Pu‘uloa Beach Lead Contamination Report

October 3rd, 2022

A community preservation effort.

Prepared by volunteers from:

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Executive Summary

In January and February 2022, Surfrider Foundation O‘ahu Chapter (SFO) obtained samples of the sandy soils from the backside of impact berms vulnerable to wave interaction and the beach area directly seaward of the Puuloa Range Training Facility (PRTF) in Ewa Beach. The samples were tested by Hawaii Analytical Laboratories, LLC. The results show lead concentrations of up to 14,000 mg/kg. The Hawai’i Hazard Evaluation and Emergency Response (HEER) Office has established a lead standard of 200 mg/kg in residential areas and 800 mg/kg in industrial areas. The lead concentrations detected by SFO testing is thus over 17 times the accepted levels for industrial areas. Maps showing the locations of the samples and the results for lead concentrations are shown below in Figures 20-23 and Tables 3-4. The chain of custody forms and laboratory reports are provided in the appendices A and B.

The highly contaminated impact berms at PRTF are cause for concern, especially due to the proximity of Oahu’s EPA designated Sole Source Aquifer, the City and County of Honolulu’s (CCH) Pu‘uloa Beach Park, residential neighborhoods on either side of the firing range, and the fragile coral reef ecosystem. The lead contamination we documented seaward of the PRTF is currently exposed to coastal erosion and may migrate into the reef ecosystem or longshore to the highly used public areas. Families either live in or visit these areas each day and many children may be exposed to severely dangerous levels of contamination.

SFO reviewed the PRTF Range Environmental Vulnerability Assessments (REVA) from 2009, 2014, and 2019. We believe downgrading the “High” risk rating assigned to Foxtrot Range in 2014 to “Moderate” in 2019 was premature given the high concentrations of lead present and inaction thus far on Phases I and II of the Pu‘uloa Shoreline Stabilization Project.

As immediate steps to address the extremely high levels of lead, SFO requests that the Navy do the following:

1. Clean up any lead-contaminated soil on, seaward of, and adjacent to the PRTF.
2. Sample the soils and water at the Pu‘uloa Beach Park and within the nearby residential neighborhoods of ‘Ewa Beach and Iroquois Point.
3. Sample the reef ecosystem seaward of PRTF for lead contamination.

In the long-term, SFO asks the Navy to:

1. Relocate all of the PRTF impact berms away from the sensitive coastal environment.
2. Conduct more frequent lead remediation of berms.
3. Incorporate quantitative soil testing into the REVA program.

We strongly urge the Navy’s immediate attention to this important public safety issue. We thank you for your thoughtful consideration. If we can provide any additional information, please contact us by email at chair@oahu.surfrider.org.

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1. Introduction

The value of Hawai‘i’s beaches cannot be overstated. Sandy shorelines provide immense aesthetic, recreational, cultural, economic, environmental, and ecological benefits to our community. Sandy beaches provide a wide range of ecosystem services, including breakdown of organic materials and pollutants, water filtration and purification, nutrient cycling, water storage, groundwater discharge, and biodiversity, among many others (Buzzi, et al., 2021). They are of extreme cultural importance and a driver of Hawai‘i’s tourism economy. The Pu‘uloa littoral cell, located just west of the Pearl Harbor entrance, extending from Keahi Point to Pu‘uloa Beach Park (Figure 2) and westward is one such natural resource. This valuable beach area and the health of the people who use it are currently threatened due to contamination at the Pu‘uloa Training Facility.

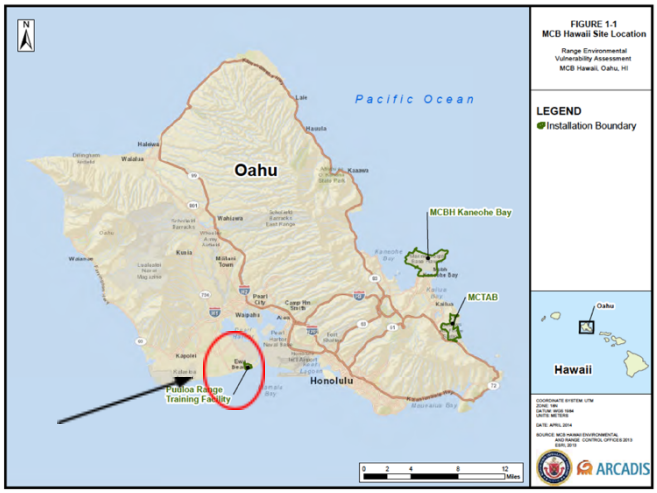

Figure 1. Map of Oahu, HI. Location of Pu’uloa Range Training Facility. Retrieved From: REVA, 2014.

Figure 2. Site map showing the location of Pu'uloa Beach, the City and County of Honolulu's (C&CH) Pu'uloa Beach Park and the Pu'uloa firing range.

The beach at Puʻuloa functions as a natural system. It starts offshore with the sands mixed amongst the reef below the waves. Above the water, the beach system extends *mauka* (inland) to the dunes that run parallel with the shoreline. The sands within the system migrate naturally; the dunes capture sand driven ashore by winds and waves, which provides a stockpile that creates an ecosystem of wildlife and also helps maintain the beach against erosive storm events.

Human activities that may damage the beach and its important coastal ecosystem are strictly controlled. According to Hawaiʻi Administrative Rules (HRS) §205A-21, "it is the state policy to preserve, protect, and where possible, to restore the natural resources of the coastal zone". At Puʻuloa, however, the coastal resources are currently unprotected from migrating contamination from the adjacent Department of the Navy property (Figure 2). The pollution diminishes the quality of the natural resources while also threatening the safety of the public and wildlife. The loss of a safe and healthy beach system is the loss of an important recreational and cultural resource and a loss to the resilience of the shoreline infrastructure, as a poorly managed beach increases the risk of coastal hazards including flooding and erosion.

Figure 3. Photograph taken on 28 January 2020, showing the erosion of potentially contaminated range soils into the coastal environment.

The Department of the Navy is currently contaminating the Puʻuloa Beach with lead due to Munitions Constituents (MC) from the Puʻuloa Range Training Facility (PRTF). MCs are any material originating from unexploded ordnance, discarded or other military munitions, including explosive and nonexplosive materials (Jenkins, et al., 2012). At a typical Small Arms Range (SAR),

concentrated and dispersed heavy metal will build up in the impact berm (Figure 4). At the PRTF SAR, the firing range impact berms are directly atop the coastal dune and are susceptible to ocean wave interaction. The Navy's lead and other contaminants can easily migrate from the range into adjacent State of Hawaii land, C&CH land and private properties due to wind, rain, and coastal erosion. Lead entering the sensitive natural coastal environment is a great risk to public health and federally protected wildlife.

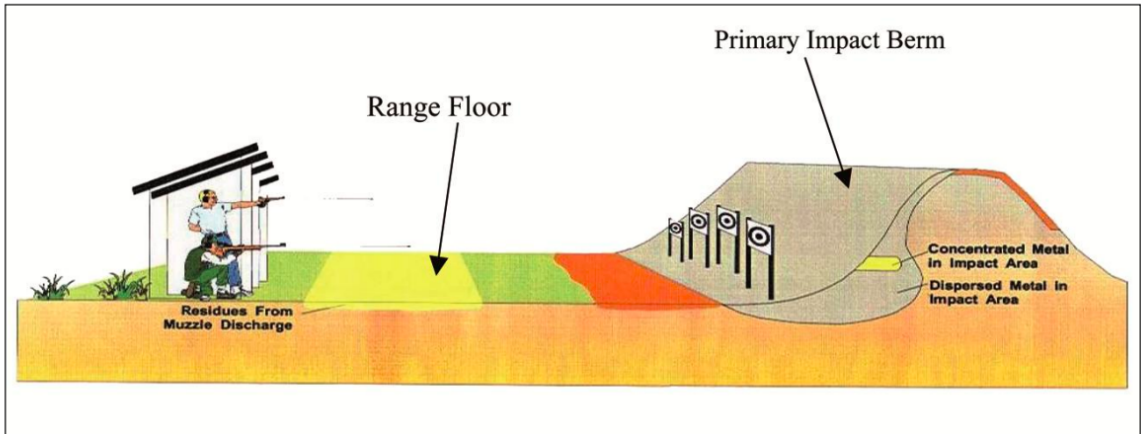

Figure 4. Cross section of a typical rifle and handgun range. (from Jenkins, et al., 2012)

The Environmental Protection Agency (EPA) has set a level of 400 mg/kg in play areas and 1,200 mg/kg for non-play areas to trigger soil remediation to protect human health (Environmental Health and Medicine Education, 2017). This regulation applies to cleanup projects using federal funds; however, this value is for guidance only and is not enforceable. Most States have their own standards and regulations. Usually, state regulations and standards are stricter than federal, and is what is followed and enforced. In the State of Hawai'i, the Hawai'i Hazard Evaluation and Emergency Response (HEER) Office has action levels or standards that lead concentrations in soil should not exceed 200 mg/kg for residential properties and 800 mg/kg for commercial and industrial properties. Soil and sand containing lead above the regulation will pose health risks to young children who accidentally ingest lead contaminated soil and sand. Children are more affected than adults due to their developing neurologic systems. A polluted beach can also inhibit the economic growth of a community, which could lead to an increased public health risk for the community. In addition, protected and endangered animals that live on the beach, such as sea turtles, monk seals, crabs and birds, may be more sensitive to lead. Lead, being a heavy metal and a Potentially Toxic Element (PTE) should receive special attention, because in addition to being toxic, these compounds are non-biodegradable and persistent, tending to bioaccumulate in biota and thus implying an exponential risk to the whole ecosystem and the health of the public.

1.1. Purpose

The purpose of the Puʻuloa Beach Strategy is to restore and preserve the marine and coastal resources of this unique and important area to assure sustainability for public use of our adjacent shoreline and recreation for generations to come.

1.2. Objectives

The goals of the Puʻuloa Strategy are:

1. Reduce risk of harm to the public and wildlife, including endangered species;
2. Recover a diverse population of native plants and animals within the dune habitat;
3. Restore a sustainable and resilient beach system;
4. Enhance the natural beauty of Puʻuloa Beach;
5. Provide ample access for a wide variety of recreational users;
6. Respect and honor historic kānaka maoli resources and cultural traditions;
7. Provide natural protection for critical inland infrastructure including military facilities.

1.3. Scope

The proposed Puʻuloa Strategy is a Puʻuloa Beach Contamination Assessment. At the completion of the contamination assessment, an understanding of the extent and degree of contamination will allow for development of a second phase to safely initiate restoration of the natural area. This draft report focuses on the details of the contamination assessment. Potential further actions may include restoring the beach and dune with diverse native coastal plantings designed to enhance the resiliency and sustainability of the natural system.

Figure 5. Photograph taken on 24 June 2020 of Pu'uloa Beach.

2. Puʻuloa Beach Contamination Assessment

To assess the risk of damage to the coastal area from lead contamination, the Puʻuloa Strategy includes three components:

1. Review of background information on the contamination issue
2. Sampling of the coastal soils and nearshore reef ecosystem
3. Coordination with government offices

2.1.1 Background: Cultural History

Puʻuloa Beach is a part of the Plain of Kaupeʻa. The native people, Kānaka Maoli, regarded this area as sacred land and the realm of homeless or wandering souls. In the 1880s James Dowsett purchased Puʻuloa to establish a large ranch. The Army acquired Puʻuloa which was then transferred to the Navy between 1915 and 1916. The Navy developed the area into a small-arms range. By 1934 the area was maintained by the Marine Corps and during the Vietnam era they established a sniper school. The school was transferred to Marine Corps Air Station Kaneohe Bay in 1979, now called Marine Corps Base Hawaiʻi (MCBH). The 1000-yd sniper range was recently relocated back to Pu'uloa in 2012.

2.1.2 Background: Munitions Constituents (MC)

SARs are associated with MCs which contain lead, antimony, zinc, and copper. Lead (Pb) is the primary concern associated with SAR because it is the most prevalent metal found in soils on operational ranges. Recently fired, unweathers bullets and shots contain metallic Pb, which generally has a low chemical reactivity, low solubility in water, is relatively inactive, and has limited vertical migration through soil matrices. However, it has a greater potential to be mobile in conditions with acidic soils, shallow groundwater, soils with low cation exchange capacity, proximity to surface waters, and high erosion rates. When Pb contacts soil it usually sticks tightly to soil particles and remains in the upper layer of soil. Pb is the material of choice for bullets because of the low cost, availability, versatility, and performance. Many bullets have a coating of copper making them more environmentally sensitive in wet soils because of the galvanic corrosion potential. Bullets from rifles are more likely to break apart than pistols, exposing more Pb to the soil and providing a larger surface area.

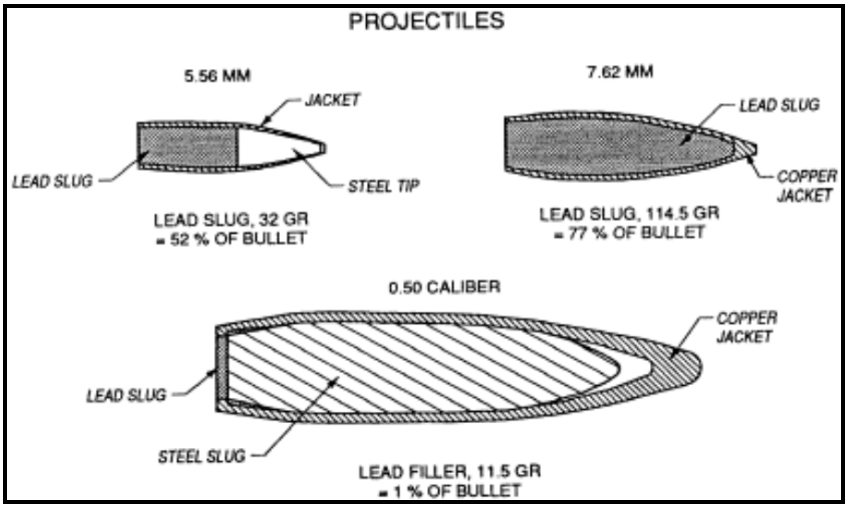

Figure 6. Diagram of Lead Bullets. Retrieved from: Scott, 2001

2.1.3 Background: Pu‘uloa Range Training Facility

PRTF was established in the early 1900s and is positioned on the leeward coast near Pearl Harbor, at the Eastern edge of the ‘Ewa Plain. PRTF is a 137-acre facility consisting of six SARs, containing two rifle ranges and four pistol ranges. PRTF has a combined total of 100 firing lanes. These six ranges are oriented from North to South, with the firing direction South toward the Pacific Ocean (REVA, 2014). Ranges are illustrated in figure 7.

Figure 7. Map of Range Locations. Retrieved from REVA, 2014.

Alpha Range is listed as a Known Distance (KD) rifle range up to 1,000-yard firing line. Bravo, a KD rifle range, has firing line ranges up to 600-yards. Charlie, Delta and Echo Range are also KD pistol ranges supporting pistol, shotgun and rifle ammunition. Similar design and training features as Echo, Foxtrot Range is a KD pistol range and is one of the most heavily used ranges at PRTF. According to Range Control personnel, it facilitates about 80% of the annual sustainment training for MCBH personnel (REVA 2014). The six SAR impact berms are within 100 feet of the Pacific Ocean with no additional structures to protect the beach, and significant portions of the impact berms are within 10 feet of the presumed High Water Mark (HWM). ʻEwa Beach Park is owned by the City and County of Honolulu (CCH) and is located within 180 feet of the installation boundary. The beaches are heavily used for recreation, surfing, swimming, and fishing. This beach is one of the few in Hawaii that provides edible limu (seaweed) used by Native Hawaiians as an integral part of the traditional Hawaiian diet, and is used for medicinal, religious, and cultural purposes. The Pu'uloa shoreline is protected under the State of Hawaii Department of Land and Natural Resources (DLNR) ʻEwa Limu Management Area. The State classifies this portion of the Pacific Ocean as Class A marine water, with the objective to protect the water for recreational purposes and aesthetic enjoyment.

2.1.4 Background: Lead Contamination at PRTF

The risk of lead contamination at the PRTF has been evaluated by the US Marine Corps (USMC) in Range Environmental Vulnerability Assessments (REVA) every five years since 2009. The REVA compares MC concentration data to HEER office regulatory values for environmental compliance. However, none of these studies conducted quantitative soil testing for lead content. The REVA process relies on estimated MCs loading rates, fate and transport modeling to qualitatively assess risk in a Conceptual Site Model (CSM), which measures the risk outside of the operational range complex. The assessment relies on estimated MC modeling only in surface and groundwater, which may not show accurate results in order to assess the hazard and risk of lead contamination.

The 2009 REVA estimated the risk of ground and surface water concern as "Moderate" for each range at PRTF, which the REVA defines as the "*potential for lead migration but likely no immediate threat to human health or the environment; however, actions may be necessary to prevent future concern".*

The 2014 REVA documented that in the 18 months leading up to the 2014 assessment, "…severe tidal shifts and weather patterns have caused significant damage to the backside of the impact berm at Foxtrot Range in the form of substantial erosion." The 2014 REVA upgraded the risk concern at the Foxtrot range to "High", which is defined as "potential for lead migration to an identified receptor and requires additional actions". The report added: "The main concern at the Foxtrot range is the threat of an imminent release of MC into the ocean from the impact berm…" due to erosion. The severe erosion noted in the 18 months prior to the 2014 REVA coincided with a major shoreline armoring project in which 9 T-groins were constructed immediately East of the PRTF property, intending to trap sand moving in longshore currents.

The 2019 REVA downgraded the risk for the Foxtrot range back to “Moderate”, citing “Current range management activities and best management practices implemented since that time addressed this threat”. However, none of the maintenance actions taken on the Foxtrot range addressed the interaction between the backside of the Foxtrot impact berm and open-ocean waves. Even though Foxtrot range received the highest surface water risk rating from the SAR Assessment Protocol (SARAP) due to the long duration of use, high lead loading, and that the impact berm was partially eroded, berm reconstruction only occurred on the landward side of the impact berms. At the time of the 2019 REVA visit, MCBH was evaluating a plan to address the erosion, one phase of which would involve retreating the impact berms landward. MCBH representatives stated as recently as July, 2022 that there is no current programming nor funding for this project, therefore downgrading the risk rating for the Foxtrot range from “High” to “Moderate” was premature. The rest of the ranges in the 2019 report have moderate SARAP ratings for surface water, and all ranges were rated as a low risk for groundwater SARAP.

While none of the REVA evaluations have conducted lead testing at PRTF, the 2014 REVA referenced a 1999 study in which soil samples showed dangerously high levels of MC in the form of lead present outside of the impact berms (Table 1) up to 6 inches deep. While periodic lead mining is conducted on the mauka sides of the PRTF impact berms, residual MC remains in the impact berms which sit atop the beach dune and are vulnerable to beach erosion and other pathways to human and ecological receptors.

Impact Berm	B	C	E	F
Total lead (mg/kg)	37,000	2,280	12,800	713
TCLP Lead (mg/kg)	11.8	9.1	16.4	0.32
CEC (meq/100g)	18.8	3.30	2.60	15.3
pH (no units)	8.89	9.17	9.27	8.15
TOC (mg/kg)	1,710	< 259	< 241	< 256

Table 1. Lead concentration from impact berm samples taken in 1999. Retrieved from: REVA ,2014

As stated earlier, in the 2019, 2014 and other reports, the MCBH identified no immediate threats of contamination in surface and groundwater, however current and future shoreline erosion will cause the off-range release of lead from the impact berms into the beach and ocean. The latest Environmental Assessment (EA) in 2019 initiated measures to mitigate coastal erosion and found no off-range migration of MC that presents a potential unacceptable risk to humans or the environmental health and no further assessment was taken.

2.1.5 Background: PRTF Beach Erosion

SFO agrees with Naval Facilities Engineering Systems Command (NAVFAC) Pacific's assessment that current and future shoreline erosion could cause significant off-range releases of lead from the impact berms into the beach and ocean (NAVFAC 2019). The sandy beach profile is shown in Figure 8.

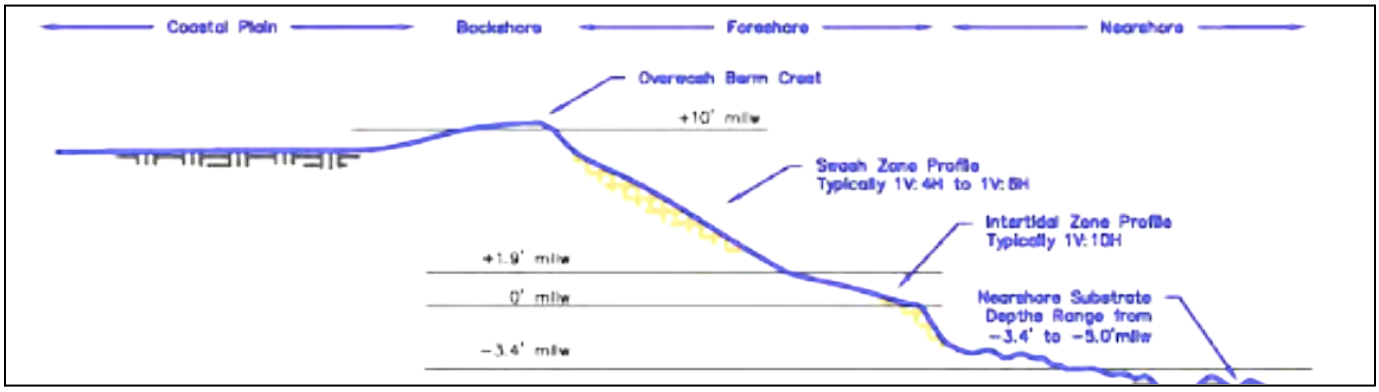

Figure 8. Beach Profile Schematic. Retrieved From: "Pu'uloa Shoreline Erosion Study", 2015

Over the long term the shoreline in front of the Range has been relatively stable. However, periods of erosion and shoreline recession have been noted over the past 5 to 10 years, particularly at the east end (Foxtrot Range). MCBH Reports have addressed shoreline recession with restoration of vegetation and irrigation in 2000. According to MCBH, vegetation and irrigation functioned well until 2014, when increasing erosion steepened the slope and undermined approximately 90% of the vegetation. Approximately 300 feet of shoreline recessed immediately East of the facility at Keahi Point over the last 60 years. This erosion was addressed by the construction of the Iroquois Point beach nourishment and stabilization project in 2013, which constructed 9 T-groins east of PRTF.

The Puʻuloa Shoreline Erosion Study (2015), used a series of historical aerial photographs to show shoreline trends, from 1976 to 2013. In Figure 9, red bars represent erosion, while green bars represent accretion. Over the 20-year period, the shoreline has accreted an average annual rate of up to one ft/yr. However, more recent observations show changes. The middle bar chart (1996-2005) illustrates that the East end experienced erosion with rates approaching one ft/year. Whereas, the West end accreted at a slightly greater rate of up to 2 ft/yr. The bottom bar chart in Figure 9 shows that the erosion seen up through 2005 increased and spread westward through 2013. The greatest average annual erosion rate for 2005 to 2013 exceeded 2 ft/yr.

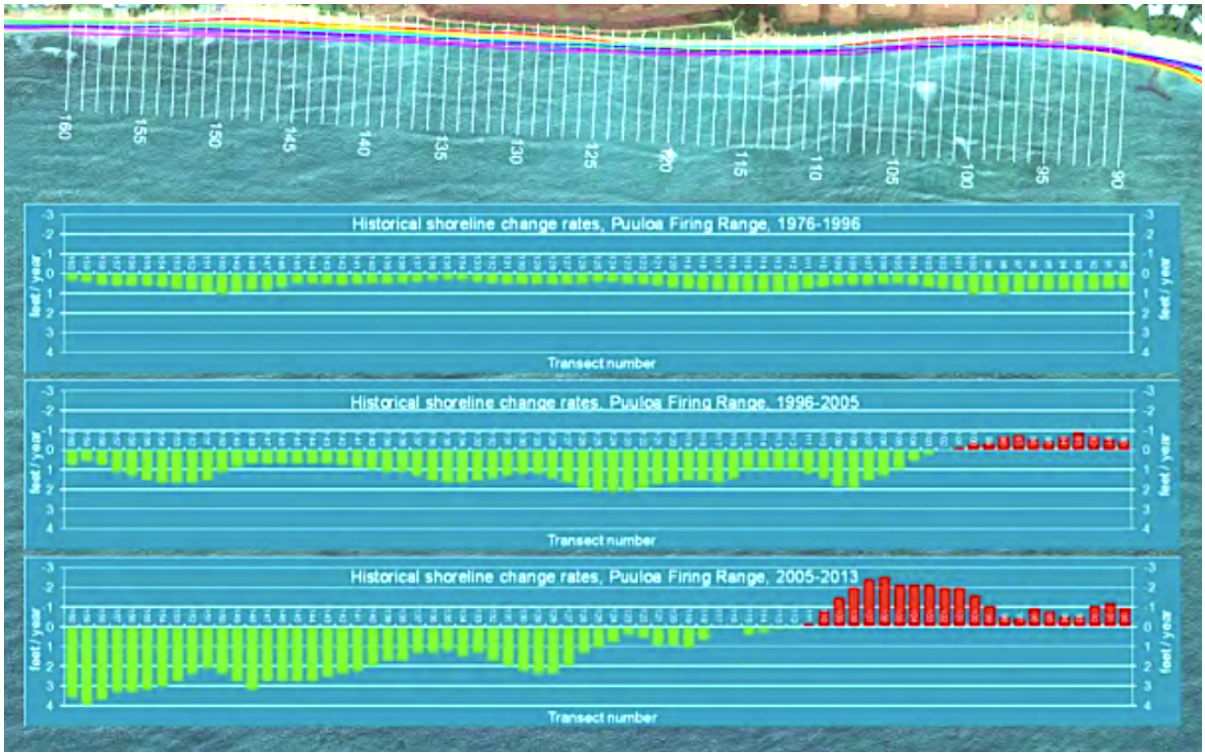

Figure 9. Historical Shoreline Changes Rates 1976 - 2013. Retrieved from: "Pu'uloa Shoreline Erosion Study", 2015.

The impact of climate change on coastal zones must be noted. The global mean sea levels are expected to rise by 20 cm by 2050, leading to increased flooding and erosion along global coastal zones (Figure 10). As seen in Figure 10-13, weather in this region has become more variable, indicating that there will be more severe storm events leading to an increase in erosion.

The PRTF is located on a soil type that has a low erodibility factor of 0.02. The REVA 2014 report stated that over the previous 18 months, severe tidal shifts and weather patterns caused significant damage to the backside of the impact berm at Foxtrot Range in the form of substantial erosion. "The main concern at this range is the threat of an imminent release of MC into the ocean from the impact berm, which was partially eroded in 2012", REVA, 2014. The 2019 REVA report concludes that future shoreline erosion is a concern.

MCBH proposed a 1,500 ft steel sheet pile bulkhead along the PRTF shoreline to mitigate coastal erosion and conducted an Environmental Assessment (EA) in 2019, which determined that the project would not have significant environmental impacts despite the loss of the sand beach the structure would likely cause, as cited in the 2015 Pu'uloa Shoreline Erosion Study. However, SFO, local government agencies, and community members were concerned about the nearshore coral reefs, surf breaks, likely beach loss, and accelerating coastal erosion. SFO cited numerous shortcomings in the EA in a letter to the Secretary of the Navy, calling on the Department of the Navy to conduct a more thorough Environmental Impact Statement (EIS). No EIS was conducted, but MCBH responded and halted the construction of the shoreline barrier.

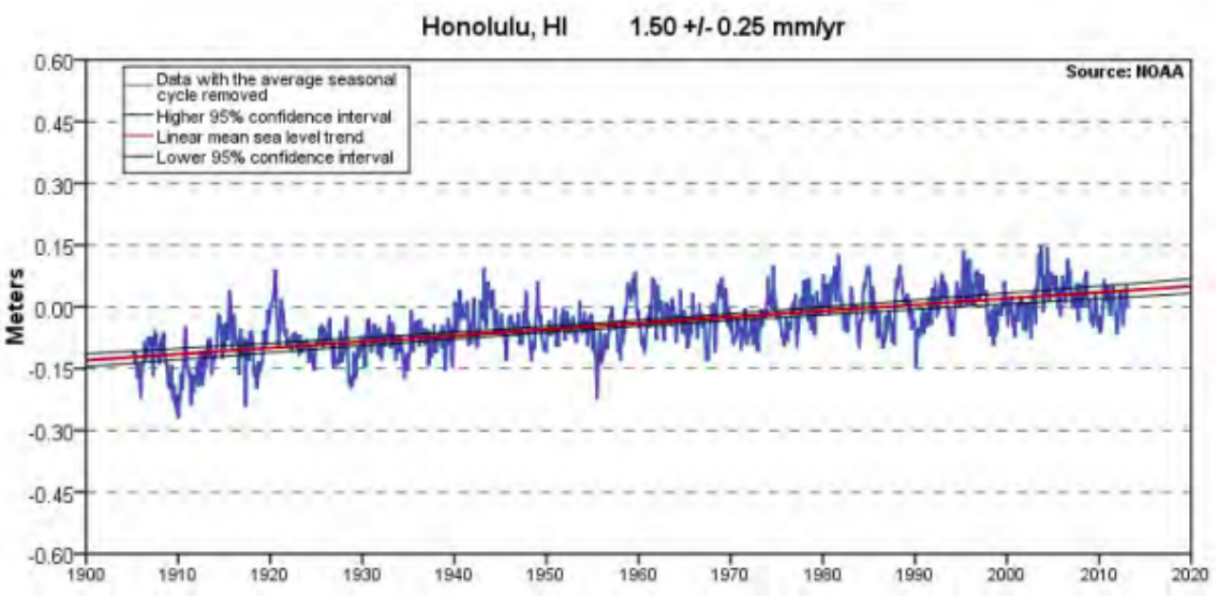

Figure 10. Sea Level Rise. Retrieved from: "Pu'uloa Shoreline Erosion Study", 2015.

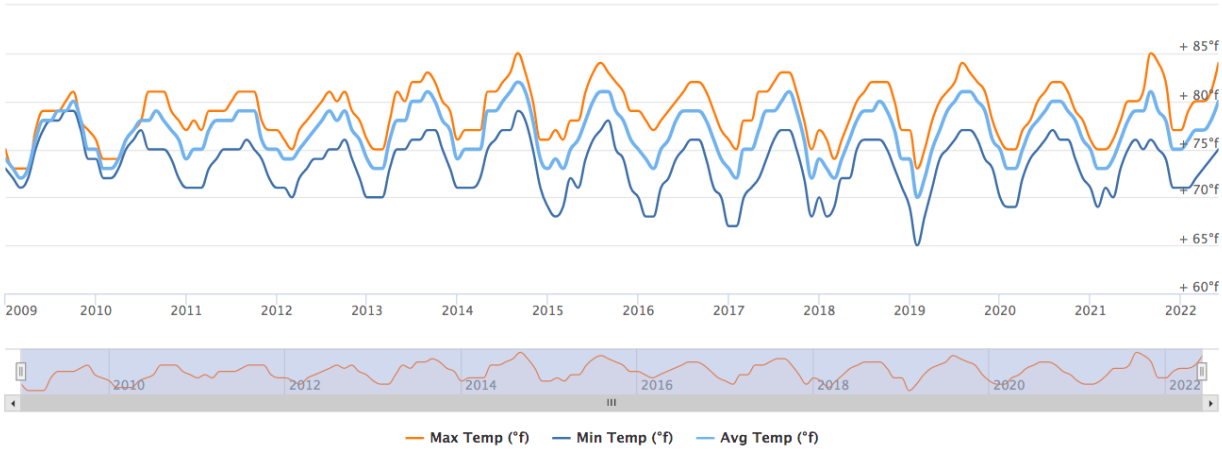

Figure 11. Max and Average Temperature. Retrieved From: "World Weather", 2022.

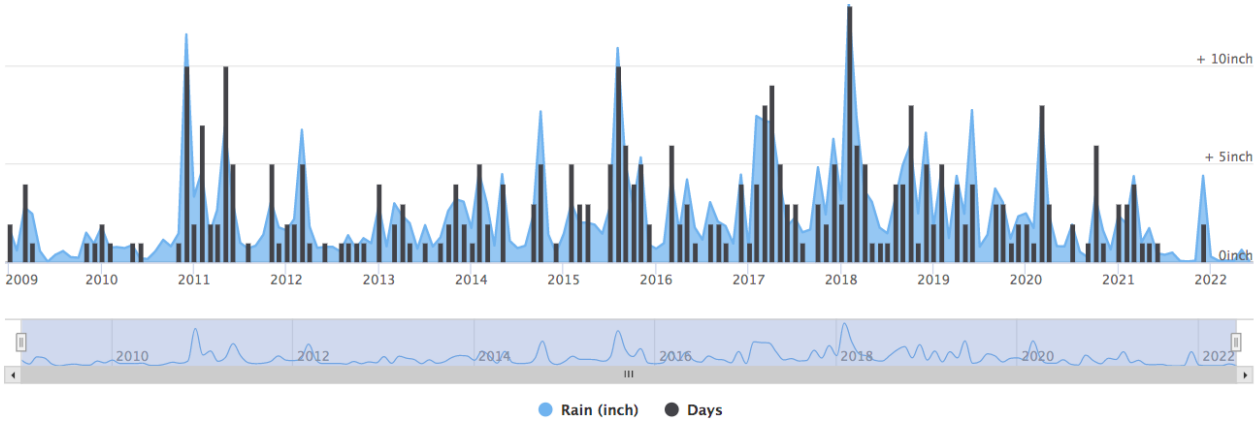

Figure 12. Average Rainfall Amount (Inch) and Rainy Days. Retrieved From: "World Weather", 2022.

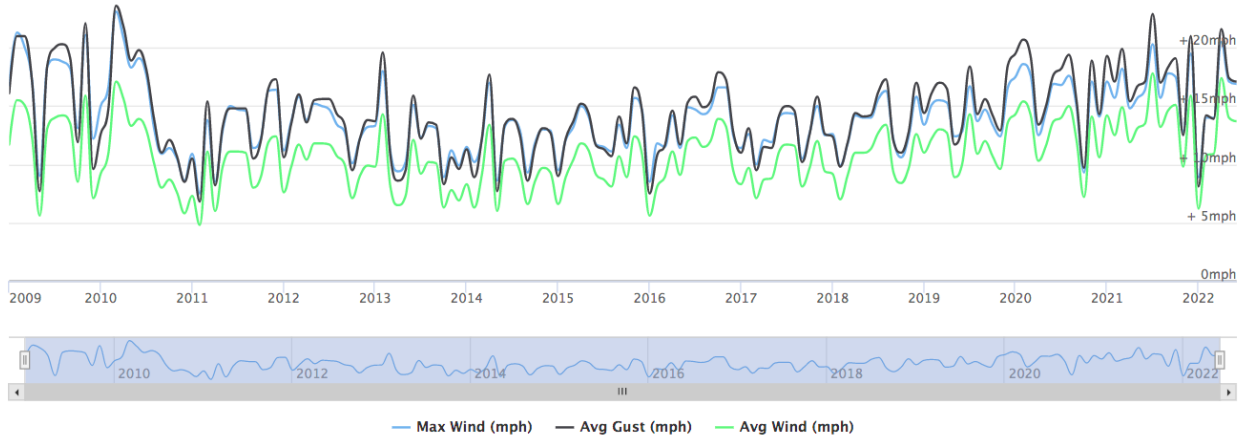

Figure 13. Average and Max wind Speed and Gust (mph). Retrieved From: "World Weather", 2022.

2.1.6 Background: PRTF Topography & Lead Mobilization

The PRTF is less than 10 feet above sea level and is located on a flat plain. The 2020 REVA report describes the soils as generally permeable. Therefore, MC has the potential to migrate downward with infiltrating water to the shallow water table which discharges to the ocean over an 8-mile range mixing with the ocean water.which discharges into the ocean. While the aquifer below PRTF is designated by the state of Hawaii as non drinking water, it is part of the EPA Designated Sole Source Southern Oahu Basil Aquifer. According to REVA reports, the position of the facility and the soil type increases the potential of MC to migrate downward with infiltrating water to the water table and discharging into the ocean.

Pb mobility is affected by a number of factors and these factors will determine the extent of the actual hazard it might pose. These factors include; metal speciation, soil chemistry, water chemistry, bullet composition and condition. Pb should have a moderate mobilization due to sandy soils (permeable), acid soil (6-7pH), but a basic pH of surface waters (7.8-8.4 pH), and

presence of limestone. However, the mere presence of Pb solubilized in soil can pose a risk to wildlife. Pb transports to groundwater depends on a number of factors including; amount of normal precipitation, topography, and distance (depth) to groundwater from the soil surface. As we already know (Section 2.1.4) this area is classified as semi-arid, meaning there is low precipitation, however the PRTF has installed irrigation systems which may affect the solubilization and transportation of Pb to groundwater. Storm water runoff is also low due to the design of the berms and low precipitation. The topography is flat which favors infiltration to groundwater. The aquifer is close to the surface meaning there is a higher chance of Pb concentrations. Another factor to be considered is that Pb in soil can limit the growth of plants, leading to increased soil erosion. Eroded soil may be more easily infiltrated and the distance to groundwater may be reduced, which could result in higher Pb concentrations.

2.1.7 Background: Public Health Issues with Lead

When a substance is released into the environment, people and animals can only be exposed if there is contact with it, such as breathing, eating, or drinking the substance, or by skin contact. Pb exposure depends on many factors if people or animals will be harmed, including; the dose (how much), the duration (how long), and how you come in contact with it. Other considerations include; sex, age, family traits, diet, lifestyle, and state of health.

Exposure routes can be accidental drinking of the surface waters and ingestion of sand, Figure 15. Age is the biggest risk factor, if adults and children swallow the same amount of lead, a bigger proportion enters the bloodstream in children. For instance, 50% of ingested Pb is absorbed in children, whereas, 99% of Pb ingested in adults will leave the body. Absorbed Pb enters the bloodstream and travels to the soft tissues and organs. Pb toxicity mainly affects the nervous system for both children and adults. Another big risk factor for Pb is repeated or long exposure. For adults, this has resulted in decreased performance and weakness in fingers, wrist, and ankles. High levels of exposure can severely damage the brain and kidneys in adults or children, can cause death and miscarriages. Repeated and high exposure even in adults are at extreme risk. For example, a former Kentucky gun range manager tested for Pb and detected levels were 56 times higher than the average adult's, this puts him in danger of organ failure.

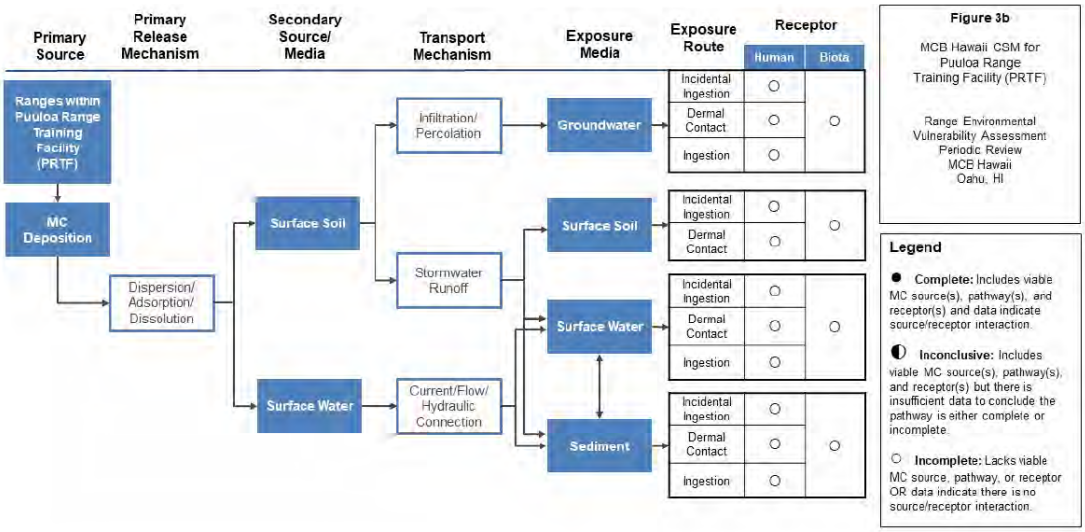

Figure 15. Lead Mechanisms. Retrieved from: REVA, 2020.

Children are very vulnerable to Pb poisoning because of the higher levels of accumulation in their bodies. Children are also more likely to ingest sand and dirt while playing. There has been no determined safe blood Pb level in children, however those with levels of 5mcg/dL or higher have more Pb in their body than 97.5% of other children in the United States. The Hawai‘i State Department of Health (DOH) uses this level (5mcg/dL) set by the Center for Disease Control and Prevention (CDC) to trigger public health follow-up. Pb can affect children in different ways depending on exposure and duration. In the most severe cases children can develop anemia, kidney damage, colic, muscle weakness, and brain damage, which can ultimately cause death. Treatment is available; however, recovery is more likely once the child is removed from the source of exposure. There can be long-term consequences of Pb exposure. Hawai’i Public Health data on Pb blood levels in children are lacking (Figure 16). According to The Hawai’i Childhood Lead Poisoning Prevention Program (HI-CLPP) only 26.7% of children ages 1-2, were tested in 2018.

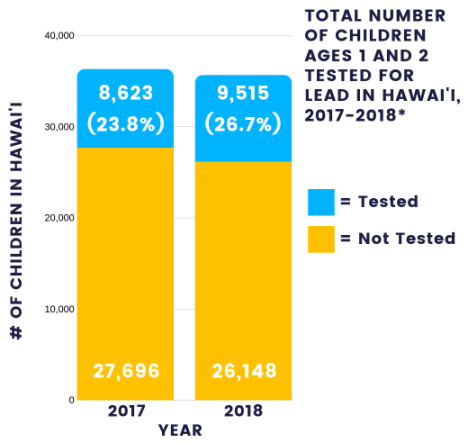

Figure 16. Percentage of Children Tested for Lead 2017 & 2018 in Hawai'i. Retrieved from: HI-CLPP, 2020.

2.1.8 Background: Environmental Lead Contamination

Repeated exposure to Pb can lead to bioaccumulation (in a single organism) and biomagnification (chemicals transfer from lower to higher trophic levels). In some circumstance's animal species, such as ducks, could ingest less than one lead shot and die. Pb toxicity depends on species, size, age, and health of the organism. Elevated Pb in an environment can result in decreased growth and reproduction in plants and animals, and neurological effects in vertebrates.

The REVA 2014 report recognizes that, discharge of groundwater associated with Pb to ocean sediments could affect benthic organisms (species that live on the bottom of the ocean) or coral-associated species but is unlikely to have an impact on human health since the MC would be diluted in the ocean water. However, species will still be impacted. For example, Pb inhibits respiration and photosynthesis in Phaeodactylum, a commonly found algae that is vital for marine ecosystems. Corals incorporate Pb from dissolved and particulate metal which are absorbed by tissues or feeding. It is hypothesized, corals that live in high temperatures may increase the rate of metal uptake and accumulation, even if Pb concentrations in the environment are low.

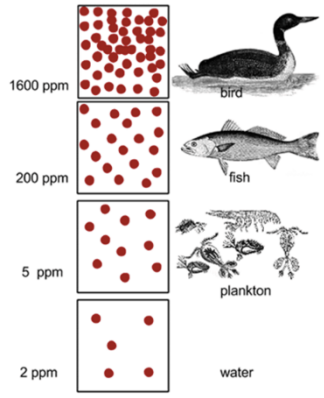

Figure 17. An example of Biomagnification. Retrieved from: Biology Junction, NA.

Biomagnification in the environment (Figure 17) can ultimately affect human health by eating fish and other organisms. An example of biomagnification is mercury pollution and eagles, they would accumulate more mercury with every fish that they ingested causing them to produce thinner shells, decreasing their reproductive success. On the other hand, mercury toxicity has little effect on the fish, whereas, Pb accumulation in fish tissues causes oxidative stress which damages their nervous system. According to the 2020 MCBH report, there are no threatened or endangered species that are regularly present at or near PRTF, other than the occasional and infrequent visitors such as the Hawaiian monk seal, Hawaiian green sea turtle, and pueo (endemic owl). However, biomagnification will cause a hazard to these endangered animals. The Hawaiian green sea turtles are of concern because some remain in one area for a long time, causing accumulation of Pb from sediments and food. Pb is not an essential nutrient for turtles, so any Pb in their blood indicates exposure to Pb in food or water.

2.1.9 Background: Economics & Demographics

The PRTF is located in the city of ʻEwa Beach, which is considered the westside of Oahu and has a population of 15,000. The largest ethnic groups are; Asian (52.4%), multiracial (19.5%), Native Hawaiian & Pacific Islander (7.36%), White (6.93%), with 34% of the residents born outside of the US. In ʻEwa Beach the per capita income (2020) was $27,789, persons in poverty was 10%.

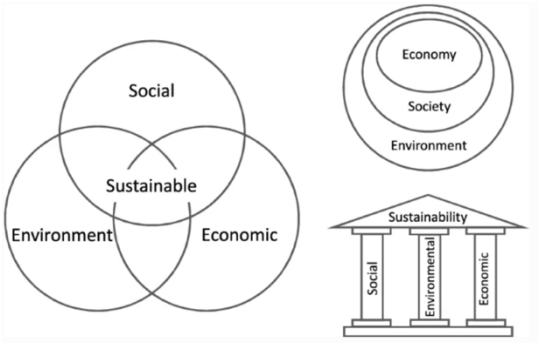

Figure 18. Three Pillars of Sustainability. Retrieved From: Purvis, et al., 2018

Overall, economic growth in ʻEwa Beach has been increasing, however, poor environmental health lowers economic growth by lowering the quantity and quality of natural resources and public health. As illustrated in Figure 18, to have a good economy you also need a healthy environment and social equity. When compared to a predominantly white area, for example, Kailua, with the largest ethnicity being white (45%), multiracial (23%), and Asian (20%), with only 10% of the residents born outside of the US. This area has a significantly higher education level, per capita income of about $10,000 more, and a lower poverty level. The Ethnicities between ʻEwa Beach and Kailua are compared in Figure 19, which shows there are racial inequalities. Climate change and environmental pollution disproportionately affects those who suffer from socioeconomic inequalities. The term for this is called environmental racism which refers to the unequal access to a clean environment based on race.

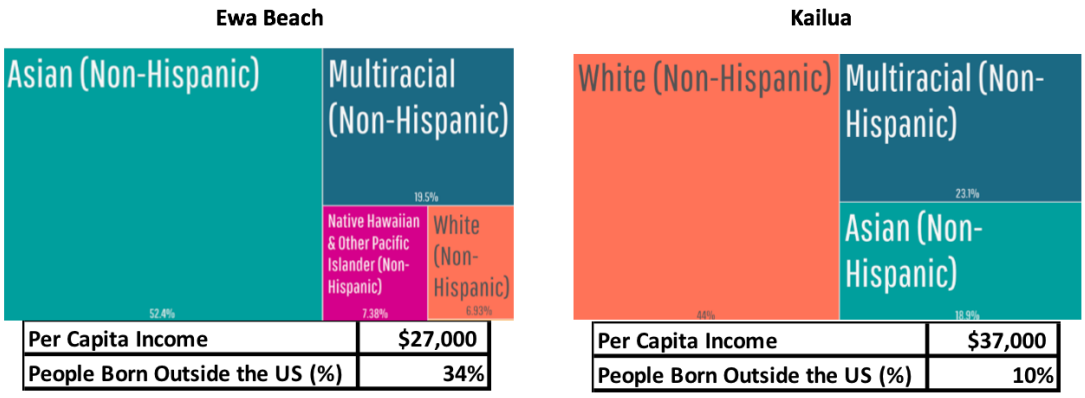

Figure 19. Ethic Comparison of Ewa Beach and Kailua. Data Retrieved from: DATAUSA, 2019

Communities of color are disproportionately affected by environmental hazards and are more likely to live in areas with heavy pollution. People of color (POC) are also more likely to die of environmental causes. The continuation of pollution may lower the economy in ʻEwa Beach with examples of this being seen all over the world. For instance; clams, scallops, and oysters account for $400 million in annual revenue in the US, and an increase in ocean acidification can cost the industry $480 million. These risks are amplified in POC communities such as the Quinault tribe, whose economy and diet rely on seafood. The Quinault tribe has a long, historic, detailed account of their environment and have recently seen an increased number of dead fish washing ashore due to low oxygen levels in the rivers. The environmental pollution of Pb can lead to illness, decrease tourism, and harm ecology, which ultimately can negatively affect the economy.

It should be noted that the Native Hawaiian population immediately west of PRTF will increase significantly due to the planned 400-home Department of Hawaiian Homeland (DHHL) project on the 85-acre parcel formerly occupied by the Pacific Tsunami Warning Center. Any future impacts on the residents near PRTF will disproportionately impact Native Hawaiians.

2.2 Sampling of the coastal soils

The following sections describe the methods, results, and discussion of Surfrider Foundation's initial assessment of contamination in the coastal zone.

2.2.1 Methods

On two separate occasions SFO obtained samples of the soil along the Puʻuloa coastal zone. As shown in the site map Figure 20, eight samples were collected in January, 2022 (see appendix A for Chain of Custody Form). As shown in the site map Figure 21, a second set of 16 samples were collected in February, 2022 (see appendix B for Chain of Custody Form).

Two sets of Pb samples were submitted for total Pb analysis. The samples were collected during the morning. Each sample set was collected by a shallow excavation of each sample site (from

surface to 5 cm deep) with a small stainless-steel spoon, sanitized between each location. Samples were put in quart-sized Ziploc bags and labeled for each sample site location. Immediately after the sample bags were filled and labeled, they were placed in a cooler with ice packs. Samples were then transported to Hawaii Analytical Laboratory, LLC located at 3615 Harding Ave, Honolulu, HI 96816. There, the samples were tested for Total Pb (soil) using the EPA Method 3051m/ 7000Bm. Total Pb results are reported in mg/kg for each sample.

Figure 20. Site Map of Eight samples January, 2022

Figure 21. Site Map of sixteen samples February, 2022

2.2.2 Results

Samples were submitted in January, 2022 (Table 3), and February, 2022 (Table 4). The HEER Office established environmental action levels for Pb in soil. Total Pb in soil should not exceed

200 mg/kg for residential properties and **800 mg/kg** for commercial and industrial properties. If soil results show estimated total Pb levels above 200 mg/kg, young children and pregnant women should avoid accidental ingestion of the bare soil. Cleanup actions may be warranted for residential properties where soil Pb levels exceed 200 mg/kg. Total Pb levels above 800 mg/kg are considered a potential concern for commercial or industrial uses of a property, and warrants action to further evaluate Pb levels in soil and pursue cleanup options. The national standards set by the EPA are 400 mg/kg in play areas and 1200 mg/kg in non-play areas.

Samples processed for Total Pb in Table 3 & 4 that exceed 200 mg/kg are listed in bold print and highlighted in yellow. Three of the eight samples collected in January exceed 200 mg/kg for Total Pb with the highest being Sample 5 -Pistol range at **2200 mg/kg**. Nine of the sixteen samples collected and analyzed for Total Pb in February exceed 200 mg/kg. Six of those samples greatly exceed 200 mg/kg, with the highest level from Sample 12 FOXTROT MID SWALE at **14000 mg/kg**.

Table 2. HEER Pb Standards & EPA Pb Standards.

HAWAII HEER Standards for Lead in Soil (mg/kg)	
Residential Properties	200
Industrial Properties	800

NATIONAL EPA Standards for Lead in Soil (mg/kg)	
EPA Play Areas	400
EPA Non-Play Areas	1200

Table 3. Lead Concentration Measurements. January, 2022. Analyzed by Hawai'i Analytical Laboratory LLC

Data Analyzed: January 28, 2022			
Sample No.	Sample Lab No.	Sample ID	Results (mg/kg)
1	202204077	A-RANGE	43
2	202204078	B-RANGE	120
3	**202204079**	**MIDDLE ROAD**	**220**
4	202204080	MIDDLE A-RANGE	<39

Data Analyzed: January 28, 2022			
Sample No.	Sample Lab No.	Sample ID	Results (mg/kg)
5	**202204081**	**PISTOL RANGE**	**2200**
6	**202204082**	**FOXTROT**	**2100**
7	202204083	OLD PISTOL RANGE	100
8	202204084	PUBLIC AREA BEACH PARK	<40

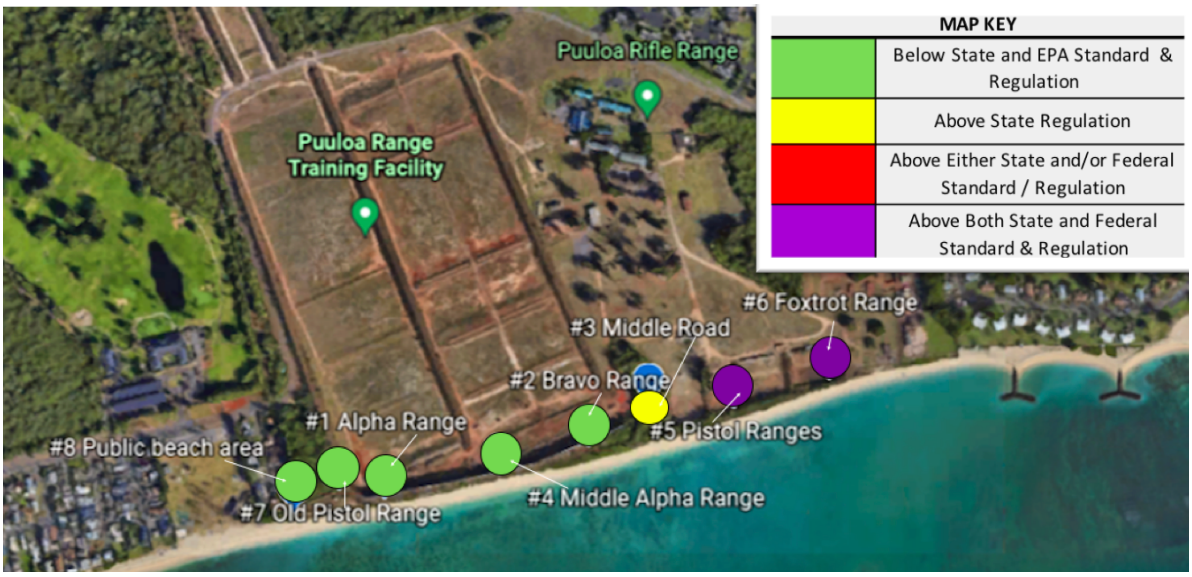

Figure 22. Site Map. Taken January 28, 2022

Table 4. Lead Concentration Measurements. February, 2022. Analyzed by Hawai'i Analytical Laboratory LLC

Data Analyzed: Feburary 29, 2022			
Sample No.	Sample Lab No.	Sample ID	Results (mg/kg)
1	202214071	ALPHA RANGE 2	140
2	202214072	ALPHA RANGE EAST	88
3	**202214073**	**B RANGE WEST**	**660**
4	**202214071**	**B RANGE EAST**	**340**
5	202214075	5 SPEAKER GULLY	88
6	**202214076**	**CHARLIE RANGE**	**2600**
7	**202214077**	**DELTA**	**3700**
8	**202214078**	**DELTA EAST**	**3400**

Data Analyzed: Feburary 29, 2022			
Sample No.	Sample Lab No.	Sample ID	Results (mg/kg)
9	**202214079**	**ECHO RANGE**	**6700**
10	202214080	FOXTROT CENTER	200
11	**202214081**	**FOXTROT EAST**	**820**
12	**202214082**	**FOXTROT MID SWALE**	**14000**
13	**202214083**	**FOXTROT TOP BERM**	**2100**
14	**202214084**	**FOXTROT FLAGPOLE**	**250**
15	202214085	KAPALINA MAINTENANCE	<40
16	202214086	KAPALINA HOME	<40

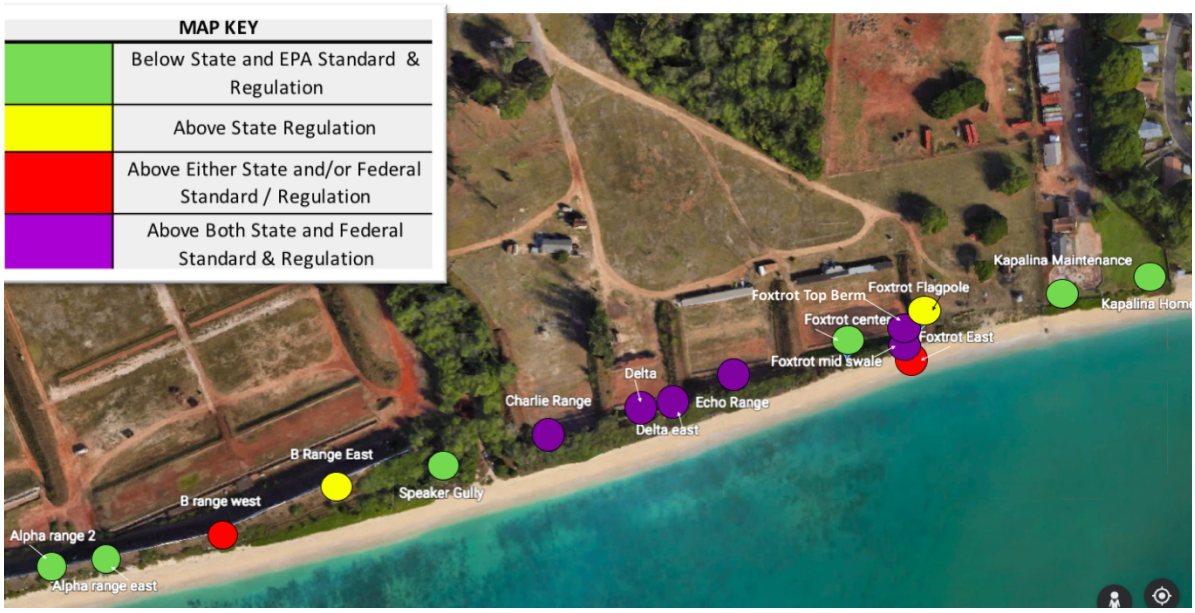

Figure 23. Site Map of February, 2022 Results with Key.

2.1.3 *Discussion*

The magnitude of risks posed by Pb bullets affects humans, and the environment, make the issue one of public health, environmental health and economical concern. The Contamination Assessment is of high importance to human health due to the public park and residential properties in close proximity to the facility. The REVA reports have shown moderate to high risk concern for human and biota health in surface waters, however, it uses estimated modeling and data to determine risk. Our results show a need for a call to action with a more holistic approach to determine health risks not only for human health but also ecological.

It is also important to question, what would be different if Pb pollution were happening in an area without racial and socioeconomic inequalities. For example, the Honolulu Skeet Club on Kailua Bay has been categorized as an active Superfund site managed by the HEER Office because of contamination found in bullets. There have been many studies on ecological health, warning signs posted, and informational guides on public health risks at the Skeet Club. However, this is not the case in ʻEwa Beach. If there is a continuation of pollution at Puʻuloa, a lack of testing, and communication with the community, increased negative disparities could result. PRTF is not alone; potential risks these ranges pose to their surroundings receive little oversight from the federal government. The EPA does not regulate range design or maintenance but does circulate a best practice guide to managing Pb from gun ranges. As of 2014, the Occupational Safety and Health Administration had only inspected 201 gun ranges nationwide. Of those inspected, 86% had a Pb-related violation.

We can determine if there is a low, medium, high or extreme risk based on a risk assessment matrix, for ecological and public health. For public and ecological health, it is important to note that repeated exposure of Pb can be very harmful.

Table 5. Risk Assessment Matrix

Risk Assesment Matrix					
Likelihood	Hazard				
		Not Harmful (1)	Slightly Harmful (2)	Harmful (3)	Very Harmful (4)
	Highly unlikely (1)	Low Risk (1)	Low Risk (2)	Medium Risk (3)	Medium Risk (4)
	Unlikely (2)	Low Risk (2)	Medium Risk (4)	High Risk (6)	High Risk (8)
	Likely (3)	Medium Risk (3)	High Risk (6)	High Risk (9)	Extreme Risk (12)
	Highly likely (4)	Medium Risk (4)	High Risk (8)	Extreme Risk (12)	Extreme Risk (16)

1	Low Risk
2	Low Risk
3	Medium Risk
4	Medium Risk
6	High Risk
8	High Risk
9	High Risk
12	Extreme Risk
16	Extreme Risk

Ecological Health: The likelihood of being exposed depends on the species. Wildlife and plants that live on the shore and up to 8 miles out to sea have a highly likely exposure. For example, algae with repeated Pb exposure can potentially be very harmful (risk of 9-16), whereas, benthic organisms may have a hazard of slightly harmful to harmful (risk of 6-12). The threatened Hawaiian green sea turtle has a likelihood of exposure of unlikely to highly likely. This is variable depending on how long they are in the area, how often they visit, what they eat, and the temperature of the water. A sea turtle study done in Kailua Bay found a maximum blood Pb concentration of 140 ng/g. The CDC blood Pb level of concern in children is 40 ng/g. This shows that sea turtles in Puʻuloa may have a high exposure risk. There is a lack of information on the hazard of Pb exposure to sea turtles, studies show that they are affected by a disease called fibropapillomatosis, in which rampant tumor growth debilitates the turtle and leads to death. This results in a slightly to very harmful hazard with a risk of 2-16. This is a large range, meaning more studies are needed. Overall, ecological health in this area could potentially be a medium to high risk due to bioaccumulation and biomagnification, as well as, how the species is affected by Pb exposure.

Public Health: People who visit the beach regularly have a likelihood of exposure to Pb from unlikely – highly likely, based on location and time spent in the area. If children visit the beach often, they have a higher likelihood of exposure because they frequently put their hands or other objects in their mouths, and these can often have amounts of soil and dust on them that the child then swallows (likely – highly likely). Children with repeated exposure have a hazard of harmful to highly harmful, with an overall risk score of 9-16. For adults, even with a high likelihood of repeated and high exposure have a low to medium risk of harm, score of 1-4. Pregnant people are more at risk, with a score of 3-9.

3. Conclusion and Request for Action

The proposed Puʻuloa Beach and Dune Protection Strategy is a community-led effort to protect and preserve this cherished natural coastline. The Contamination assessment calls for an evaluation of lead contamination in the coastal system. This proposed action is a critical step in enhancing the safe public use of Puʻuloa's unique and important coastal resources. To avoid

further degradation of valuable beach resources, the Pu‘uloa Strategy should be implemented without delay. As immediate steps to address the extremely high levels of lead, SFO respectfully requests the Navy / MCBH lead the following:

1. Clean the lead-contaminated soil on, seaward of, and adjacent to the PRTF
2. Insist City and County of Honolulu sample the soils and water at the Pu‘uloa Beach Park and within the nearby residential neighborhoods of ‘Ewa Beach and Iroquois Point to determine public and environmental health risks
3. State / DLNR testing the reef ecosystem seaward of PRTF for lead and other toxic contaminants to determine existing ecological health
4. Publish public reports on the results of these efforts

In the long-term, SFO asks the Navy to:

1. Relocate all of the PRTF impact berms away from the sensitive coastal environment
2. Conduct more frequent lead remediation of the berms
3. Incorporate quantitative soil testing into the REVA program

We strongly urge the Navy’s immediate attention to this important public safety and environmental quality issue. We hope to hear back from you with a response to our requests. We thank you for your thoughtful consideration.

To request more information, please send an email to beachprotection@oahu.surfrider.org & jozeekilloren@gmail.com

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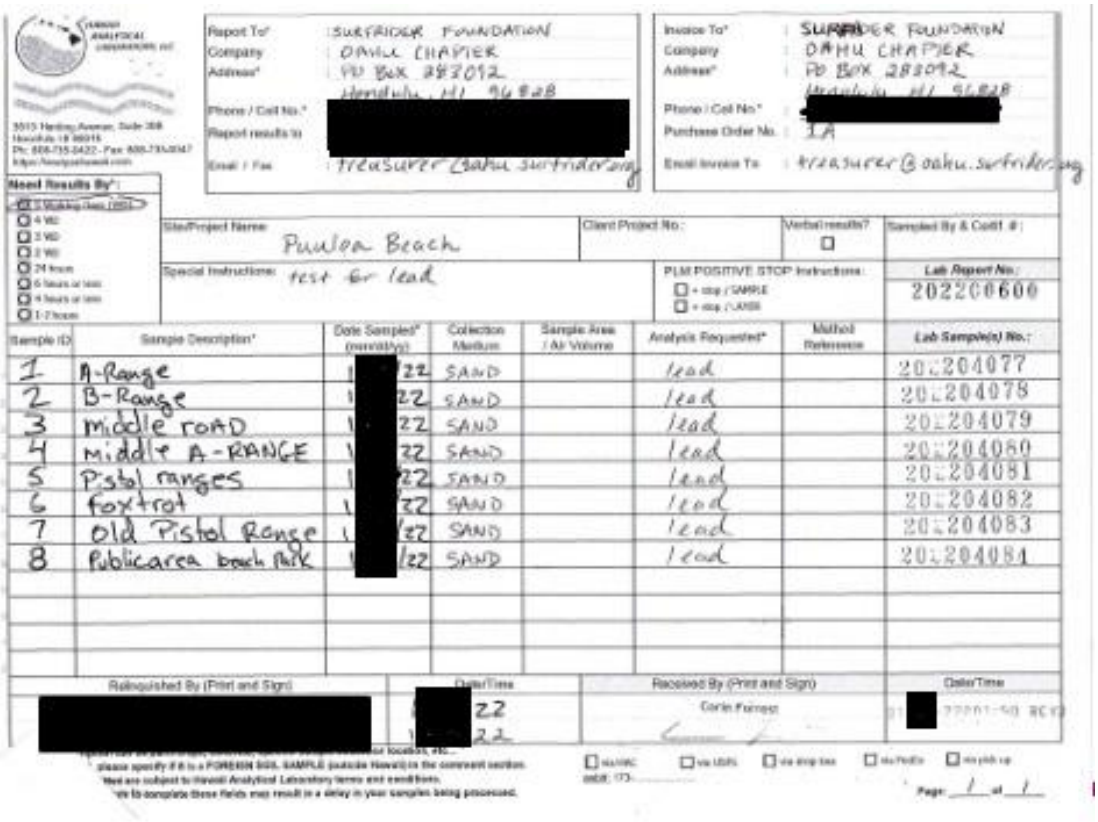
Appendices

Appendix A: Chain of Custody Form and Lab Results From Hawai'i Analytical Laboratory LLC. January 2022



Report To: SURFRIDER FOUNDATION
Company: OAHU CHAPTER
Address: PO BOX 283092
Phone / Cell No.: [redacted]
Report results to:
Email / Fax: treasurer@oahu.surfrider.org

Invoice To: SURFRIDER FOUNDATION
Company: OAHU CHAPTER
Address: PO BOX 283092
Phone / Cell No.: [redacted]
Purchase Order No.: IA
Email Invoice To: treasurer@oahu.surfrider.org

Need Results By*:
☑ 5 Working Days (STD)
☐ 4 WD
☐ 3 WD
☐ 2 WD
☐ 24 hours
☐ 8 hours or less
☐ 4 hours or less
☐ 1-2 hours

Site/Project Name: Puuloa Beach
Client Project No.:
Verbal results?: ☐
Sampled By & Cell#:
Special Instructions: test for lead
PLM POSITIVE STOP Instructions:
☐ + stop / SAMPLE
☐ + stop / AREA
Lab Report No.: 202200600

Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1	A-Range	[redacted]22	SAND		lead		20□204077
2	B-Range	[redacted]22	SAND		lead		20□204078
3	middle road	[redacted]22	SAND		lead		20□204079
4	middle A-RANGE	[redacted]22	SAND		lead		20□204080
5	Pistol ranges	[redacted]22	SAND		lead		20□204081
6	foxtrot	[redacted]22	SAND		lead		20□204082
7	old Pistol Range	[redacted]22	SAND		lead		20□204083
8	Publicarea beach park	[redacted]22	SAND		lead		20□204084

Relinquished By (Print and Sign): [redacted]
Date/Time: [redacted]22
Received By (Print and Sign): Carla Furuya
Date/Time: [redacted]

please specify if it is a FOREIGN SOIL SAMPLE (outside Hawai'i) in the comment section.
Work are subject to Hawaii Analytical Laboratory terms and conditions.
*ALL fields must be complete these fields may result in a delay in your samples being processed.

☐ via FAX ☐ via USPS ☐ via drop box ☐ via FedEx ☐ via pick up
other (?):

Page: 1 of 1

Hawaii Analytical Laboratory
ANALYTICAL REPORT

Friday, January 28, 2022

Surfrider Foundation, Oahu Chapter
P.O. Box 283092
Honolulu HI 96828

Phone Number: [redacted]
Facsimile:
Email: treasurer@oahu.surfrider.com

Lab Job No: 202200600
Date Submitted: 1[redacted]/2022
Project Name: Puuloa Beach, 1[redacted]/22

Total Recoverable Lead

EPA Method: 3051m / 7000Bm

Sample No.	Your Sample ID / Description	Results	Units	Date Analyzed
202204077	1	43	mg/kg	1/28/2022
Comments				
202204078	2	120	mg/kg	1/28/2022
Comments				
202204079	3	220	mg/kg	1/28/2022
Comments				
202204080	4	< 39	mg/kg	1/28/2022
Comments				
202204081	5	2200	mg/kg	1/28/2022
Comments				
202204082	6	2100	mg/kg	1/28/2022
Comments				
202204083	7	100	mg/kg	1/28/2022
Comments				
202204084	8	< 40	mg/kg	1/28/2022
Comments				

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on www.aihaaccreditedlabs.org, in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 - 20181015

Surfrider Foundation, Oahu Chapter
P.O. Box 283092
Honolulu HI 96828

Phone Number: [redacted]
Facsimile:
Email: treasurer@oahu.surfrider.com

Lab Job No: 202200600
Date Submitted: 1[redacted]/2022
Project Name: Puuloa Beach, 1[redacted]/22

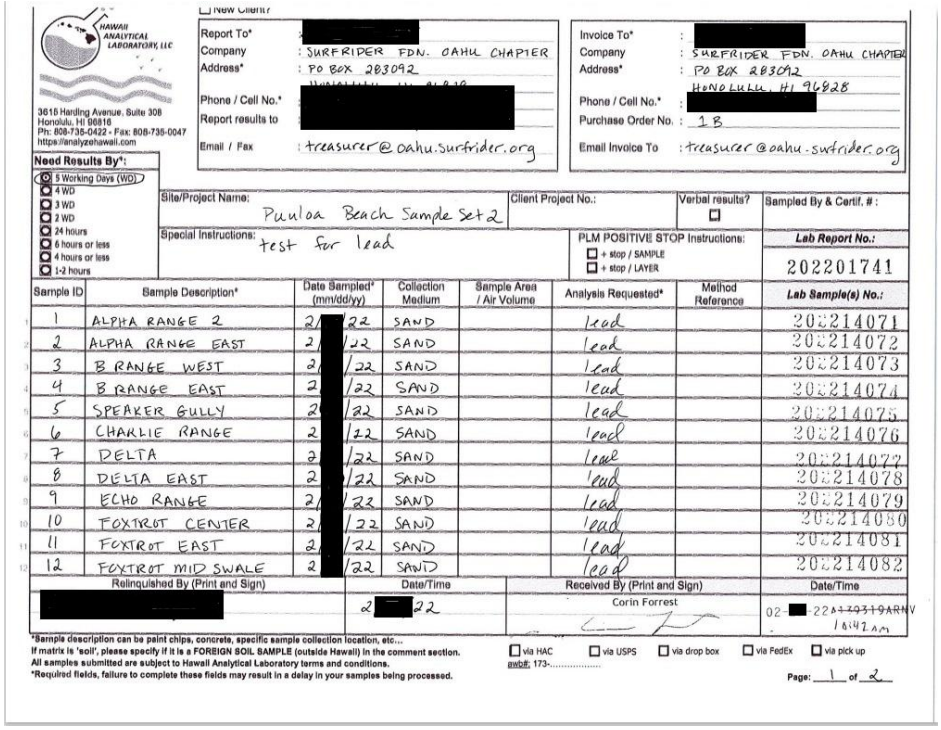
All Quality Control data are acceptable unless otherwise noted.
MRL for lead air is 5ug.
MRL for lead wipe is 10ug.
MRL for lead paint or soil is 40 mg/kg for a 0.25g sample.

General Comments
The sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures associated with the "analytical method" referenced above. Modifications to this methodology may have been made based upon the analyst's professional judgment and / or sample matrix effects encountered. The analysis of sample relates only to the sample analyzed, and may or may not be representative of the original source of the material submitted for our analysis. All analysts participate in interlaboratory quality control testing to continuously document profiency. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report should not be construed as an endorsement for a product or a service by the AIHA LAP, LLC or any affiliated organizations. Sample and associated sampling / collection data is reported as provided by client. TWA values have been calculated based on information supplied by the client that the laboratory has not independently verified. Results have not been corrected for blank determinations unless noted in remarks. Unless otherwise indicated the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions
> This testing result is greater than the numerical value listed.
< This testing result is less than the numerical value listed.
# = Analytical methods marked with an "#" are not within our AIHA LAP, LLC Scope of Accreditation.
MRL = Method Reporting Limit.

Anne Antin
Quality Control Manager

Appendix B: Chain of Custody Form. From Hawai'i Analytical Laboratory LLC. February 2022



HAWAII ANALYTICAL LABORATORY, LLC
3618 Harding Avenue, Suite 308
Honolulu, HI 96816
Ph: 808-735-0422 - Fax: 808-735-0047
https://analyzehawaii.com

☐ New Client

Report To*: [redacted]
Company: SURFRIDER FDN. OAHU CHAPTER
Address*: PO BOX 283092
Phone / Cell No.*: [redacted]
Report results to: [redacted]
Email / Fax: treasurer@oahu.surfrider.org

Invoice To*: [redacted]
Company: SURFRIDER FDN. OAHU CHAPTER
Address*: PO BOX 283092 HONOLULU, HI 96828
Phone / Cell No.*: [redacted]
Purchase Order No.: 18
Email Invoice To: treasurer@oahu.surfrider.org

Need Results By*:
- ◉ 5 Working Days (WD)
- ○ 4 WD
- ○ 3 WD
- ○ 2 WD
- ○ 24 hours
- ○ 6 hours or less
- ○ 4 hours or less
- ○ 1-2 hours

Site/Project Name: Puuloa Beach Sample Set 2
Client Project No.:
Verbal results? ☐
Sampled By & Certif. #:
Special Instructions: test for lead
PLM POSITIVE STOP Instructions: ☐ + stop / SAMPLE ☐ + stop / LAYER
Lab Report No.: 202201741

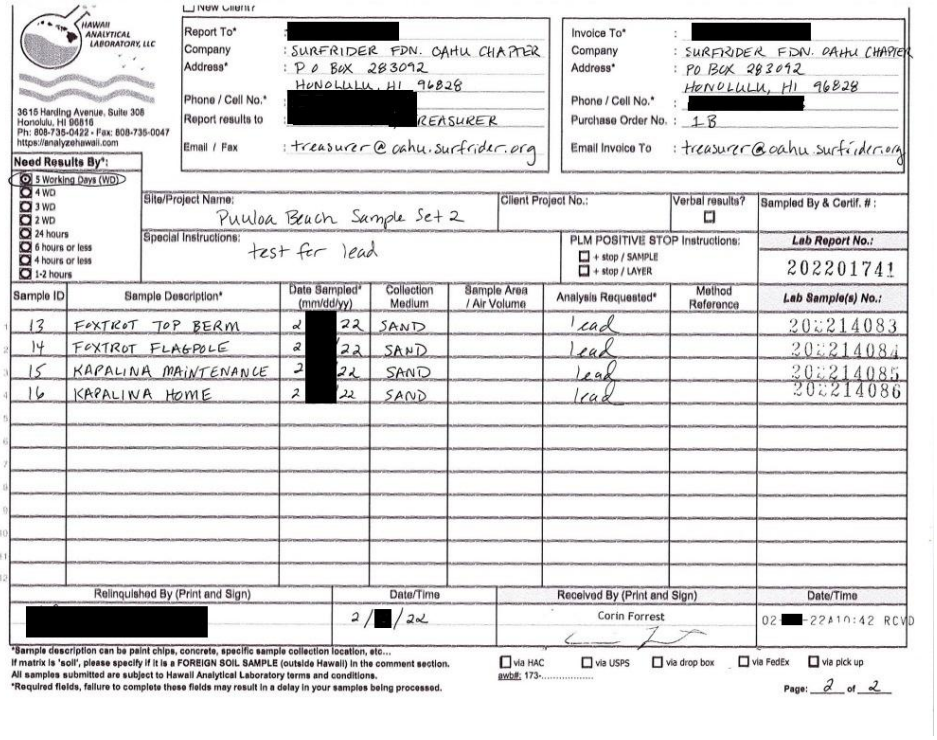
Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1	ALPHA RANGE 2	2[redacted]/22	SAND		lead		202214071
2	ALPHA RANGE EAST	2[redacted]/22	SAND		lead		202214072
3	B RANGE WEST	2[redacted]/22	SAND		lead		202214073
4	B RANGE EAST	2[redacted]/22	SAND		lead		202214074
5	SPEAKER GULLY	2[redacted]/22	SAND		lead		202214075
6	CHARLIE RANGE	2[redacted]/22	SAND		lead		202214076
7	DELTA	2[redacted]/22	SAND		lead		202214077
8	DELTA EAST	2[redacted]/22	SAND		lead		202214078
9	ECHO RANGE	2[redacted]/22	SAND		lead		202214079
10	FOXTROT CENTER	2[redacted]/22	SAND		lead		202214080
11	FOXTROT EAST	2[redacted]/22	SAND		lead		202214081
12	FOXTROT MID SWALE	2[redacted]/22	SAND		lead		202214082

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
[redacted]	2[redacted]22	Corin Forrest	02-[redacted]-22 ~~17:03:19 ARNV~~ 16:42 AM

*Sample description can be paint chips, concrete, specific sample collection location, etc...
If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
*Required fields, failure to complete these fields may result in a delay in your samples being processed.

☐ via HAC ☐ via USPS ☐ via drop box ☐ via FedEx ☐ via pick up
awb#: 173-.....

Page: 1 of 2



HAWAII ANALYTICAL LABORATORY, LLC

3615 Harding Avenue, Suite 308
Honolulu, HI 96816
Ph: 808-735-0422 • Fax: 808-735-0047
https://analyzehawaii.com

☐ New Client?

Report To*	[redacted]
Company	: SURFRIDER FDN. OAHU CHAPTER
Address*	: P O BOX 283092 HONOLULU, HI 96828
Phone / Cell No.*	: [redacted]
Report results to	: [redacted] TREASURER
Email / Fax	: treasurer@oahu.surfrider.org

Invoice To*	: [redacted]
Company	: SURFRIDER FDN. OAHU CHAPTER
Address*	: PO BOX 283092 HONOLULU, HI 96828
Phone / Cell No.*	: [redacted]
Purchase Order No.	: 18
Email Invoice To	: treasurer@oahu.surfrider.org

Need Results By*:
- (●) 5 Working Days (WD)
- ☐ 4 WD
- ☐ 3 WD
- ☐ 2 WD
- ☐ 24 hours
- ☐ 6 hours or less
- ☐ 4 hours or less
- ☐ 1-2 hours

Site/Project Name: Puuloa Beach Sample Set 2
Client Project No.:
Verbal results? ☐
Sampled By & Certif. # :
Special Instructions: test for lead
PLM POSITIVE STOP Instructions: ☐ + stop / SAMPLE ☐ + stop / LAYER
Lab Report No.: 20220174!

	Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1	13	FOXTROT TOP BERM	2[redacted]22	SAND		lead		20:214083
2	14	FOXTROT FLAGPOLE	2[redacted]22	SAND		lead		20:214084
3	15	KAPALINA MAINTENANCE	2[redacted]22	SAND		lead		20:214085
4	16	KAPALINA HOME	2[redacted]22	SAND		lead		20:214086
5								
6								
7								
8								
9								
10								
11								
12								

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
[redacted]	2/[redacted]/22	Corin Forrest	02[redacted]22 10:42 RCVD

*Sample description can be paint chips, concrete, specific sample collection location, etc...
If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
*Required fields, failure to complete these fields may result in a delay in your samples being processed.

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awb#: 173-.....

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Hawaii Analytical Laboratory
ANALYTICAL REPORT

Wednesday, March 2, 2022

Surfrider Foundation, Oahu Chapter
P.O. Box 283092
Honolulu HI 96828

Phone Number: [redacted]
Facsimile:
Email: treasurer@oahu.surfrider.com

Lab Job No: 202201741
Date Submitted: 2[redacted]2022
Your Project: Puuloa Beach Sample Set 2, 2[redacted]22

Total Lead (soil)

EPA Method: 3051m / 7000Bm

Sample No.	Sample ID / Description	Results	Units	Date Analyzed
202214071	**1**	140	mg/kg	3/1/2022
Comments				
202214072	**2**	88	mg/kg	3/1/2022
Comments				
202214073	**3**	660	mg/kg	3/1/2022
Comments				
202214074	**4**	340	mg/kg	3/1/2022
Comments				
202214075	**5**	88	mg/kg	3/1/2022
Comments				
202214076	**6**	2600	mg/kg	3/1/2022
Comments				
202214077	**7**	3700	mg/kg	3/1/2022
Comments				
202214078	**8**	3400	mg/kg	3/1/2022
Comments				
202214079	**9**	6700	mg/kg	3/1/2022
Comments				

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on www.aihaaccreditedlabs.org, in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 – 20181015

Surfrider Foundation, Oahu Chapter
P.O. Box 283092
Honolulu HI 96828

Phone Number: [redacted]
Facsimile:
Email: treasurer@oahu.surfrider.com

Lab Job No: 202201741
Date Submitted: 2[redacted]2022
Your Project: Puuloa Beach Sample Set 2, 2[redacted]22

Total Lead (soil)

EPA Method: 3051m / 7000Bm

Sample No.	Sample ID / Description	Results	Units	Date Analyzed
202214080	**10**	200	mg/kg	3/1/2022
Comments				
202214081	**11**	820	mg/kg	3/1/2022
Comments				
202214082	**12**	14000	mg/kg	3/1/2022
Comments				
202214083	**13**	2100	mg/kg	3/1/2022
Comments				
202214084	**14**	250	mg/kg	3/1/2022
Comments				

Total Recoverable Lead

EPA Method: 3051m / 7000Bm

Sample No.	Sample ID / Description	Results	Units	Date Analyzed
202214085	**15**	< 40	mg/kg	3/1/2022
Comments				
202214086	**16**	< 40	mg/kg	3/1/2022
Comments				

Surfrider Foundation, Oahu Chapter
P.O. Box 283092
Honolulu HI 96828

Phone Number: [redacted]
Facsimile:
Email: treasurer@oahu.surfrider.com

Lab Job No: 202201741
Date Submitted: 2[redacted]2022
Your Project: Puuloa Beach Sample Set 2, 2[redacted]22

All Quality Control data are acceptable unless otherwise noted.
MRL for lead air is 5ug.
MRL for lead wipe is 10ug.
MRL for lead paint or soil is 40 mg/kg for a 0.25g sample.

General Comments
The sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures associated with the "analytical method" referenced above. Modifications to this methodology may have been made based upon the analyst's professional judgment and / or sample matrix effects encountered. The analysis of sample relates only to the sample analyzed, and may or may not be representative of the original source of the material submitted for our analysis. All analysts participate in interlaboratory quality control testing to continuously document profiency. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report should not be construed as an endorsement for a product or a service by the AIHA LAP, LLC or any affiliated organizations. Sample and associated sampling / collection data is reported as provided by client. TWA values have been calculated based on information supplied by the client that the laboratory has not independently verified. Results have not been corrected for blank determinations unless noted in remarks. Unless otherwise indicated the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions
> This testing result is greater than the numerical value listed.
< This testing result is less than the numerical value listed.
# = Analytical methods marked with an "#" are not within our AIHA LAP, LLC Scope of Accreditation.
MRL = Method Reporting Limit.

Eva Skogsberg
Laboratory Manager