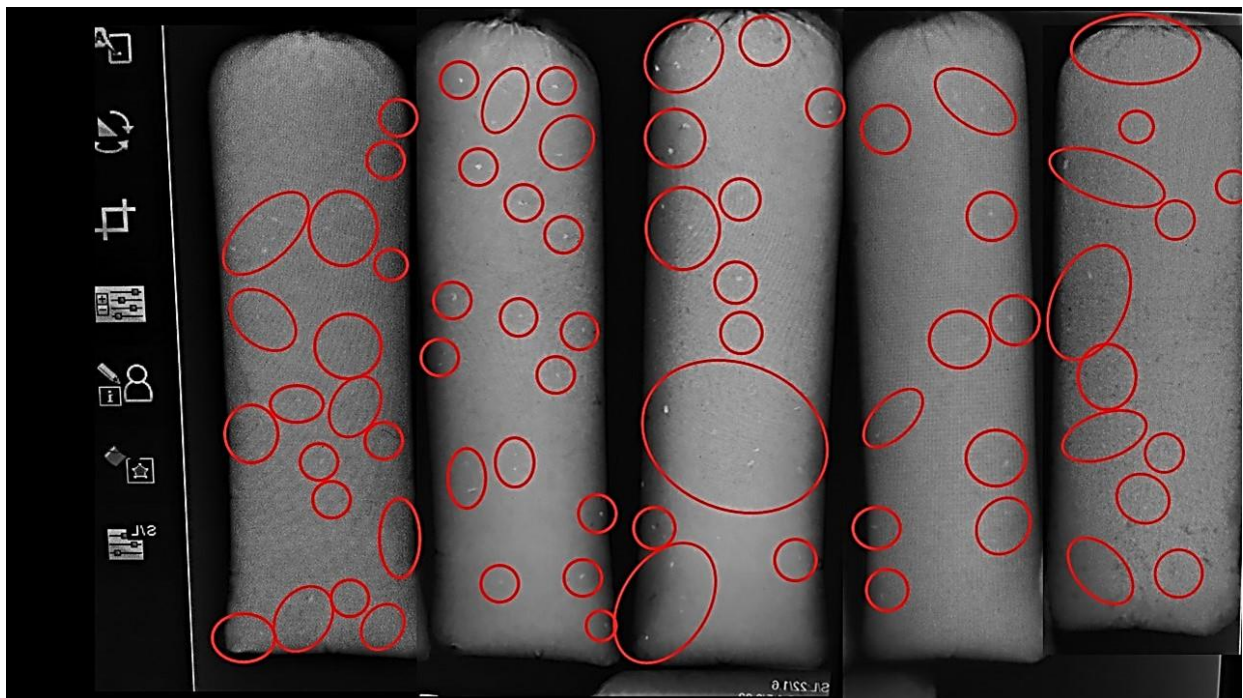
Batch Two:



Batch Three:



The following close-up of the above batch is darkened with lead fragments circled in red:



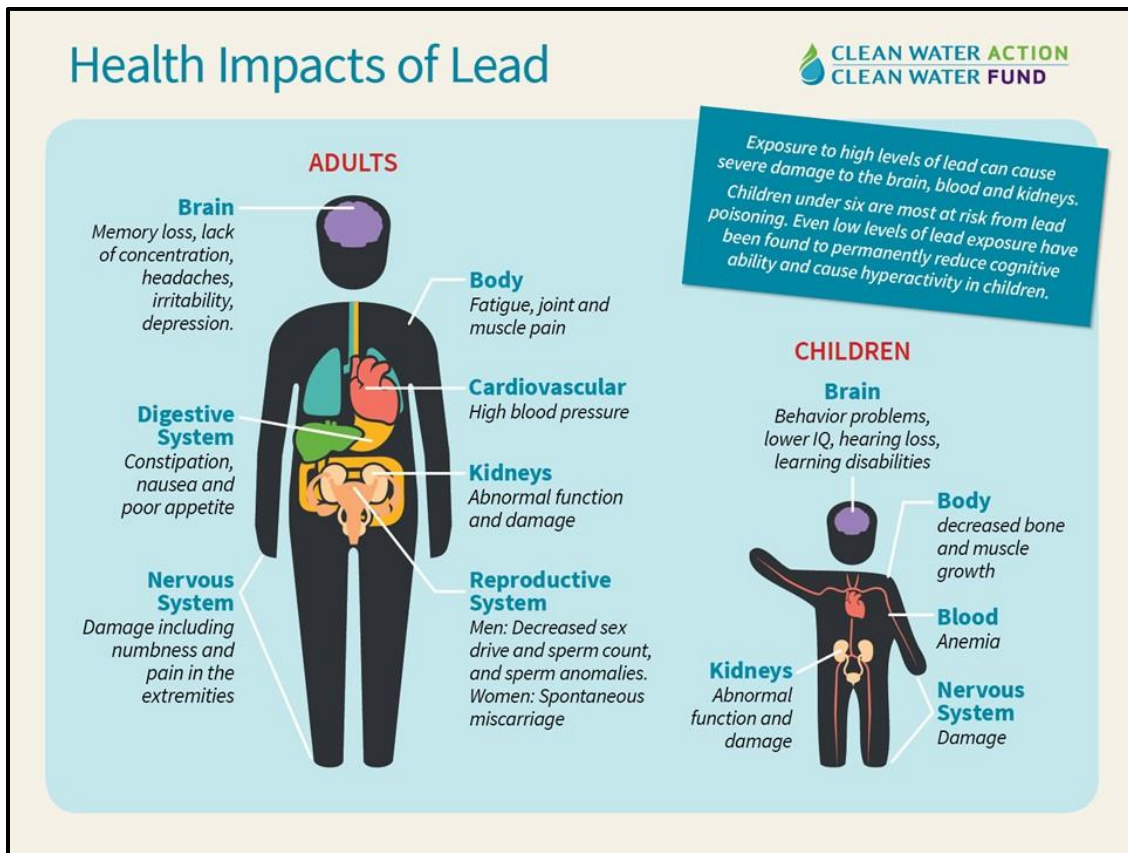
Assessment: After testing Mr. Moen gave all the meat packages back to Mr. Ellenwood explaining that there was no foreseeable way for anyone who might want to consume the packaged meat to avoid direct lead exposure, and that if he chose to ingest it he would be at high risk for elevated blood lead levels based on the results.

Discussion: This particular harvesting scenario proved to be ideal to test for the presence of lead fragments in meat due to three components: 1.) the use of conventional copper-jacketed, lead-core ammunition, 2.) the shot in the viscera through the ribs, and 3.) the mixing of the meat (and therefore lead fragments) in choosing to grind the meat into burger.

After being presented with the results, Mr. Ellenwood wanted to know what the health risks of chronic lead-exposure might be. This is a particularly important question for tribal subsistence hunters who routinely risk exposure to lead by exercising their reserved treaty rights throughout the year using lead ammunition.

It is not the aim of this report to provide a comprehensive list of the complex ways lead affects human health, but the topic has been greatly studied and more information than what is below can easily be found online. Suffice it to say that lead is a cumulative toxicant that affects multiple body systems and is particularly harmful to babies and young children.

General impacts of lead exposure to human health include:



On their website, the Centers for Disease Control and Prevention (CDC) distinguish the short-term and long-term impacts of lead exposure:

A person exposed to lead over a short period of time may feel:

- Abdominal pain
- Constipated
- Tired
- Headachy
- Irritable
- Loss of appetite
- Memory loss
- Pain or tingling in the hands and/or feet
- Weak or lethargic

A person exposed to lead over a longer period time may feel any or all of the above symptoms with additional symptoms that include depression, distraction, forgetfulness, nausea, and susceptibility to high blood pressure, heart disease, kidney disease, and reduced fertility.

The CDC points out, that “because these symptoms may occur slowly or may be caused by other things, lead poisoning can be easily overlooked. Exposure to high levels of lead may cause anemia, weakness, and kidney and brain damage. Very high lead exposure can cause death.” (Source: <https://www.cdc.gov/niosh/topics/lead/health.html>).

Studies have also correlated repeated lead exposure to increased aggressive behavior and violent crime rates (<https://www.sciencedirect.com/science/article/abs/pii/S0013935107000503>)

A case study from 2017, *Chronic Lead Intoxication from Eating Wild Harvested Game*, documents that subsistence hunters who routinely risk exposure to lead in this manner can face other health threats including gout and joint pain. This study also provides evidence that switching to lead-free ammunition significantly reduces subsistence hunter’s blood lead levels.

Further evidence of this last point occurs in a 2012 study, *Lead Exposure in Nunavik: From Research to Action*, in comparing blood lead levels of subsistence hunting populations in Nunavik with non-hunting populations. The study concludes that, “Analysis of blood samples show that blood lead levels in Nunavik significantly declined between 1992 and 2004, with the decrease occurring primarily in 1999_2000 (23), namely the period corresponding to the intervention by Nunavik organizations relative to the banning of lead in hunting activities.”

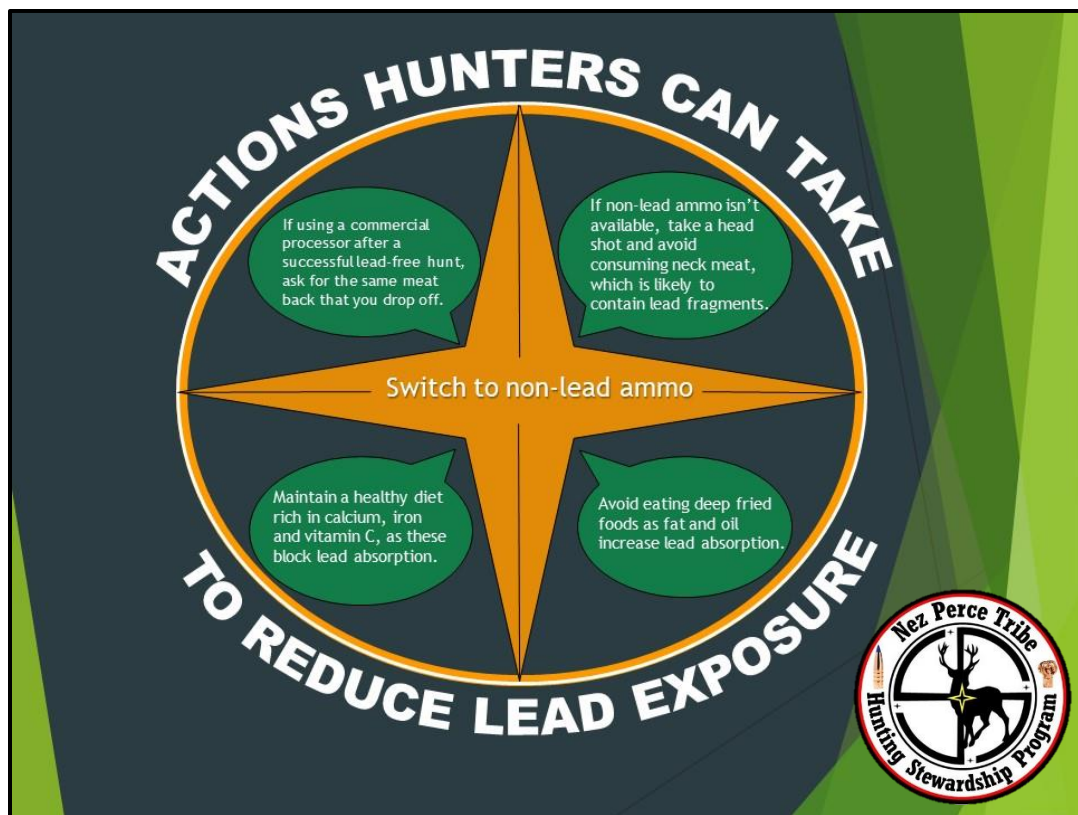
Regardless of the dose or frequency of exposures, the key facts about human health and lead are worth repeating. According to the World Health Organization (WHO, 2018) these include:

- **Lead in the body is distributed to the brain, liver, kidney and bones. It accumulates in the teeth and bones, where it is stored over time. Human exposure is usually assessed through the measurement of lead in blood.**
- **Lead in bone is released into blood during pregnancy and becomes a source of toxic exposure to the developing fetus.**
- **There is no known level of lead exposure that is considered safe.**
- **Lead exposure is preventable.**

Conclusion: This investigation reveals how a particular subsistence rifle-harvesting scenario creates a high probability for toxic lead exposure through the consumption of lead fragments in burger meat. It shows the vulnerability that hunting families face when they attempt to do the right thing and prevent meat wastage by boning-out and grinding rib meat after a through shot with a lead bullet in the visceral cavity of their targeted animal. This combination of choices represents a particularly dangerous scenario for lead exposure, reinforcing how important it is for hunters to switch to lead-free, copper-based ammunition in order to completely avoid any risks of this kind.

Furthermore, it also serves as evidence that there is a spectrum for potential lead exposure that rifle-hunters face based on the choices they make regarding: 1.) the type of ammunition they use, 2.) the placement of their kill-shot, and 3.) how they decide to butcher the meat they acquire.

These results strongly suggest that shot placement and processing choices can influence potential lead exposure. When hunters do not utilize lead-free ammunition options- due to national ammo shortages, a lack of local availability, personal funds, or awareness- and conventional lead-core cartridges are used, a head shot, or high-neck shot, is a safer choice than a cavity shot for animal take down (as long as the head and neck are discarded). Butchering meat into steak and chop cuts rather than grinding meat for burger is a also a safer choice, especially with a cavity kill shot.



For more information please visit: www.nezpercewildlife.org/get-the-lead-out