

The Grave Situation in Princeville

Those who do not learn from history are doomed to repeat it...

From the State of Hawaii Land Use Commission December 9, 1980 memorandum:

“In comments dated June 25, 1979, The Department of Health cited the following concerns:

1. There may be burial sites of cattles (sic) afflicted by anthrax on the property marked by silver oak trees. These sites when encountered shall be left undisturbed during grading or land clearing operations.”
2. Kaua’i Department of Health: Once anthrax was diagnosed, silver oak trees or rock piles were used to identify known anthrax sites on the Princeville Ranch.

1917 Princeville Ranch Anthrax Outbreak

“The first appearance of the disease occurred on a ranch at Hanalei, on Kauai, and unfortunately a considerable number of animals had died before the diagnosis of anthrax was made...” Lucius E. Pinkham, Governor of the Territory of Hawaii. December 1918.

Official territorial records indicate that in March 1917 cattle began dying on the Princeville Ranch lands. In 1917, as reported in the Hawaiian Forester, the initial deaths were thought to be associated with heavy rains and winds and the herd was moved to lower paddocks/pastures better shielded from the weather. The initial diagnoses were erroneous—the disease was not weather, or hemorrhagic septicemia, but ANTHRAX.

“It is unfortunate that these animals were all skinned, the hides salted, the carcasses being left to harbor and spread infection. It was then noticed that the pack horses used in carrying these hides caught the disease, and six of them have also died. Also carrying around these dripping hides has contaminated other paddocks.” Hawaiian Forester 1917.

“...[M]ore than 300 head of cattle were lost before a diagnosis was made, and these animals were buried shallow without cremation. Cattle were dying at the rate of ten per day until vaccine was received and administered, by which time another 225 had died. The remaining 2,400 head were vaccinated twice before daily deaths subsided.” The Territorial Division of the Animal Industry/Loyal to the Land: Bergin.

By the time the anthrax quarantine was lifted on the Princeville Ranch in 1919, 500+/- cattle (mostly Herefords – bulls can weigh as much as 1800 pounds, and heifers 1500 pounds) and some horses and mules had been lost to the disease. While incineration would have been far preferable to dispose of the anthrax carcasses during the 1917-19 outbreak, there were not enough resources (manpower and fuel); the cattle were dying so fast that it was impossible to get enough wood to burn them. The afflicted carcasses were therefore limed and buried and the soil covering the graves was also “thoroughly limed”. Silver oak trees or rock piles were used to identify known anthrax grave sites on the Princeville Ranch. Unfortunately, the use of lime, which was the protocol in 1917-19, has since been found to be contra-indicated because

it adds calcium to the soil which aids in sporulation and longevity of bacillus anthracis spores. Canadian Veterinary Journal, 2008; Canadian Food Inspection Agency, March 22, 2013.

During the 1917 outbreak, Dr. Nørgaard, the Territorial Vet, contracted cutaneous anthrax. Antibiotic treatment had yet to be discovered, so a significant area of his arm had to be dissected. Maui News, May 4, 1917.

About 8 weeks after that, an outbreak at the Territorial Dairy on O'ahu killed a third of the 100 dairy cattle and Antone Gomes Pestana, Territorial Dairy farm worker there, also contracted cutaneous anthrax during the 1917 outbreak. Honolulu Star-Advertiser, May 29, 1917. Then in July, several widely separated ranches on Maui experienced outbreaks. Dr. Nørgaard was convinced that the anthrax was deliberately planted to disrupt the Territory's participation in delivering food to the war effort.

Anthrax has been dormant across Hawai'i since the last confirmed case in a saddle horse on the Princeville Ranch in 1919. Credit for that dormancy is given to the prompt quarantine of Kaua'i by the Territorial Vet and Governor, and vaccinations at the Ranch, the O'ahu dairy farm, and the affected areas in Maui.

Anthrax Basics

When animals die of anthrax, vegetative bacteria sporulate upon nutrient limitation in the carcass or soil while in the presence of air. After release into the soil environment, spores form a localized infectious zone at and around the carcass. Spores are the dormant form of the bacteria which returns into vegetative form on receiving the signals for germination. Environmental decontamination, especially in soil, is difficult if not impossible. The surprisingly resistant spores have earned the status as a bio-terror weapon. National Institute of Health: January 2020.

Anthrax is a naturally occurring gram-positive spore forming bacteria that is amazingly robust. Weaponized anthrax is concentrated and aerosolized bacillus anthracis spores--the primary difference between naturally occurring anthrax and weaponized anthrax is the boosting of concentration of the spores and aerosolization. However, anthrax infection from any source, weaponized or not, is very serious. By way of analogy, a bullet from a single-shot Colt 45 is just as dangerous as a bullet from an automatic weapon, if indeed you are hit by one.

Soil becomes infected with anthrax by discharges from animals suffering from the disease or by the dead bodies of animals which are allowed to decompose on the surface. The NIH reports that **a billion spores per each ml of blood or bodily fluid** would be released into the soils around an anthrax-stricken carcass. Approximately 450 to 500 cattle and horses succumbed to anthrax on the 3000-acre ranch during the outbreak and bled into the soil.

"...Anthrax manages to persist in soil for hundreds of years despite environmental extremes, including wind and rain, and even go undetected during outbreaks in humans and livestock." Viruses that inserted their genetic material into anthrax's genome, "instead of killing the pathogen... spurred its ability both to grow and persist in the soil". Scientific American, February 2010.

Science has proven that anthrax spores can have a half-life of at least 100 years and complete environmental decontamination, *especially in soil*, is extremely difficult if not impossible; it can be spread through the air if disturbed. All the attributes of spores: high resistance to temperature, pressure, pH, ionizing radiations, and half-life of 100 years, make them a suitable bio-terror agent.” “Anthrax: A disease of biowarfare and public health importance”. World Journal of Clinical cases. January 2015.

MOST DEADLY

Anthrax

- Spores stay in the ground
- No treatment
- Vaccinate against

Fig.2. Animal dead of anthrax in Outbreak 4. This animal died : 10:00 pm and was photographed at 8:00 am the next d. carcass is very much enlarged due to bloat and gaseous dist and dark tarry blood is exuding from the nose.

In addition to its longevity in soil, “anthrax spores can live for 2-20 years in pond water and up to 20 months in saltwater”. National Center for Biotechnology, “Decontamination Options for Bacillus anthracis-Contaminated Drinking Water from Spore Surrogate Studies” 2010.

Development of Princeville I

Since the outbreaks (1890 and 1917) on the Princeville Ranch, burial sites of anthrax animal carcasses marked by silver oak trees and rock piles have remained undisturbed. Thirty-two of the 33 silver oak trees still observable in Princeville I are located on what became the Woods 9

of the Makai Golf Course¹. And, neither of the two silver oak tree sites noted in the 1983 Princeville II EIS study has been developed; one is on the Prince Golf Course and the other is still a vacant lot.

Donn “Curly” Carswell, the original engineer of Princeville I, the first Master Planned community on Kaua‘i, was also a rancher and married to Gayle Wilcox. The Wilcox family acquired the Princeville Ranch in 1895 and were the owners of the ranch during the 1917 anthrax outbreak. Mr. Carswell was well aware of the history of anthrax on the Princeville Ranch and the significance of the silver oak trees and rock piles that marked burial sites from both the 1890 and 1917 outbreaks.

During the design and development of Princeville I, great care was taken to ensure that any land areas marked by silver oaks were not slated for development. The large number of silver oaks on the lower elevations of Princeville I was indicative of numerous anthrax burial sites. The Master Plan presciently designated that area to become what is now the Woods 9. With Curly’s shared knowledge of the anthrax burial sites, Golf Course Architect Robert Trent Jones Jr designed and built the 27-hole Makai Golf Course as three 9-hole courses. But unlike the other 18 holes (“Lakes 9” and “Oceans 9”), the Woods 9 was designed and built without digging below the surface. All golf hazards and obstacles were created by adding dirt to the existing landscape to create hills, bunkers, etc. in order to blanket the contaminated area and keep any anthrax spores safely contained underground. Robert Trent Jones, Jr deposition, pps 96-104.

Today, there are 32 silver oak trees on Woods holes 5,6,7, and 9 and what appears to be an old rock pile on hole 6. Bruce Charlton, principal golf course designer for RTJII, and Matthew Schaller, assistant golf director from 1976-1978; from 1989 to 2006 he was project manager for Princeville Corporation have personal knowledge of the Makai Golf Course; they remember the presence of silver oak trees between the green of the 2nd hole and the tee box of the 3rd hole on the Woods Course. However, these trees are no longer observable, perhaps taken out by hurricanes or Kaua‘i’s notorious rains and floods.

The initial buyers of lots adjacent to the Woods Course in the Princeville I Master Planned community (1975 timeframe) were given notice that the Woods Course had a history of anthrax burials. Local golfers have long referred to Hole 6 of the Woods Course as the “Anthrax Hole” due to the presence of multiple silver oak trees and the remaining rock pile.

As referenced by the archival history, as well as the best practices embraced by the State Department of Health, the bacteria has lain dormant underground, safely blanketed by soil. There has been **NO** disturbance of anthrax contaminated soil since the quarantine was lifted in 1919. **None of the sites where the known silver oaks stood or are still standing in Princeville has ever been developed.**

¹ A single silver oak is located outside the Woods 9, less than one block from the Woods Course, on a developed residential lot. This singular tree is obviously young and appears to have grown from a seed pod blown from the silver oaks found on Woods 9.

Water is Also at Risk

Water naturally drains from Woods holes 4-9 through holes 1-3. The elevation of Holes 4-9 of what is now the Woods Course ranges from 280' to 260'. The elevation of Woods Holes 1, 2, and 3 ranges from 220' to 130'. The Wailei'a (also known as Kiaiakua) Stream runs along the entirety of the Woods Course southern boundary from Hole 6 (see map) past Hole 2, then downstream to the Kamo'omaika'i Fishpond (a/k/a Pu'u Poa Marsh) which empties into Hanalei Bay.

Anthrax spores can live for 2-20 years in pond water and up to 20 months in saltwater; unearthing dangerous spores from the Woods Course that can be washed into the local waters by North Shore rains is a serious cause for concern.

Risks of Development - What Could Possibly Go Wrong?

Starwood Capital Group ("SCG"), the present owner of the 27-hole Makai Course and 1Hotel was made aware of the presence of anthrax burial sites on the Woods Course in December 2020 by Nancy McMahon of Exploration Associates, who was retained for the Ka Pa'akai Study necessary for its previously proposed "Glamping" project.² Remarkably, in spite of their explicit knowledge of the anthrax gravesites, SCG has made clear its intention to develop the Woods 9 Course for multi-story luxury townhomes, condos and a smattering of single family residences, most of which will never be owner occupied.

There are three primary modes of human contraction of anthrax—cutaneous, gastrointestinal, and inhalation. According to the CDC, anthrax is caused by B anthracis bacteria. It is a serious disease, and all types of anthrax can cause death if not promptly diagnosed and treated with antibiotics. "About Anthrax", CDC May 14, 2024.

Cutaneous anthrax, contracted through skin contact, is the most common, and mildest, form of anthrax in humans. It accounts for 95% of anthrax cases worldwide. Cutaneous anthrax can initially present as sores resembling insect bites, itchy blisters or bumps, and/or swelling around the sore. (photo). The incubation period ranges from a few hours to 17 days. About 24% of untreated patients die and many cases are complicated by meningitis. In fact, 30% to 50% of all anthrax meningitis cases are associated with cutaneous anthrax and most cutaneous anthrax deaths are from secondary anthrax meningitis. "Risk Factors for Death or Meningitis in Adults Hospitalized for Cutaneous Anthrax". NIH, Infectious Diseases Society of America, October 2022.

Gastrointestinal Anthrax occurs when a person eats undercooked tainted meat from an infected animal or drinks B anthracis contaminated water. Symptoms of gastrointestinal anthrax may include fever and chills, swelling of the neck and glands in the neck, sore throat, painful swallowing, nausea, and vomiting (especially bloody vomiting), and diarrhea or bloody diarrhea. The incubation period is typically between one and six days and, according to the

² SCG's plans for "glamping" on the Woods Course were subsequently prohibited by Kaua'i Ordinance 1105.

FDA, the death rate for gastrointestinal anthrax without treatment is over 50%. Unfortunately diagnosing gastrointestinal anthrax is considered quite difficult due to its nonspecific early symptoms, which often mimic other common digestive illnesses like food poisoning, and widespread systemic disease develops rapidly.

Inhalation Anthrax, although rare in humans, is the deadliest form of anthrax that occurs when a person breathes in anthrax spores. First symptoms include fever, malaise and a cough or chest pain, shortness of breath and altered mental status. Symptoms usually present within a week after exposure, but the incubation period can be prolonged for up to two months. “Anthrax” CDC Yellow Book 2024. Researchers have found that once anthrax progresses to its advanced stage, which typically occurs four days after the first symptoms, patients are almost certain to die from it, even if they receive the best care modern medicine has to offer. Stanford Medicine, February 2006.

State of Hawaii, Department of Health, Disease Outbreak Division:

“Inhalation Anthrax: Caused by breathing in anthrax bacteria or spores. The spores are too small to be seen by the naked eye and have no special color, smell, or taste.

This is considered the deadliest form of anthrax and the form most often associated with bioterrorism. Infection usually develops within a week after exposure, but it can take up to 2 months. Inhalation anthrax begins with mild cold or flu-like symptoms which include fever, chills, malaise, mild cough, or chest pain. Symptoms progress to respiratory distress with stridor (vibrating noise when breathing), hypoxemia and cyanosis (bluish coloring of the skin due to low oxygen). Death from inhalation anthrax can be greater than 85% if left untreated.”³

Recurring Anthrax Outbreaks

“[T]he evil may be ever with us, in hiding, and will be liable to outbreak at any time.”

The Garden Island 1917

In addition to the 1917 outbreak, there are historical references to an anthrax outbreak on the Princeville Ranch in 1890. While the source of the outbreaks remains a mystery, it is more likely than not that the spores of anthrax bacillus remain in the soil where the outbreaks of this disease have occurred in the past, i.e. it is an anthrax endemic area.

Recurrent outbreaks are not uncommon in many parts of the world, including in the U.S. Texas has its “Anthrax Triangle” with frequent outbreaks. In December 2023, a Texas man was infected when he butchered a lamb that had died recently next to the “Anthrax Triangle”. Five

³ A case of inhalation anthrax was diagnosed in Minnesota in August 2011 when a man who had vacationed in the U.S. western national parks checked into a community hospital with severe respiratory symptoms. Initially diagnosed as pneumonia, inhalation anthrax was subsequently diagnosed in the patient when the hospital requested the CDC’s intervention to rule out anthrax. Fortunately, the patient survived but was hospitalized for 60 days of intensive antibiotic treatment and 3 rounds of anthrax vaccines. Despite exhaustive investigation, the source of the B anthracis was not identified. In a similar case, a heavy equipment operator in Canada was diagnosed with inhalation anthrax after exposure to contaminated airborne dust from an anthrax outbreak in bison.

people including him ate the well-cooked (vs. under-cooked) meat, but he is the only one who was infected. He survived. CDC Morbidity and Mortality Weekly Report, June 6, 2024.

Wyoming's 2024 anthrax outbreak was first identified in Carbon County affecting several cattle herds during August-September, 2024. Press release from the Wyoming Livestock Board, September 3, 2024. Wyoming Fish & Game also announced the death of a moose, in Carbon County on September 3, 2024. And in November, Wyoming Public Media published "Anthrax.Cattle.Ranchers.Government mistrust. The fallout of Elk Mountain's rare disease outbreak" following a couple who lost 30 cattle to anthrax, and detailing her journey with the cutaneous disease, the difficulty figuring out what it was and the aftermath. See article in Folder 5 – Recurring Outbreaks.

During the 1917 Princeville outbreak, the use of lime (calcium) on the carcasses and gravesites introduced a new element that has since been proven to actually increase the sporulation of bacillus anthracis spores and contribute to its ability to survive in soil. This raises the risk that viable spores will be disturbed during any potential development effort and be infectious.

Broader Risks to Livestock and Wildlife

While there is obviously a serious concern about public health, the threat to humans is not the only reason to avoid the disturbance of bacillus anthracis spores. Once disturbed, the bacteria can be transported from one site to another on the soles of boots/shoes, gloves and clothing, tires, tractors, heavy equipment, etc. Our island is a complex microcosm and what happens in one area affects what happens in another.

There is a robust cattle, bison, and horse ranching industry on the North Shore of Kaua'i. Due to the absence of the disease in the islands, livestock are not routinely vaccinated for anthrax in Hawaii. Similarly, sheep, goats, and hogs that are farm raised on Kaua'i are not vaccinated. In addition to livestock, there are also approximately 300,000 wild boar on Kaua'i, which are frequently hunted and eaten, as well as mule deer, wild cows, and feral goats. All of these animals are susceptible to anthrax.

While wild boar have a higher resistance to anthrax than cattle and sheep, they are not immune to the disease. It is not an unlikely scenario that, should bacillus anthracis spores in soil on the Woods Course be disturbed by Starwood, run-off from our frequent North Shore rains could transport the spores into the Wailei'a Stream which runs the entire length of the Woods Course, into the Kamo'omaika'i Fishpond/Pu'u Pōa Marsh and eventually into Hanalei Bay. Wild pigs drinking from the stream and ponds could then contract anthrax. Envision: a hunter kills an infected boar, makes jerky, sausage, or stew, and contracts what seems to be food poisoning or a stomach virus. Diagnosis of gastrointestinal anthrax is considered quite difficult due to its nonspecific early symptoms, and it will not likely be suspected. According to the FDA, the death rate for gastrointestinal anthrax without treatment is over 50%.

The impact of an anthrax outbreak on Kaua'i in livestock such as cattle, horses, sheep, mules, and wildlife species, i.e. deer, feral pigs, goats, and rats, has the potential for catastrophic

consequences. Dogs and cats (pets and feral) are also at risk. The unintentional transportation of contaminated soil from one part of the island to another is highly likely and the threat of potential spread to the other islands is not to be lightly dismissed.

As mentioned before, water contamination is also a serious issue considering the course of the Wailei'a Stream from the top of the Woods 9 to the Kamo'omaka'i Fishpond/Pu'u Pōa Marsh, and into Hanalei Bay. The Fishpond, ironically, is adjacent to the 1 Hotel owned by Starwood Capital Group. From a financial perspective, the effect of an anthrax outbreak on tourism on Kaua'i could also be devastating.

Bottom Line

Many scientific studies only address anthrax in the "topsoil" – within the top 2". Anthrax spores do appear to degrade within some years this close to the surface. Although the anthrax carcasses buried on the Woods Course in 1917 were "buried shallow", the burials were surely deeper than a few inches. Very few studies have been done to evaluate the survival of more deeply buried spores, those better protected from UV light, heat, cold, chemicals and other potential degrading influences. In South Africa, viable spores have been found in 200-250 year old bones in Kruger National Park.

"It should be noted that characterizing the extent of contamination and efficacy of decontamination in an outdoor setting is inherently problematic and subject to considerable uncertainty especially at the detection levels of concern to public health. This scientific uncertainty, and the lack of previous experience in clearing an outdoor environment, may ultimately require a more conservative approach." EPA/CDC Interim Clearance Strategy for Environments Contaminated with Anthrax. July 2012; updated January 2024.

According to Drs. John Alderete (microbiologist) and Andrew Pavia (infectious disease specialist who consults with the CDC Task Force on Anthrax), the best way to ascertain if anthrax has well and truly been eliminated from land is to burn it, scrape it, replant it with new grass and put livestock on it to see if they survive. Obviously, this is not a viable strategy in a residential neighborhood.

The Department of Health statement quoted by the LUC in 1979 was appropriate health policy and remains so. What was prescient then is equally sound now. Known anthrax burial sites have not been disturbed and anthrax has not reappeared on Kaua'i since 1919.

Let the sleeping spores lie.

Archival Territorial Records reflect the following:

March 1917: Cattle began dying at Princeville Plantation. Hawaiian Forester & Agriculturalist, April 1917.

April 9, 1917: Princeville manager, Mr. Parish, called in Dr. Glaisyer, Deputy Territorial Veterinarian. By that time 60 animals had died at Princeville; cause of death was initially determined to be hemorrhagic septicemia.

April 13, 1917: Dr. Glaisyer to A.H. Rice, Board of Forestry and Agriculture, Honolulu. [By] "March 22, some seventeen had died. During the remainder of the month more died, but it was considered that these animals died from the heavy rainfall and not much attention paid to it. They were then moved to a lower paddock, better protected from winds, etc, but the losses did not cease and I was called." The cattle "were dying faster than they could be buried. It is practically impossible to get enough wood to burn them all, quick enough, as there are so many. After burying, the animals are covered with quicklime, then earth, and the ground adjacent thoroughly covered with lime also... Send 750 doses vaccine. Fifty-five deaths. Vaccine urgently needed. 200 not adequate. Impossible to burn bodies, dying too quickly. Am burying and liming. Six deaths today."

April 16, 1917: Anthrax diagnosed. The following message was received from Dr. Glaisyer: "Microscopic examination blood animals dying Hanalei reveals anthrax. Two deaths today. Request Nørgaard come at once. Bring anthrax vaccine instead of vaccine previously ordered."

By April 17, "about" 85 cattle, 2 horses and 4 mules had died of the disease and "until the arrival of the vaccine on April 25 a varying number died each day". Hawaiian Forester, 1917. Unfortunately, the vaccine "failed to stop the loss to the extent which had been hoped for". By the end of the month all of the vaccine had been used up and new cases of anthrax had begun to appear.

In May 1917, anthrax broke out in a dairy on Oahu and, in June, on several sites on Maui. Afflicted animal carcasses were immediately burned and the herds quarantined and vaccinated. In total, approximately 33 animals died on Oahu and less than 50 head of cattle and horses were afflicted on Maui. Hawaiian Forester, 1917 The news of the outbreak of anthrax on the Princeville Ranch on Kaua'i and the availability of anthrax vaccine in the islands resulted in a quick diagnosis and treatment; these outbreaks were relatively quickly contained with minimal losses.

The November 1918 issue of the Hawaiian Forester stated, "At Hanalei, Kauai, we have a much more serious condition... Considering the character of the disease and the great resisting powers of the spore form of the infection to all disinfectants and the experiences gained in similar outbreaks in other countries, these lands must be looked upon as remaining dangerous for a considerable period of time".

“All outbreaks in 1917 occurred along roadways, as did the Kaua’i cases.” *Loyal to the Land, The Legendary Parker Ranch* p.250. What is now Lei O’ Papa Road is a portion of the Kauai Historic Belt Road completed in 1917; it bisects the Woods Course between Woods Holes 4-9 and 1-3.

By the end of 1917, over 500 head of cattle and horse stock were lost to the disease and the disease continued on Kaua’i into 1919. The death from anthrax of a saddle horse on the Princeville Plantation in March 1919 “justifies the quarantine which has continued to be maintained on the pastures where the infection still remains”. *Hawaiian Forester*, April 1919, p. 85.

In August 1918, Dr. Victor Nørgaard, Territorial Veterinarian, lifted the quarantine in the Kalihiwai district only to the extent that the guards were removed from the main road from Kalihiwai to Hanalei Bridges, but the removal of the quarantine guards did not constitute a removal of the quarantine of the infected district. “All fenced and anthrax-infested pastures, enclosures, or premises remain quarantined and such pastures, enclosures or premises must be kept fenced as to prevent absolutely entrance of stray livestock from adjoining highways and districts. Further, it was ordered that all gates opening on public roads or non-infected premises “shall be securely fastened and be provided with a sign forbidding admission”... Report of the Territorial Veterinarian, *Hawaiian Forester* October 1918, p.413.