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## Breakthrough Medicine



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### Message from the Author

*I would like to thank you for taking the time to read my letter. I am a concerned Naturopathic physician who has practiced in the Verde Valley for more than 20 years as a primary care provider. Early in my career I did specialty training in Environmental Medicine with Dr. Walter Crinnion. I am a member of the National Association of Environmental Medicine, National Association of Environmental Professionals, and participate weekly medical rounds with Environmental Medical Education International.*

### Introduction and history

*June of 2023, a concerned colleague contacted me. He asked me if I had seen an increase in cancer and autoimmune. I told him around 2015 my practice had a big shift from longevity medicine, now more than half my practice is cancer and autoimmune. I said, this could be due to many factors why? He told me the reason why he contacted me, was to see if I knew about the re-finishing of the Cottonwood Slag pile. I was unaware and wanted to know more. The following day I met with him, one of his ill patients, and Children's Health Defense. Since that meeting, this has been the focus on my study for the last 5 months.*

*Located by 6<sup>th</sup> street is the Fairgrounds...*



*In 2008 negotiations began with a Tuscon based company to recycle the copper slag pile which is located in the center of Cottonwood, by the fairgrounds, kids park, library, rec center, VFW, subsidized housing, senior center, fire department, police department, buisnesses.. At the time Mineral Research Inc (MRI) presented a proposal and was granted a temporary permit. The purpose of this project is to recycle copper slag into: sharp shot, asphalt, shingles, dog runs...*

At the 2008 Cottonwood city counsel meeting a concerned citizen brought up violations from MRI's AJO plant. Also the former vice mayor of Sedona in the meeting voiced his concerns on toxicity dispersion. MRI stated that they submitted Leach Studies to ADEQ (AZ environmental quality) and there was only barium and chromium. They also stated that since this project collects dust; therefore, there will be no dispersion off site. MRI was granted a temporary permit. As part of this conditional permit, MRI was suppose to conduct Phase 2 environmental studies. There were delays in setting up the processing plant. Eventually MRI put in a processing plant around 2013 and was in operation 2014.



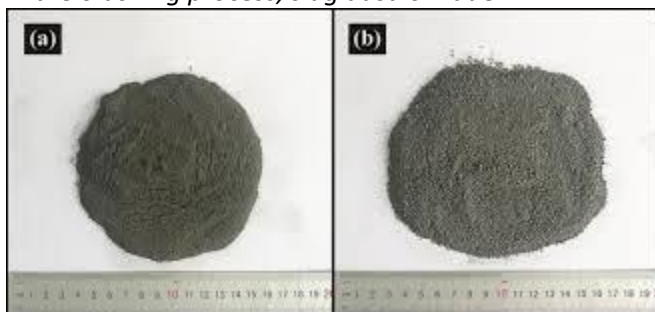
Please note the slag dispersion in one year

shows is an aerial from google earth from 2014, rodeo grounds are to the lower left side & fairground building upper left 7- 11 o'clock, VFW at 5-6 o'clock, and surrounding buisnesses from 12 o'clock to 5 o'clock..

### Mining Waste

What is in Copper Slag Dust anyway? Iron silicate is the primary metal in copper slag and some copper was my guess. In a journal review "Copper slag generated mainly during copper smelting, and classified as a potentially harmful waste, is an important secondary resource containing not only valuable metals, such as Cu, Fe, Zn, Co and Ni, in abundant quantities, but also hazardous elements, such as Pb and As."<sup>1</sup> Pb is lead and As is Arsenic by the way.

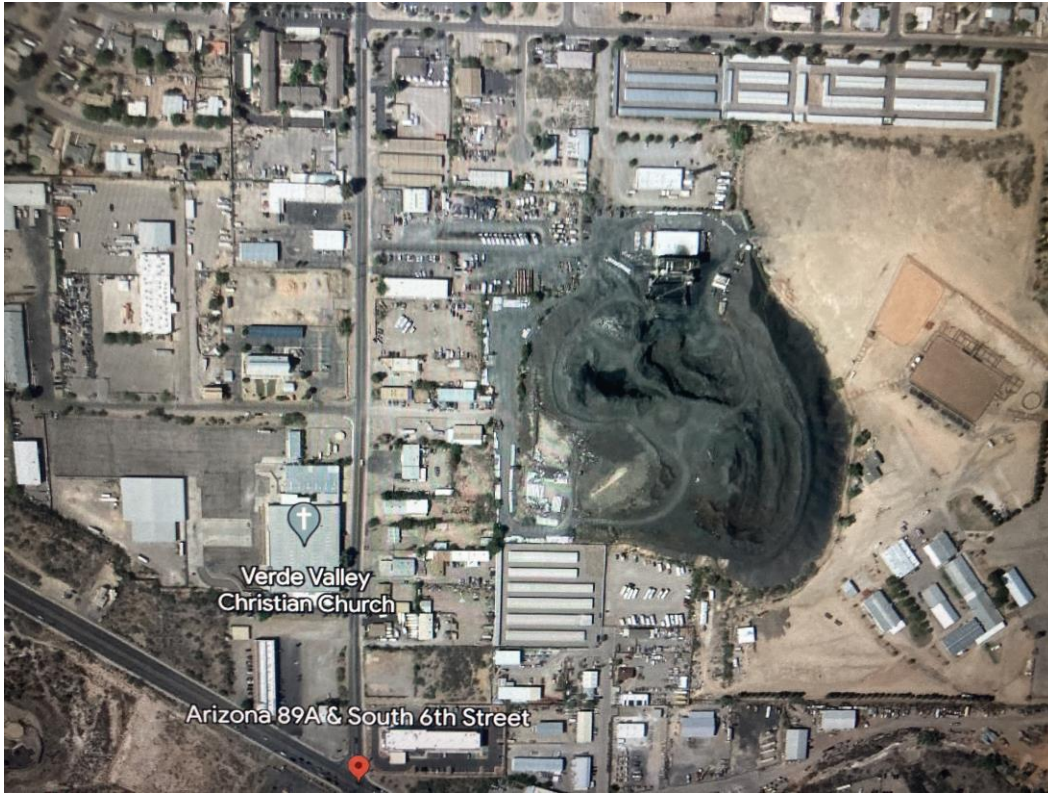
In the crushing process, slag dust is made.



August 2023 Google Earth- August 28 I was driving up 89 A to Jerome from my office on Main Street. I wish I stopped to get the picture of how the slag pile had literally transformed into the shape of a Parot head. All I could think was about the large hanging mass of slag and when it falls or comes down, it will disperse more toxic metals. The following week, I got an email from ADEQ stating they did an unannounced visit to MRI the

<sup>1</sup> Comprehensive review on metallurgical recycling and cleaning o copper slag, Journal Resources, Conservation and Recycling vol 168 May 2021

week before. I hope they drove up 89A to get a good look at the huge hanging slag on top of the Slag Pile at MRI's site.



### **October 2023**

*After community members appeal to the City of Cottonwood and ADEQ about the situation of Slag Dust dispersment, MRI could not show that they have done phase 2 environmental studies since processing in the middle Cottonwood City. "ADEQ has temporarily shut down the MRI slag crushing facility until they get an air quality permit. This is a great start, but after speaking with ADEQ, they said MRI will be back up and operating as soon as this new air quality permit is in place." states Jennifer Richards.*

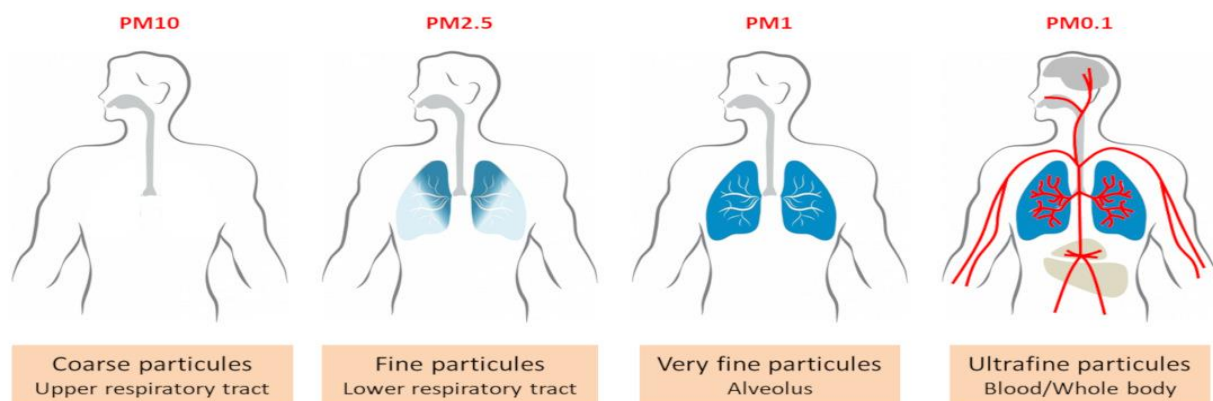
### **Contamination- Particulate Matter**

*After my colleague's patient moved into the office by the VFW and became ill, she hired an environmental scientist to collect and test what she believed was making her sick. In our meeting of concerned citizens in July, the environmental scientist stated that the report revealed that the particle size was very small and had a lot of iron silica. PM 2.5 and possibly smaller. PM stands for Particulate Matter. 2.5 stands for size which is microns. To give you an idea of how small 2.5 micro might be, you can think of a bacterial cell. We know a lot about PM 2.5 from occupational health hazard, pollution, and studies on wild fires.*

### **Review of pathophysiology: PM2.5 Mechanisms of Damage**

*"PM2.5 (particles < 2.5 micron) cause oxidative damage in human cells. This leads to:*

- Upregulation of phase I detoxification enzymes (Cytochrome P4501A1 and 1B1)*
- Decreased levels of reduced glutathione Increased inflammation: elevated CRP, TNF- $\alpha$ , IL-6, IL-8, IL-1B, MCP-1*
- Oxidative damage at cellular and mitochondrial level Increased levels of 8-OHdG (marker of DNA damage)*



The important take home, breathing in small particles cause oxidizing substances such as Reactive Oxygen Species (ROS). When the defense mechanisms are exceeded, inflammatory reactions will appear; in the final stage, cell death can occur, either by necrosis or apoptosis (programmed cell death), and or possible changes in cells. At the cardiovascular level, **atherosclerosis**, an inflammatory process in the blood vessel wall, will lead to the formation of atheroma plaques and arterial damage; this is one of the mechanisms of heart attacks and strokes.

As mentioned above, the composition of particles is one of the determinants of their toxicity. Thus, transition metals such as iron, copper, or vanadium, can lead to the production of the highly reactive hydroxyl radical. Organic compounds cause the production of ROS in macrophages and bronchial epithelial cells via quinones and polycyclic aromatic hydrocarbons.<sup>2</sup> this can cause asthma, lung issues, possible lung cancer. When small particles containing known carcinogens are breathed in, the consequence can cause cancer, pneumonitis, and or scarring of the lungs. These conditions do not happen overnight but can present years later.

### Statistics for Our Area

I became concerned and contacted Department of Health and Human Services to see if Yavapai County has any significant cause of death. By county 2020 statics shows Yavapai is number two in total Malignant neoplasms of Females in the state of Arizona.<sup>3</sup> "By county 2020 statics shows Yavapai is number two in Prostate Cancer of Malse in the state of Arizona. By county 2020 statics shows Yavapai number one in Alzheimer of males in the state of Arizona"<sup>4</sup> I received questions about the average age of your community. Yavapai County average age based on census in 2020 was 54 years old. La Plaza Arizona average age was 57 years old. I looked to see number of men died of Alzheimer's in La Plaza vs Yavapai county next. Yavapai county has 2.5 higher death from Alzheimer than La Plaza.

### Doctors Data Report

Concern about the potential toxicity of slag dust that was collected at my colleague's patient's office and collected around town by the environmental scientist; I sent a sample she gave me to my lab I use to test patients for heavy metals. This lab is not a certified environmental lab; however, I reviewed the situation with their medical liaison who said they would do this as a special project. I received a copy of a preliminary test from the Environmental Scientist that the patient hired, and it is similar.

Analysis performed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)  
10 mg of sample digested in 2.5mL nitric acid, diluted to 50mL; run in triplicate- Table 1

<sup>2</sup> <https://www.encyclopedie-environnement.org/en/health/airborne-particulate-health-effects/>

<sup>3</sup> Table 5E-11 Age Adjusted Mortality Rate for Females pg. 327

<sup>4</sup> Table 5E-11 Age Adjusted Mortality Rate for Males pg. 326

Element	Result (ng / g)
Iron	51,000,000
Zinc	6,100,000
<b>Aluminum</b>	<b>3,500,000</b>
<b>Copper</b>	<b>2,200,000</b>
<b>Arsenic</b>	<b>200,000</b>
<b>Lead</b>	<b>120,000</b>
Barium	72,000
Manganese	65,000
Strontium	53,000
Cobalt	28,000
Vanadium	8,770
Antimony	8,100
Tin	7,500
Chromium	5,400
Cadmium	5,000
Selenium	5,000
Lithium	4,000
Molybdenum	3,600
Nickel	2,300
Uranium	1,500
Bismuth	724
Thorium	720
Tungsten	701
Thallium	337
Gadolinium	302
Tellurium	263
Cesium	174

*I was not expecting Aluminum to be the highest element after iron and zinc. I also thought there should be mercury. Part of the process of smelting using COKE (coal) typically releases mercury. Mercury will show later in my investigation with a review of Tavasci Marsh and Tuzigoot National Monument in another paper I am writing. We know the leach studies done in 2008 showed chromium and barium; however, no one questioned the form of chromium. Hexavalent chromium is prolific in United States as a contaminant. Hexavalent Chromium is a carcinogen, so the dust samples and water testing should be differentiated for type of chromium. Environmental Working Group a non profit that educates on tap water showed Cottonwood is >300 x the acceptable limit of hexavalent chromium in 2020.*

### **Studies Around Mining Communities**

*I was asked to look at the data on health outcomes in communities that had copper mining and slag piles. I did a deep dive and did not find much on the subject which is highly suspicious. I suspect that mining companies don't want to fund studies due to liability, and everyone wants these slag piles gone from their towns. We do have data from occupational health studies from copper slag processing plants which I will explore along with the elements found in the test I ran.*

### **General Review on Copper Slag**

*This is from a recent abstract, "Mining operations, including crushing, grinding, smelting, refining, and tailings management, are a significant source of airborne metal and metalloid contaminants such as As*

**(arsenic), Pb (lead)** and other potentially toxic elements. In this work, we show that size-resolved concentrations of As and Pb generally follow a bimodal distribution with the majority of contaminants in the fine size fraction ( $< 1 \mu\text{m}$ ) around mining activities that include smelting operations at various sites in Australia and Arizona. This evidence suggests that contaminated fine particles ( $< 1 \mu\text{m}$ ) are the result of vapor condensation and coagulation from smelting operations while coarse particles are most likely the result of windblown dust from contaminated mine tailings and fugitive emissions from crushing and grinding activities. These results on the size distribution of contaminants around mining operations are reported to demonstrate the ubiquitous nature of this phenomenon so that more effective emission management and practices that minimize health risks associated with metal extraction and processing can be developed.”<sup>5</sup> Please note the size was 1 micron.

### **Respirable Particulates**

” Much attention has been focused on young children; their lungs are still immature and their immune systems are still evolving. In addition, children have a higher ventilation per minute than adults and are often involved in outdoor activities. It is also known that lungs condition of young children is a good prognostic factor for the lungs condition in adulthood. Despite heterogeneous results and some interpretive bias, the majority of short-term studies show a relationship between PM<sub>2.5</sub> exposure and the occurrence of lung disease and asthmatic disease. It is also recognized that asthmatic children are much more sensitive to the effects of particles than healthy children. Long-term studies confirm a relationship between fine particles and lung function, lung development, and the occurrence of respiratory symptoms.”<sup>6</sup>

### **Air Pollution and Covid Outcomes**

Air Pollution and PM 2.5 and smaller, could the air pollution around our area play a role in COVID outcomes. The answer is in a review of clinical study done in 2022. This study looked at the association between long-term exposure to particulate air pollution with SARS-CoV2 infection and COVID-19 deaths in California, U.S.A. “In this study we found that those living in the highest quintile of long-term PM<sub>2.5</sub> exposure in California (16.2-18.8  $\mu\text{g}/\text{m}^3$ ) had risks of SARS-CoV-2 infections 20% higher and risk of COVID-19 mortality 51% higher, than those living in the lowest quintile of long-term PM<sub>2.5</sub> exposure, after adjusting for covariates including comorbidities. Each 1  $\mu\text{g}/\text{m}^3$  of long-term PM<sub>2.5</sub> exposure was associated with a 4% increase in SARS-CoV-2 infection risk and COVID-19 mortality risk, after adjustment for covariates.”<sup>7</sup>

### **Dust Exposure**

As early as 1972 CDC wrote a report of Elementary properties of copper slag and measured airborne exposure at a copper slag processing facility, they knew of the toxicity of breathing in copper slag dust.. even back then. 1999 NIOSH report concluded that personal exposure of carcinogen metals presents in blasting; these include Arsenic, Beryllium, Chromium, Lead, Manganese, Titanium, and Vanadium when compared to blasting with silica sand. We can learn a lot of copper slag dust exposure from occupational studies.<sup>8</sup>

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<sup>5</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0048969714008869>

<sup>6</sup> <https://childrenshealthdefense.org/defender/aluminum-childhood-vaccines-asthma-cola/>

<sup>7</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9316717/>

<sup>8</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6404526/>

## **“Blasting at Cottonwood Slag Pile”**

*The Caption read from the Verde Valley Independent Mon Aug 21*



*This is a review article from Health and Human Services – March 7 2019*

*In 1974, EPA was created. The National Institute for Health was established in 1887 long before EPA. “NIH for Occupational Safety and health recommended a ban on the use of abrasives containing > 1% silica.” Given rise to abrasive substitutes like copper slag. This is the controversy is silica bound to iron not a probable. NIH should speak up again on behalf of citizens. According to MRI’s material safety sheet 35 – 45 % silica. In the article it also states “Carcinogens, suspected carcinogen, and other toxic elements were detected in all bulk samples. Personal total dust levels were moderately correlated with personal arsenic level (Rs= 0.70) and silica levels (Rs= 0.89).” The study looked at **processed vs unprocessed slag**. The take home was processing copper slag liberated the carcinogens and suspected carcinogens. – Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, and Titanium.<sup>9</sup> There are no studies processed copper slag dust blowing into neighboring buildings or contaminating neighboring landscape, playgrounds, yet.*

### **Silicates on health**

*The Mineral Research Inc. Material Safety Data sheet states that Silicate constitutes 35 – 40% of their product. This is from the CDC website: “Breathing in dust from crystalline silica-containing materials can lead to lung disease. Silica dust particles become trapped in lung tissue causing inflammation and scarring. The particles also reduce the lungs’ ability to take in oxygen. This condition is called silicosis.*

*Silicosis results in permanent lung damage and is a progressive, debilitating, and sometimes fatal disease. Chronic silicosis typically occurs after 10 or more years of exposure to respirable crystalline silica. However, the disease can occur much more quickly after heavy exposures. Silicosis can develop or progress even after workplace exposures have stopped”.<sup>10</sup> When I drove by MRI’s processing facility by the VFW, I watched the workers non were wearing protective equipment while working digging up copper slag using backhoes. Symptoms of silicosis may include cough, fatigue, shortness of breath, and or chest pain.*

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<sup>9</sup> [file:///C:/Users/Offic/Downloads/cdc\\_76379\\_DS1%20\(1\).pdf](file:///C:/Users/Offic/Downloads/cdc_76379_DS1%20(1).pdf)

<sup>10</sup>

<https://www.cdc.gov/niosh/topics/silica/risks.html#:~:text=This%20condition%20is%20called%20silicosis,more%20quickly%20after%20heavy%20exposures.>

Another study showed fibrogenicity and carcinogenic potential of smelter slag. This is an animal study, "The major reaction seen in both the feldspar- and the novaculite-treated rats was a granulomatous inflammation with varying degrees of fibrosis associated with the granulomas. Significant numbers of primary lung tumors, principally adenocarcinomas and adenomas, were seen in the copper slag ( $p = 0.005$  and  $p = 0.022$  for the primary and secondary slags, respectively), in the feldspar ( $p = 0.007$ ), in the novaculite ( $p$  less than  $0.001$ ), and in the Min-U-Sil ( $p$  less than  $0.001$ ) groups when compared to the vehicle control group. Based on the tumor incidence data, one must conclude that both copper slags tested in this study are carcinogenic to rats."<sup>11</sup>

There is a study possible close to our situation. *Metalliferous Mine Dust: Human Health Impacts and the Potential Determinants of Disease in Mining Communities*. Inhaled PM induces oxidative stress leading to inflammatory responses in the airways and bronchial hyper-reactivity and metal fumes are well-recognized causes of occupational asthma, but the contribution of metal dusts to non-occupational asthma is less obvious. High blood lead is correlated with having asthma in children, but the meaning is unclear. Other diseases linked to metal exposures (with or without air pollution) include chronic neurological disorders such as Parkinsonism and Alzheimer's disease (including Al, Cu, Mn,), renal and liver disorders.<sup>12</sup>

#### **Review of 4 Elements found in my Slag Dust Test:**

##### **Copper:**

Let's look at one of elements not considered a carcinogen but can cause illness, Copper. It of course is a copper slag pile. Copper toxicity can result from chronic or long-term exposure to high levels through contaminated water, soil, food. Remember children crawl and play in the dirt. Symptoms of copper toxicity can include diarrhea and headaches. Wilson's Disease is a rare autosomal genetic condition that they cannot detoxify copper and accumulate it in organs and the eyes. Copper can also accumulate in endocrine glands such as the thyroid, causing type II hypothyroid. I feel this is part of the etiology of obesity.

Copper has been linked to obesity. This is a serious issue because in the United State, CDC for children ages 2-19 in 2017 – 2020 probably worse since COVID, reported that the prevalence of obesity was 19.7 and affected about 14.7 million children and adolescents. Amongst Hispanic children the rate was 25.2%. The conclusion showed, "Serum copper levels were positively associated with body mass index and waist circumference, and elevated serum copper levels were associated with higher odds of overweight/total obesity and central obesity in children and adolescents."<sup>13</sup> There was also a dose response meaning the high the serum copper the greater in obesity.

In recent webinar I attended. Dr. Greenblatt presented finding around Spectrum Disorder. "Our bodies require a delicate balance of copper levels. One of copper's roles in the body is in the synthesis of dopamine, the neurotransmitter that supports alertness and motivations. However, too much copper creates an excess of dopamine leading to an excess of the neurotransmitter norepinephrine. High levels of these neurotransmitters lead to symptoms similar to ADHD symptoms: hyperactivity, impulsivity, agitation, irritability, and aggressiveness."

In children with excess copper, stimulant medications are ineffective and can cause side effects such as agitation, anxiousness, and changes in sleep and appetite. Most ADHD medications work by increasing levels of dopamine, intensifying the effects of excess copper. Excess copper also blocks the production of serotonin,

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<sup>11</sup> <https://pubmed.ncbi.nlm.nih.gov/2458479/>

<sup>12</sup> <https://link.springer.com/article/10.1007/s40726-019-00108-5>

<sup>13</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0946672X2030122X>

which is responsible for regulating mood. The imbalance of copper and neurotransmitter levels triggers emotional, mental, and behavioral problems such as depression and anxiety.”<sup>14</sup>

### **Aluminum:**

Another potential carcinogen is Aluminum. It is absorbed through the respiratory tract, skin, and gastrointestinal tract. There are studies that show it can cross the blood brain barrier which can lead to neurologic conditions such as Alzheimer’s and dementia, and spectrum disorder.

This was our 3rd highest element in my report from the lab. Aluminum is not classified as carcinogen, but a possible carcinogen; however, aluminum is rarely by itself as a toxicant and has been shown to have potentiation. ‘According to the CDC it can cause lung problems and some studies show it is also neurotoxic. During pregnancy – fetal development and premature infant have lower thresholds of aluminum toxicity. Aluminum is prolific in the environment and many vaccinations have gone to aluminum as the adjuvant which is highly controversial in a developing brain because of the potential neurotoxicity. We are now seeing higher amounts of asthma with aluminum exposure in children.<sup>15</sup> When a child has renal insufficiency their threshold to more toxicity increases because their detox pathway is compromised. It is best to remember the proximity the Copper Slag Processing Plant has to our Recreation Center, our library, our fairgrounds, and our park.

### **Alzheimer’s Disease -link to metals**

I am highly concerned that the copper slag pile processing plant is located next to Veterans of Foreign War’s headquarters. The elders of our community who are more vulnerable to toxic exposure frequent this site. Because of Yavapai county statistic of having the highest deaths in men for the state of Arizona, we should look at aluminum as contributing cause. Alzheimer’s Disease is a progressive condition that causes changes in neurocognitive function leading to loss of memory and devastation of quality of life. Estimated costs around treatment and care for Alzheimer’s patients in 2020 was \$241 billion, with a projected cost by 2050 of 1.08 trillion.<sup>16</sup> This condition devastates the families not just financially but also emotionally.

“There are many studies looking at the potential mechanism of action for Alzheimer’s. Disease (AD). It is thought to be caused by a derangement of proteins, “Accumulation of two proteins, amyloid beta (A $\beta$ ) and tau, in amyloid plaques and neurofibrillary tangles (NFTs), respectively, is thought to contribute to the development and progression of AD.” This is condition is multifactor including genes, stress, poor sleep, diet, ect; however, there are studies showing toxic exposure to metals as one possible mechanism for the disease.

One explanation is that metals play a role in changes in neurochemistry creating a cascade of changes in the brain. Some also believe it is a protective mechanism. Below is a diagram showing how metals can cause Alzheimer’s Disease”<sup>17</sup> In Copper Slag, Iron silicate is the primary metal. The diagram shows Fe which is iron as a possible contributor in the altered homeostasis meaning balance. Cu is copper and Zn is zinc, there is a delicate balance amongst these elements. In a journal review “Copper slag generated mainly during copper smelting, and classified as a **potentially harmful waste**, is an important secondary resource containing not only valuable metals, such as Copper, Iron, Zinc, manganese, and cobalt in abundant quantities, but also **hazardous elements**, such as Pb and As.”<sup>18</sup> Pb = Lead / As = Arsenic.

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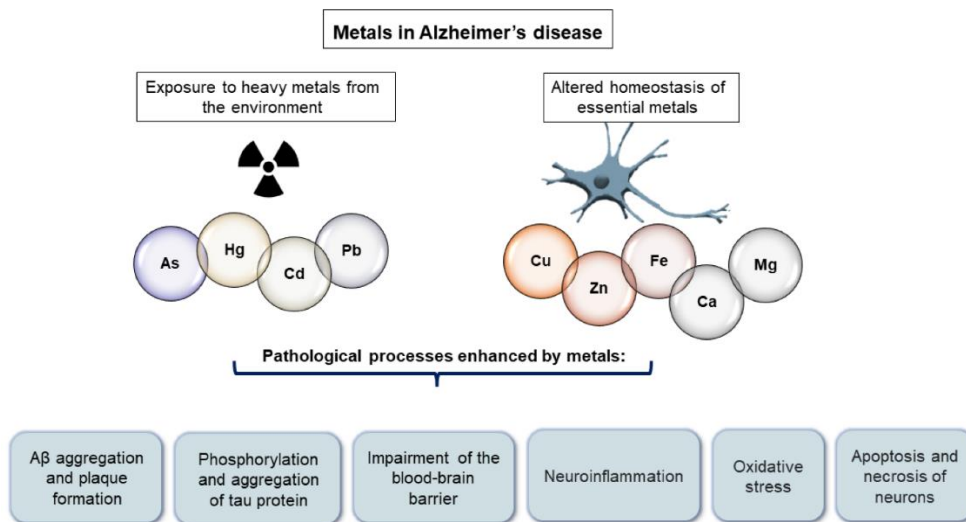
<sup>14</sup> <https://www.zrtlab.com/blog/archive/mineral-imbalance-adhd-zinc-copper/>

<sup>15</sup> <https://childrenshealthdefense.org/defender/asthma-risk-kids-vaccine-aluminum-exposure-cdc-study/>

<sup>16</sup> The End of Alzheimer’s Program, Bredesen, Dale pg 28

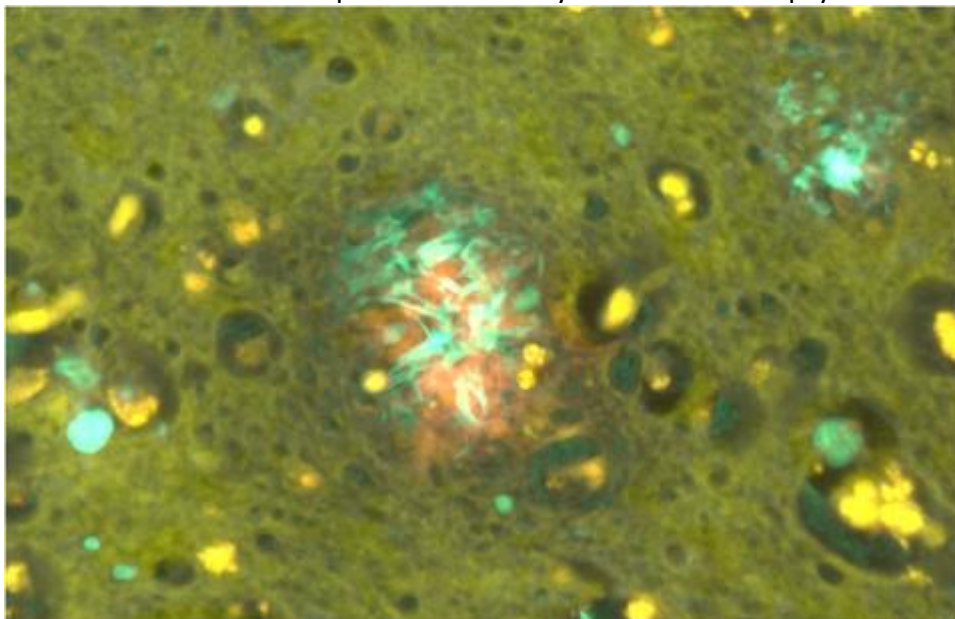
<sup>17</sup> <https://www.mdpi.com/2227-9059/11/4/1161>

<sup>18</sup> Comprehensive review on metallurgical recycling and cleaning o copper slag, Journal Resources, Conservation and Recycling vol 168 May 2021



From the Journal of Alzheimer's – study Human Exposure to Aluminum Linked to Familial Alzheimer's Disease. Amyloid-beta (green fluorescence) and aluminum (orange fluorescence) in senile plaque from brain tissue of a familial Alzheimer's disease donor. "One could envisage increased amyloid-beta in brain tissue as a response to high levels of aluminum content, or that aluminum fosters the accumulation of amyloid-beta," said Dr. Exley. "Either way, the new research confirms my resolve that within the normal lifespan of humans, there would not be any AD if there were no aluminum in the brain tissue. No aluminum, no AD."<sup>19</sup>

– Photo from Journal of Alzheimer's published January 2020 a brain biopsy



### Arsenic

Next highest toxic metal known carcinogens next highest on the list: Arsenic. "Arsenic is well absorbed by both the gastrointestinal, skin, and respiratory tract and then widely distributed through the body. Arsenic is known to cause cancer, respiratory and cardiovascular disease, diabetes, and pre-diabetes."<sup>20</sup> A National Institutes of Health study of children found a correlation between higher-than-normal arsenic concentrations

<sup>19</sup> <https://www.j-alz.com/content/human-exposure-aluminum-linked-familial-alzheimer%E2%80%99s-disease>

<sup>20</sup> Clinical Environmental Medicine, Crinnion & Pizzorno pg 120-129

in urine and early-stage cardiovascular disease. Increased exposure was related to the ingestion of certain foods and proximity to industrial sites.<sup>21</sup>

*One of my daughter's friend and mother were living at the subsidized housing near by the slag pile right around the time they began re-mining. She asked me what I thought about her daughter having 5 melanomas. Her daughter was not even 14 years old. I told her it is probably environmental. I asked her mother, since they moved, has she had any more melanomas? She stated no. I could only find 1 study on arsenic and melanoma but non on children.<sup>22</sup> Could it be because of the lead or other elements?*

*Arsenic and neurotoxicity in children. Long term exposure can begin even before birth. It can start in utero, that is why it is so important to eat organic and drink filtered water. "Chronic moderate exposure to arsenic, more so than high acute exposure, may induce greater harm on intellectual function in children. Several investigations by Wasserman and colleagues showed that the relationship between arsenic exposure and cognition in children might be age dependent. In a study of arsenic-exposed children aged 6 y.o., researchers found a negative association between arsenic and performance on the Wechsler Preschool and Primary Scale. In this review study there was also a strong correlation between arsenic toxicity and mental health status. There is substantial evidence to suggest that arsenic exposure increases the risk of impaired cognition and enhanced susceptibility for mood disorders."<sup>23</sup>*

#### *Arsenic and obesity*

*Arsenic is associated with cancer, heart disease, diabetes, and obesity. "This study also showed that the higher the arsenic, the higher the BMI. The WHO estimated that in 2016, more than 1.9 billion adults worldwide were overweight, and of these over 650 million were obese. In the US, **it has been estimated that by 2030 nearly 1 in 2 adults in the US will be obese.** Overall, these large numbers, combined with the large numbers of people who are also exposed to arsenic, highlight the important role that a synergistic relationship between arsenic and obesity could play in public health. Clearly the best approach to improving public health is to focus on interventions aimed at decreasing exposure to arsenic as well as obesity."<sup>24</sup>*

#### **Lead**

*Lead is then next prolific contaminate in the slag dust and a known carcinogen. "Lead is readily absorbed through the respiratory, skin, and gastrointestinal tracts. **Gastrointestinal absorption of lead in children can be up to five times greater than adults' exposure** to the same source. Lead crosses both the blood-brain barrier and placenta, once in the placenta can easily enter the into the fetal brain. Lead is a powerful prooxidant compound causing a tremendous amount of damage to cells and tissues."<sup>25</sup>*

*Exposure occurs through various ways like inhalation, ingestion, or skin contact. Direct contact of lead or lead-based compounds through the mouth, nose, eyes and through cracks of the skin may also increase lead levels. In adults, about 35–40% of inhaled lead dust is deposited in the lungs and about 95% goes into the bloodstream. On ingestion of inorganic lead almost 15% is absorbed, however this value is higher in children, pregnant women, and people with deficiencies of calcium, zinc or iron. **Children are at a higher risk,***

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<sup>21</sup> <https://childrenshealthdefense.org/defender/children-arsenic-risk-cardiovascular-disease/>

<sup>22</sup> <https://childrenshealthdefense.org/defender/arsenic-contaminated-food-water-cancer/>

<sup>24</sup>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7891850/#:~:text=Arsenic%20is%20associated%20with%20cancer,mofier%20of%20arsenic%2Dcaused%20disease.>

<sup>25</sup> <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>

**particularly at sites where lead related occupations are nearby playgrounds.** Poisoning due to lead occurs mainly by ingestion of food or water contaminated with lead. However accidental ingestion of contaminated soil, dust or lead based paint may also result in poisoning. Lead is thought to be quickly absorbed in the blood stream and is believed to have adverse effects on certain organ systems like the central nervous system, the cardiovascular system, kidneys, and the immune system.<sup>26</sup> Again remember kids play in dirt and often stick the fingers in their mouths.

Early in my career I had a family that brought their son to me. He was about six and showing signs of ADD / Autism Spectrum disorder. I did a hair analysis on him which was noninvasive, but also not reportable to CDC. He was off the cart in lead. I tried to convince them to test his blood, and let me detox him, that did not happen. I reviewed the history; he was on track for his typical milestone then he had a big shift. They moved to a new house and began renovating, it was lead paint dust exposure. This exposure forever changes the trajectory of his life and his family. He is now in his twenties. His family states he cannot focus, work is difficult, socializing is difficult. They are still supporting him. This is a big deal!

Blood Lead Levels shown < 5 microgram / dl are capable of reducing IQ levels. BLL > 1.6 microgram / dl in children have been strongly linked to increased risk of attention deficit hyperactivity disorder, oppositional defiant disorder and misconduct disorder. We now have a 5G town nearby. 5G changes the threshold of toxicity to below 1 microgram / dl in one study, I will share later. Cumulative lead burden assessed in adults by bone level, is associated with a risk of developing both Parkinsonism and Alzheimer's disease.<sup>27</sup> These are all big deals and financial burdens on generations to come.

From Birthdefects.org: Lead can affect reproduction in both males and females. Lead can increase the risk of spontaneous abortion. In males, high levels of lead exposure can cause sperm abnormalities. The abnormalities include abnormal sperm forms, decreased mobility, and even absence of sperm. Some studies have reported a significant increase in spontaneous abortion and birth defects when the father was exposed to lead during sperm formation. Parental lead exposure was associated with an 8.6-fold elevated risk of pre-term delivery, and with a 2.4 fold perinatal death rate, and a 5 fold rate of low birth weight.<sup>28</sup>

### **Lead is a Carcinogen**

There are many studies linking lead exposure to various cancers, but lead and Lung cancer has been studied for years. 1997 study showed cumulative exposure to lead on workers of smelter. "The increased relative risks were probably mainly due to interactions between lead and other carcinogenic exposures, including arsenic."<sup>29</sup> In an article Environmental exposure to lead as a risk for prostate cancer showed exposure of aging males that Lead may be a risk factor for prostate cancer and/or benign prostate hyperplasia possibly through generation of reactive oxygen species and/or reducing the level of zinc which acts as a cellular growth protector.<sup>30</sup> In a study on breast cancer 284 women self-report be diagnosed with Breast Cancer there were significant blood lead levels<sup>31</sup>

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<sup>26</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4961898/>

<sup>27</sup> Clinical Environmental Medicine, Crinnion & Pizzorno pg 161-162

<sup>28</sup>

[https://birthdefects.org/lead/?gclid=Cj0KCQjwusunBhCYARIsAFBsUP9IYxGdDo7NtxvcLjYgj8ROYMxBh2KEPqH\\_b2rN37wZt6nxGHsgsMgaArAQEALw\\_wcB](https://birthdefects.org/lead/?gclid=Cj0KCQjwusunBhCYARIsAFBsUP9IYxGdDo7NtxvcLjYgj8ROYMxBh2KEPqH_b2rN37wZt6nxGHsgsMgaArAQEALw_wcB)

<sup>29</sup> <https://pubmed.ncbi.nlm.nih.gov/9098908/>

<sup>30</sup> <https://pubmed.ncbi.nlm.nih.gov/12642986/>

<sup>31</sup>

[https://journals.lww.com/enviroepidem/fulltext/2019/10001/blood\\_lead\\_levels\\_and\\_prevalent\\_breast\\_cancer.1312.aspx](https://journals.lww.com/enviroepidem/fulltext/2019/10001/blood_lead_levels_and_prevalent_breast_cancer.1312.aspx)

### **Lead and Cardiovascular disease:**

*There are many studies linking lead exposure to cardiovascular disease. This is from a review article, “ A positive association of lead exposure with blood pressure has been identified in numerous studies in different settings, including prospective studies and in relatively homogeneous socioeconomic status groups. Several studies have identified a dose-response relationship. Although the magnitude of this association is modest, it may be underestimated by measurement error. The hypertensive effects of lead have been confirmed in experimental models. Beyond hypertension, studies in general populations have identified a positive association of lead exposure with clinical cardiovascular outcomes (cardiovascular, coronary heart disease, and stroke mortality; and peripheral arterial disease), but the number of studies is small. In some studies, these associations were observed at blood lead levels < 5 microg/dL.”<sup>32</sup>*

### *Understanding the mechanisms lead and heart:*

*“In vivo and in vitro studies have shown that chronic lead exposure causes HTN and cardiovascular disease by promoting oxidative stress, limiting nitric oxide availability, impairing nitric oxide signaling, augmenting adrenergic activity, increasing endothelin production, altering the renin-angiotensin system, raising vasoconstrictor prostaglandins, lowering vasodilator prostaglandins, promoting inflammation, disturbing vascular smooth muscle Ca<sup>2+</sup> signaling, diminishing endothelium-dependent vasorelaxation, and modifying the vascular response to vasoactive agonists.*

*Moreover, lead has been shown to cause endothelial injury, impede endothelial repair, inhibit angiogenesis, reduce endothelial cell growth, suppress proteoglycan production, stimulate vascular smooth muscle cell proliferation and phenotypic transformation, reduce tissue plasminogen activator, and raise plasminogen activator inhibitor-1 production. Via these and other actions, lead exposure causes HTN and promotes arteriosclerosis, atherosclerosis, thrombosis, and cardiovascular disease. In conclusion, studies performed in experimental animals, isolated tissues, and cultured cells have provided compelling evidence that chronic exposure to low levels of lead can cause HTN, endothelial injury/dysfunction, arteriosclerosis, and cardiovascular disease”<sup>33</sup> You may not think this is important but being a Frontline COVID doctor I see this unfolding in certain people and they often end up having clotting issues. How have I been treating them? Chelation Therapy (metal detox).*

### **Autoimmune Disease**

*Back to the question from my colleague, have I seen an increase in Autoimmune? Autoimmune has a tie into many of the elements found in Copper Slag. 1999 study showed, “Occupational exposure to silica dust has been examined as a possible risk factor with respect to several systemic autoimmune diseases, including scleroderma, rheumatoid arthritis, systemic lupus erythematosus, and some of the small vessel vasculitis with renal involvement (e.g., Wegener granulomatosis).”<sup>34</sup> Aluminum can also affect the immune system and lead to immuno-toxicity. Long-term aluminum exposure can induce autoimmune diseases. After high or long-term exposure to aluminum, circulating immune complexes are increased, while the red cell immune function is decreased, which is associated with a decrease of the circulating immune complex capacity.”<sup>35</sup> “Studies reviewed here show that Arsenic significantly impacts both innate and adaptive immune defenses. Likely mechanisms involve altered expression of key immune regulators, induced apoptosis, oxidative stress and*

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<sup>32</sup> <https://pubmed.ncbi.nlm.nih.gov/17431501/>

<sup>33</sup> <https://journals.physiology.org/doi/full/10.1152/ajpheart.00158.2008>

<sup>34</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1566238/>

<sup>35</sup>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7990755/#:~:text=Long%2Dterm%20aluminum%20exposure%20can,i mmune%20complex%20capacity%20%5B10%5D>

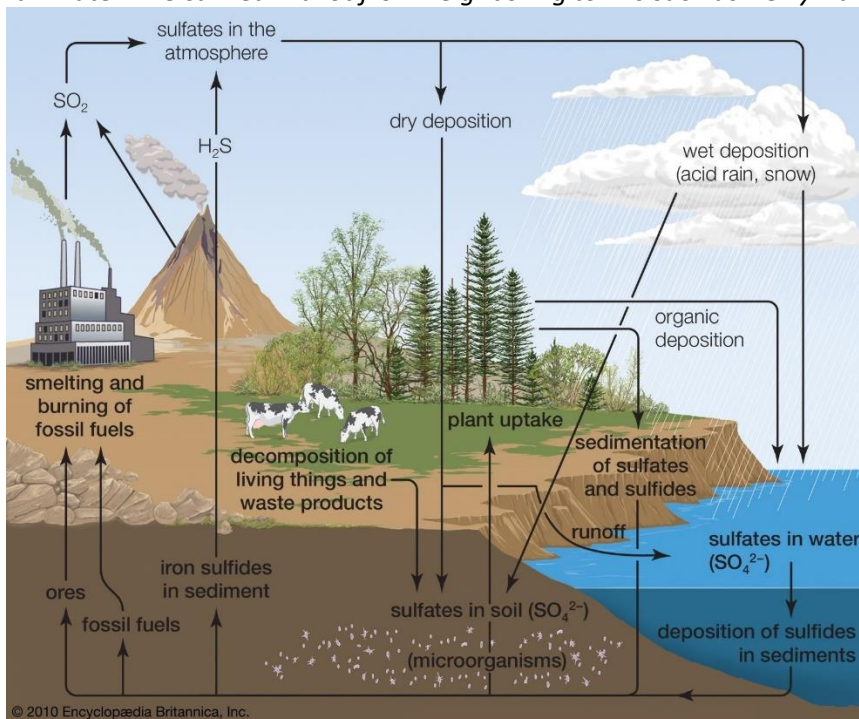
inflammation in circulating PBMC, impaired lymphocyte activation and macrophage function, and altered cellular and humoral immunity.”<sup>36</sup>“Lead can affect both cellular and humoral immune response by altering Th cell function and increasing susceptibility to the development of autoimmunity and hypersensitivity”<sup>37</sup> I believe this may answer possible contributor on why we are seeing more autoimmune.

### Recap Why Copper Slag Dust is Health Hazard

“Why Copper Slag Dust is problematic for a community”. PM 2.5 is a particulate matter that is so small that when you breathe it in it can cause trauma to tissues locally damaging and setting off cascade of reaction. PM <2.5 can be absorbed in the blood stream in your lungs. The elements in the slag dust contain heavy metals that can irritate and damage tissue. Copper slag dust has some potential carcinogen and some known carcinogens. Some of the elements are immunotoxin, hematotoxin, hepatotoxic, neurotoxic, cardiotoxic, and endocrine disruptor! Best to avoid breathing this stuff into your lungs....

### Circulating Toxicity

How does contamination of our soil, air, and storm water create an opportunity for cycling toxicity? July 2023, I sat in on an ongoing Harvest Study that is looking at how toxicity is spreading through rainwater. We can learn a lot from neighboring towns such as Dewy Humbolt, also a mining town.



*Mechanism of action  
How toxins circulate*

### University of Arizona

Plant detection from Harvest Studies done through University of Arizona showed 100% of the sample had Aluminum, Barium, Copper, Manganese, Nickel, and zinc. In the soil samples 100 % Aluminum, Arsenic, Barium, Cadmium, Chromium, Manganese, Nickle, Lead, and Zinc was detected. The professor in charge states that they do not differentiate Chromium mean hexavalent. Why is looking at this study from a neighboring town important? First, I do not believe ADEQ has tested Verde Valley’s soil since UVX shut down.

<sup>36</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3848751/>

<sup>3737</sup> <https://pubmed.ncbi.nlm.nih.gov/19540334/>

MRI has never done Phase 2 environmental testing since processing in Cottonwood. Copper slag dust has distributed for nearly 10 years since they put in the processing plant, contaminating the town more.

Please Note Rainwater Study and soil Dewy-Humboldt is our neighbor has: 100% means every sample had the metal: Aluminum in water and soil. Copper in water and soil, Lead is water and soil

**WATER DETECTION FREQUENCY**  
Percent of samples that detected each contaminant by community

Contaminants	Dewey-Humboldt	Globe-Miami	Hayden-Winkelman	Tucson
E. coli	3.9%	9.3%	11.0%	14.5%
Total Coliforms	59.6%	69.5%	55.0%	66.3%
Aluminum	100%	100%	100%	100%
Arsenic	77.8%	69.5%	96.8%	74.8%
Barium	100%	100%	100%	100%
Beryllium	48.1%	63.3%	51.6%	50.0%
Cadmium	70.4%	94.5%	98.9%	91.3%
Chromium	87.0%	85.2%	92.5%	91.3%
Copper	100%	100%	100%	100%
Manganese	100%	100%	100%	100%
Nickel	98.1%	100%	98.9%	99.4%
Lead	100%	100%	100%	99.7%
Zinc	100%	100%	100%	100%

**SOIL DETECTION FREQUENCY**  
Percent of samples that detected each contaminant by community

Contaminants	Dewey-Humboldt	Globe-Miami	Hayden-Winkelman	Tucson
E. coli	84.2%	47.9%	25.0%	55.4%
Salmonella	52.6%	41.7%	20.8%	37.5%
Total Coliforms	52.6%	41.7%	20.8%	37.5%
Aluminum	100%	100%	100%	100%
Arsenic	100%	100%	100%	100%
Barium	100%	100%	100%	100%
Beryllium	61.9%	70.7%	73.1%	72.5%
Cadmium	100%	100%	100%	100%
Chromium	100%	100%	100%	100%
Copper	100%	100%	100%	100%
Manganese	100%	100%	100%	100%
Nickel	100%	100%	100%	100%
Lead	100%	100%	100%	100%
Zinc	100%	100%	100%	100%

Please note that metals occur naturally in the environment. While we can't identify the original source of the metal. For example, arsenic may be found in soil in...

*On a positive note, I am happy to announce that University of Arizona has written (Cottonwood, Jermone, Clarkdale) into its new grant to begin studying the area. The grant has yet to be approved, but these are positive steps. We have had discussion on education of public. Future possibilities of environmental education camps for youth that can lead to scholarships is now being discussed. University Arizona has added Yavapai County to Gardenroots.com which is a soil sampling and testing project. We need to know that our gardens are safe to consume.*

**Toxic Soup**

*Since the turn of last century, our world has created a toxic soup of chemicals and heavy metals. I am not blaming all the toxicity in our air, water, soil, on MRI; however, even MRI material safety data sheet states it has known carcinogens that can cause cancer and metal known to cause birth defects. The slag pile re-finishing is a possible contributor and needs professional evaluation, not just from a concerned doctor who is worried for her community.*

*As a concerned physician in the Verde Valley, I have a legal obligation to share my findings. I am hoping we can come to a place of support and collaboration around what to do. I would like to request transparency with the public. First, we must talk about the Elephant in the room, MRI and what to do as a conscious community.*

**Please Get Involved by writing to AEDQ, City of Cottonwood, and Arizona Attorney General**

- MRI has broken their promise and possible broken laws like the clean air act
- We need professional evaluation by independent environmental scientist of the community's choosing (not by MRI).

- *I would like to see a public hearing, possible fines, and revoking of MRI's permit to process in Cottonwood. No more blasting and dispersing toxic elements around our community.*
- *We need assessment of Air, Storm Water, Soil... from various areas of Cottonwood to better understand the magnitude of contamination.*
- *I would like to see the differentiation of Chromium ASAP.*
- *I suggest that the VFW get air and soil samples first and begin education on reducing toxic exposure while in the building.*
- *Update medical providers on the situation and support them with knowing how best to test with possible long-term studies on health in Cottonwood specifically.*
- *We as a community need to be put on the Cancer Map study with regards to slag pile.*
- *We need a remediation plan and possible other options on removing the slag pile or covering it, so it doesn't disperse more metals.*

*Sincerely,*

A handwritten signature in cursive script that reads "Shaïda Sina" followed by a small, illegible mark.

*Dr. Shaïda Sina*