

Response to Planning Commission Comments

To: Michael Conger, County of Ventura Planning Division

RE: PL23-0009 Planning Commission Hearing – Appeal of Mircetic PD/CUP

We have prepared the following responses to comments raised during the December 19, 2024 Planning Commission (PC) hearing regarding the CUP/PD requested for 11820 Topa Vista Road. The appeal hearing was continued until February 20, 2025, and we would appreciate your inclusion of our efforts to address the PC's concerns in the staff report and staff presentation. We will also prepare a presentation that will discuss these responses.

Relocation of Animal Shade Structures that are closest to the appellant's proposed residence:

We have shown the neighbor's (appellant's) proposed residence on the site plan, and the location is taken directly from the approved plans for ZC22-1085 for the residence and an accessory dwelling unit. The house is proposed to be built 45.2 feet from the property line. The applicant, Keeley Mircetic, is proposing to relocate two of the animal shade structures to the northern portion of the property, adjacent to two other similar-sized shade structures, in response to the PC's comments at the recent hearing. This appeared to be the most pressing concern of the PC and also of the appellant. This relocation will result in the nearest animal shade structure being 67.67 feet from the property line and 112.83 feet from the appellant's proposed residence, which meets the 40-foot setback requirement. This shade structure is one of the structures that was built by the previous owner, and it is a metal building with concrete footings and would therefore be cost-prohibitive to move. The next closest shade structure will be 68.9 feet from the property line and 130.81 feet from the appellant's proposed residence, which meets the 40-foot setback requirement. This is also a metal building with concrete footings and would therefore be cost-prohibitive to move. The relocated animal shade structures 4 and 5 would be over 300 feet away from the proposed residence.

By relocating animal shade structures 4 and 5 we are taking every action possible to address the appellant's and the Planning Commission's concerns about proximity to the residential use in question. These are not closed structures and are commonly used for animal keeping purposes and are considered accessory to the allowable agricultural use of the property. They are open sided and have roofs only. Also, "detached one story shade covers for animals when the covers are not over 12 feet in height above grade and not more than 1,000 square feet of roof area" are exempt from Building Permits pursuant to the Building Code, which applies to all four of the shade structures 1, 2, 4, and 5, as are accessory structures less than 120 square feet, which applies to the two small sheds 1 and 2.

County of Ventura Planning Commission Hearing Case No. PL23-0009 Exhibit 11 - Applicant's Response

Vector control:

The following comments are meant to address the vector control comments as stated by the appellant at the recent hearing:

All the horses are vaccinated twice a year with the "5-way" or "EWT" which includes Eastern and Western Equine Encephalomyelitis, Tetanus, Influenza, and Rhinopneumonitis and West Nile or a combination with Rabies, and have regular vet care to ensure safe and healthy horses.

H5N1 is the bird flu which is only spread by birds and possibly cattle. Keeley does not own cattle, birds, or chickens, only horses. This was referenced in the letter that Dr Austin Howard wrote, who is a family member of the appellant, Richard Howard.

All manure is disposed of safely. Corrals are cleaned 3 times a day and the manure is put into a closed container daily, which is then removed from the property on a weekly basis. All urine is raked and covered with sand and DG. All water buckets are cleaned and scrubbed regularly and there is no standing water on the property. DG, dirt and/or sand is watered down in summer months to prevent dust.

There are several studies stating that horse manure is a solid waste and is excluded from the federal EPA waste regulation. The horse gut does not contain the two water borne pathogens that are of great concern to human health – e coli and salmonella. Horse manure is mainly digested grass, is biodegradable and is removed from the property weekly per the Manure Management Program that was approved by County Watershed Protection District.

Please see the attachment of an article related to the fact that horse manure does not spread disease.

Fly control is done 1-2 times a month using Spalding Labs fly predators, odor control and fly traps. please see link: <https://www.spalding-labs.com/contact> . The horses are sprayed with organic fly spray daily during summer months.

The horses are moving through the property during the day. They are being hand walked or ridden through the property, groomed at the grooming station or allowed to graze during winter months. They are not housed in the corrals only throughout the day.

Keeley's property is located below 11700 Topa Vista Rd and the land slopes upwards to the appellant's property. At the December hearing, potential contamination of water supply was mentioned, but that is impossible due to the topography and the fact that domestic water is supplied to both Keeley's property and the appellant's property by Sisar Mutual Water Company. There are no active water wells on either property, and the nearest active well is over 500 feet away.

Considering all of the above measures that are implemented at the project site, the project complies with the County Environmental Health Vector Control condition (condition 25), of the PD/CUP. In addition, the Manure Management Program required by the conditions of approval (condition 31) from the County's Watershed Protection District/Groundwater Program Section was already submitted to and approved by WPD. Keeley has taken all reasonable measures and more in order to ensure that flies and other vector and contamination concerns are addressed sufficiently.

Unpermitted Structures:

During the last hearing there appeared to be an assumption that Keeley built all of the unpermitted structures onsite. That is not the case. We have prepared two additional exhibits that identify to the PC what structures were present before her purchase of the property, which include the large animal shade structure 6, shed 2, the 2,780 sf garage, the accessory dwelling unit structure, and the house that was destroyed by the Thomas Fire that Keeley is proposing to rebuild. The unpermitted structures were not disclosed to Keeley during the purchase of the property. Keeley has only added the large animal shade structure 3, the four small shade structures 1, 2, 4, and 5 and a shed that are exempt from Building Permits, and a storage container. Therefore, the property had a significant number of buildings on it before Keeley's purchase, and the structures that she did add are open-sided and commonly used for equine purposes in the County. Also, the grooming stations appear to have been mischaracterized as structures, but they are simple concrete slabs used for horse washing on a temporary basis, with no permanent coverings.

Number of horses allowed on the property:

At the December hearing it was implied that there could be more horses than the Zoning Ordinance allows. This is incorrect – there are 11.8 equine animal units allowed by right on the property, and Keeley currently has 10 horses. No more than 11.8 horses can or will be housed on the property.

Please note that several of the nearby properties have horses and cattle, which are allowed by right in the RE zone.

Summary:

In summary, we ask the Planning Commission to take these additional details into account, consider the history of the property as described above, consider the effort that Keeley is taking to relocate the animal shade structures that were closest to the neighbor's proposed residence and address the other concerns brought up by the appellant and the Planning Commission at the December hearing. Keeley has cooperated with all County staff and thoroughly addressed all County requirements to permit the existing violations and maintain a clean and professional equine operation on her property. We request that your Commission recognize these efforts and approve PL23-0009 for her PD/CUP.



DATE

January 15, 2025

TO

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Estimate of Repairs

Remove, relocate, replace mare motel:	\$53,000
disassemble and save horse panels	
disassemble and dispose of existing structure	
excavate and dispose of existing post footings out of ground	
grade new pad for installation of new structure	
rough in water and electric	
supply new mare motel "kit"	
prepare pads for and set new posts (16ea) into concrete	
construct, bolt together beams and other roofing members	
install roofing panels	
supply and install gutters and down spouts	
set finish of plumbing and electrical	
import, spread, level new decomposed granite base	
reinstall horse panels	
Remove, relocate, replace 2ea 12x24 horse corals:	\$22,000
disassemble and save horse panels	
disassemble and dispose of existing structure	
excavate and dispose of existing post footings out of ground	
grade new pad for installation of new structures	
rough in water and electric	
supply 2 new corral "kits"	
prepare pads for and set new posts (8ea) into concrete	
construct, bolt together beams and other roofing members	
install roofing panels	
supply and install gutters and down spouts	
set finish of plumbing and electrical	
import, spread, level new decomposed granite base	
reinstall horse panels	
Remove, relocate, rebuild large welded steel structure:	\$390,000
supply Engeneering and permits	
disassemble and save horse panels	
rent crane and operator	

remove roofing material
cut welded connections between vertical and horizontal members
 remove all above structural members for future rebuild of structure
remove and dispose of existing concrete pad
excavate and dispose on concrete post pads
grade new pad for installation of new structure
rough in water and electric
erect vertical posts on new pads
weld horizontal members onto vertical members
 employ Special Inspector for this portion of erection
paint steel members
supply and install new roof and gutters
set finish of plumbing and electrical
import, spread, level new decomposed granite base
reinstall horse panels

DOES HORSE MANURE POSE A SIGNIFICANT RISK TO HUMAN HEALTH?

Abstract

Questions periodically arise during park and open space Master Planning processes, trail planning/development, and other public meetings whether horse manure poses significant health risks to humans. The following paper was developed to help provide information for non-scientists about laws and regulations defining toxic and hazardous wastes, the chemical and pathologic contents of horse manure, and some thoughts about the potential risks to humans exposed to horse manure.

This paper was prepared by:

Adda Quinn

March 1998, R.3 October 2001

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What Type Waste is Horse Manure?

Horse manure is a solid waste excluded from federal regulation because it neither contains significant amounts of listed hazardous components, nor exhibits hazardous properties. See definitions below:

Issue	Definition
Waste	Loss through breaking down of bodily tissue, damaged, defective or superfluous material produced by a manufacturing process - Webster's Dictionary
Solid Waste	Any discarded material that is not excluded in Section 261.4 of the Code of Federal Regulations (CFR). Domestic sewage (261.4(a)) and animal manure (261.4(b)(2)) are specifically EXCLUDED from Federal regulations
Hazardous Waste	Solid wastes which are either: A. <u>Listed</u> : literally a list of organic compounds and inorganics (metals & metal compounds) which may pose a substantial hazard to human health. The federal government maintains this list. B. <u>Characteristic</u> : 1. Fails one or more test for: a. <u>Ignitability</u> : flash point 140° F or spontaneously combustible b. <u>Corrosivity</u> : pH <2 or >12.5 c. <u>Reactivity</u> : generally sulfide & cyanide compounds d. <u>Toxicity</u> : fails Toxicity Characteristic Leachate Procedures (TCLP) tests (See Table 1) 2. Is fatal to humans in low doses or lab animals at specified threshold levels 3. Contains toxic constituents (See Table 1)

What Chemicals Comprise Horse Manure and Are They Toxic?

Toxicity Definition: Relating to or caused by a poison - Webster's Dictionary
Everything is toxic to something at some level (although not necessarily every substance to every species). Toxicity may be acute, chronic or bioaccumulative. Toxins come into the body by being ingested, inhaled or dermally absorbed. The sixteenth century Swiss physician, Paracelsus, first pointed out the fact that ALL substances are toxic and that the difference between a remedy and a poison is simply the amount that is taken into the body. "The dose makes the poison". Many chemicals that are essential to good health, like sodium chloride, are toxic at high levels, but dysfunctions can result when they are present at levels that are too low.²

The human body has the remarkable ability to function unaffected by exposures to toxics. UC Berkeley biologist Dr. Bruce Ames has said, "Every day we are ingesting in our diet at least 10,000 times more by weight of natural pesticides than of man-made"- from bacon, peanut butter, mustard, basil, tea, and wine, among others.³ The number of organic chemical compounds that have been synthesized since the turn of the century now exceeds half a million, and some 10,000 new compounds are added each year.⁴ Many of these new products are toxic to humans. Thus, the body is constantly being exposed to a variety of toxic chemicals.

As you can see in Table 2, the primary chemical constituents of horse manure are about the same as harmless household and agricultural fertilizer. In fact, animal manure is a valuable agricultural amendment and has been used for millennia to help grow our food supplies. Current mushroom culture relies heavily on horse manure, while other crops have been developed with human sewage sludges in order to recycle our own prolific wastes. Thus, based on its chemical constituents, horse manure should not be considered toxic.

Pathogens of Concern

Commercial livestock intestinal microflora has been studied in depth, but not horses. Very few statistics are available on horses. According to Dr. Deanne Meyer, Livestock Management Specialist at UC Davis (1997), it is difficult to find data on horses because it is seldom that more than 50 horses are kept in a single facility. You must have a sufficient mass of animals for study, before data can be considered representative. While the US Department of Agriculture keeps extensive data on commercial livestock operations, it keeps no data on horses. The Council for Agricultural and Science Technology (CAST) estimates livestock volume in units as follows:

Cows	104 million
Swine	60 million
Sheep	8 million
Poultry	7790 billion ⁵

The mere 6.9 million horses⁶ thought to populate the United States have been of little concern until recently when increased attention began to be given to the Clean Water Act.

"Human pathogens are rarely a concern in farm-generated wastes" (NRAES 54). Pathogens are organisms (fungus, helminths, virus, protozoa, bacteria) capable of producing infectious disease. Fungi are usually considered to be of minimal health risk (Straub et al 1993). *C. tetani* is reportedly found in equine manure, but does not represent a source of significant public health risk (NCSU 2000). Many common equine helminths (worms, bots, etc.) are pathogenic to domestic animals but are not pathogenic to man (Straub et al, 1993). Generally speaking, horse guts do not contain the 120 viruses and constituents of concern in human, dog and cat feces (carnivores and omnivores) (Atwill 1998, Putnam 1983, Davis et al 1996, Rugg 1998). Most viruses with zoonotic potential (animals infecting humans) are not found in horse wastes.7

As a result of intensive studies on commercial livestock, some protozoa and bacteria have been identified that can survive in horse guts. (See Table 3) Pathogens of primary concern are waterborne microorganisms that usually follow ingestion pathways into the body. Transmission can also occur through direct oral-fecal exposure. These include *Cryptosporidium parvum*, *Giardia duodenalis*, *Campylobacter spp.*, *Salmonella spp.*, pathogenic strains of *E. coli*, and *Yersinia spp.* By far, *C. parvum* and *Giardia* are the two of most concern because they have very low thresholds of infectious dose. People infected by these organisms may exhibit a range of symptoms from mild abdominal discomfort to death, especially among the very young, elderly, and people with immunologically suppressed systems. Neither of these organisms can be destroyed easily with traditional water treatment processes. With recent large-scale waterborne outbreaks of Cryptosporidiosis around the U.S., and the rising numbers of immunodeficient people, public attention has increasingly focused on the integrity of drinking water supplies. This paper will focus on results from recent studies on *Cryptosporidium* and *Giardia*.

Protozoa

Water supply is from Sisar Mutual H₂O Co.

Human Transmission of Disease

C. parvum, long considered a veterinary disease, has emerged as an important infectious disease of human, as well as of animal origin. Our ability to distinguish between these organisms has only become possible recently with the advent of genetic testing (genotyping). "The genotype and experimental infection data suggest the possibility of two distinct populations of *C. parvum* in humans. One population appears to involve zoonotic transmission from calf-to-human with subsequent human-to-human and human-to calf transmission. The other population appears to involve an anthroponotic transmission cycle, exclusively in humans." In laboratory experimental infection studies, the exclusively human genotype could not successfully infect laboratory animals. Retrospective analysis of outbreaks at the Georgia water park (1995; 2900 cases), Florida day camp (1995; 70 cases), and in Wisconsin (1993; 403,000 cases) indicates these infections were caused by the genotype found exclusively in humans. 8

In the "*Cryptosporidium* White Paper" published by the San Francisco Public Utilities Commission in 1996, a number of interesting facts were cited:

- While not identified until relatively recently historically, *C. parvum* is ubiquitous to 6 continents, infecting a substantial number of people (up to 16% of people in the third world and between 1-4% of the total population in North America are

prevalent for *Cryptosporidium*); potentially 10,000,000 people in the US and 1,000,000 in California.

- Detection of the presence of the organism in water does not indicate that it is viable (i.e., capable of inducing infection), and, there is no method for assessing the mechanisms by which it becomes virulent. Oocysts of *C. parvum* are present in many North American waters (0.0002-5,800 per liter) more so in lakes and rivers, less in groundwater. NO reason to be in his groundwater
- Analytical methods for understanding/ controlling the organism are so poor that b/c he the government cannot recommend control regulations. IS above us!
- County environmental health officers of Alameda, San Francisco, San Mateo, and Santa Clara believe that Cryptosporidiosis from drinking water is not a major concern. 9

Equine Transmission of Disease

Recently, several credible research papers have been published which demonstrate conclusively that adult horse guts do not significantly contain either *C. parvum* or *Giardia*, the two organisms of greatest human health concern when present in water supplies.

While some evidence exists that foals and their pregnant or lactating mothers can carry *C. parvum* or *Giardia*, neither foals nor their mares are likely to be found on trails. No studies had been done on adult horses until 1993, at which time watershed managers proposed to ban livestock from their property due to uncertainties about the role of livestock in shedding pathogens. In response to this, the Backcountry Horsemen of California (BHC) and High Sierra Packers Associations funded an independent study by UC Davis Tulare (Johnson et al). Fecal samples were obtained from 91 horses and 311 horses and mules used in backcountry riding to determine the potential risk of adult horses contaminating surface waters. Samples were collected at horse barns and round corrals throughout California during 1993 and 1994. Horses were between the ages of 4 and 24 years of age.

The typical backcountry horse trip in California lasts 4 to 7 days. The incubation period before these organisms start to shed is usually 1 to 2 weeks after infection. Thus, an adult horse acquiring an infection from contaminated surface water during a backcountry trip would likely not start shedding these organisms during the typical backcountry ride of 4-7 days.

The conclusions from Johnson et al "indicate that backcountry use of horses for recreational riding is unlikely to pose a significant risk of environmental contamination from *Cryptosporidium* of equine origin nor is it likely to create a significant threat to human health from either of these protozoans." 10 *Giardia* from cattle and horse has NOT been shown to be infectious for humans under normal circumstances. These data do not support the assumption that horses are infecting humans with *Giardia* in the back country. In fact, studies are underway to determine which mammals in the high Sierra are shedding the most *Giardia* and which mammals are the ones defecating closest to sources of water. The more a horse was used in the backcountry, the less likely it was to have *Giardia* infection.

When the Johnson et al paper was submitted to a scientific journal for publication, it was subjected to a rigorous peer-review. The major criticism voiced about the study by peers

concerned the fact that the 91 horses, while representing a broad geographical spectrum, were not sampled at trail heads prior to entering backcountry. A second study was undertaken between July and November of 1996 by Ford et al of Colorado State University Fort Collins to test fecal matter of 300 horses entering at 23 different trail heads in Colorado. Horses sampled ranged from 3 to 30 years old. Of these 300 horses, only one was positive for *C. parvum* and 2 for *Giardia*. Prevalence results were completely consistent with previous finding by Johnson et al, in California. In following up to get information on the infected individuals, the sole horse with *C. parvum* was determined to be 24 years old, had bad teeth, poor digestion and was immuno-compromised. He was ridden daily as part of a commercial string, and suffered from weight loss. He probably drank contaminated water downstream from a known beaver habitat. He was immediately put to pasture to recover. The conclusion from Ford et al is: "Based on the low prevalence of *Cryptosporidium* in the trail horse population surveyed, it can be concluded that the adult recreational trail horse population is not likely to be a significant source of *Cryptosporidium* environmental contamination in water shed areas."11

Interestingly, Dr. Rob Atwill of UC Davis/Tulare (a principle in the Johnson et al study) has found that wild animals have substantial rates of *C. parvum* in their guts, significantly higher than those found in either humans or horses. For example 30% of mice tested were found to have *C. parvum* in their guts; similarly 63% of rats, and 11% of feral pigs carried this organism.

We are in a Wildlife Corridor!

While horse manure found on trails may contain some of the pathogens discussed here, they are unlikely to exist in significant numbers to impact human health. Life expectancy of most of the protozoa discussed, when deposited in manure on a trail, is very short. Atwill cites Robertson et al. 1992 "Oocysts appear to die after several hours of being dry". Most bacteria will not grow at a water activity below 0.95 according to Atlas and Bartha. (See reference 7).

and we are disposing of all manure - we are not trail riding on his property

Bacteria

Coliform bacteria are ubiquitous and are necessary beneficial organisms that help most normal healthy species including man and animals digest their food. *E. coli* under certain conditions - such as stress or infections - cause disease in its host or may be found as a secondary invader to other diseases. Strains that exist in one species generally do not affect others - consequently man's primary concern is for *E. coli* of human origin and then only if it is found in his food or water - not because of the *E. coli* itself but because of other germs that may accompany it. While *E. coli* from a number of species, including humans, can cause intestinal disease under certain conditions, those of equine origin have not been shown to do so. "On concentrated reflection, I can come up with no explanation why the horse should be singled out as a likely source of human disease. On the contrary, among domestic animals the horse is perhaps the least likely to play such a role". 12

In the winter 2000-2001, Dr. Atwill of UC Davis Tulare, conducted a further research study on 250 horses in the San Francisco Bay Area. Due to concerns expressed by organic gardeners about the safety of using composted horse manure as a soil amendment, Atwill determined again that insignificant levels of *E. coli* 0157:H7 and *Salmonella* were in adult horse guts. Composted manure showed no *E. coli* 0157:H7 after 24 hours in pile residence. Research results should be available in the near future.

A 1998 NAHMS study on "*Salmonella* and the US Horse Population" confirms *Salmonella* is not an issue in horses (www.aphis.usda.gov/vs/ceah/cahm/Equine/eq98salm.htm).

Is the Risk of Human Exposure to Untreated Horse Manure Acceptable?

There are three types of risks: true risk, calculated risk, and perceived risk.

There are 250 million people in the US and 6.9 million horses. There are 28 million people of the State of California and 642,000 horses. Over 70% of California horses are involved in showing and recreation (about 449,400).¹³ Probably only half of these potentially use trails (about 250,000). The rest are confined to show arenas, or are at pasture as retired family pets. The remaining 30% will virtually never be found on trails since they are involved in the expensive pursuits of racing and breeding, and are too valuable to expose to the dangers on trails. Thus, horses likely to be on trails are relatively few in number compared to the number of citizens who are likely to use trails. And, obviously, not all of these horses that could potentially be on trails are likely to be on trails simultaneously.

No major human disease has ever been accurately attributed to the intimate contact human beings have had with horses for thousands of years.¹⁴ Veterinarians and vet students probably have the greatest exposure to true risk from horse manure. The horse has a very inefficient gut: it's a one-way throughput system. Horses are physiologically incapable of vomiting or regurgitating. If something gets stuck on the way through, the only way to get it out is by surgery or physical intervention. As a result, you will often find vets armpit deep under a horse's tail. Nevertheless, there has never been a documented case of veterinarians contracting illness as a result of this rather extreme true exposure to horse manure. People employed by or who provide services at horse keeping facilities, could possibly have the next most frequent opportunity for exposure to horse manure, but they don't have reported problems either. Because horses are big, imposing animals, infrequently encountered by people, the perceived risk of human exposure to horse manure is probably greater than the true risk.

We have found that many younger people in parks and open spaces near urban areas have rarely seen or even petted a horse. The average trail horse in California, ridden by an employed owner from an urban area, would likely not be present on public trails more than 12 to 16 hours per week- a maximum of about 10% of a week. Winters are difficult to ride on trails, so most riding occurs between April and November. Many more people use trails than horses. For example, in San Mateo County, a supposed "horsey" jurisdiction, the human population is nearly 700,000 compared to 4,000 horses. While all citizens and all horses may not be trail users, the horse subset that uses trails is probably very small. We believe that such small numbers of horses on urban trails and the brief time spent on them constitutes very little true risk in terms of volume or contents for people encountering horse manure.

In the California backcountry average pack trip of 4-7 days¹⁵, trail time might be 7 hours per day - maximum of about 30% of a week. Access for much of the high country is limited to horses from June through October. Most individual horse riders would be lucky to spend two weeks a year in the mountains with their animals. Thus, out of 20 weeks of available trail time, privately owned backcountry horses probably use only a maximum of 10% of time available. We believe that such limited numbers of horses on

backcountry trails and brief time spent on them constitutes very little true risk in terms of volume or contents for people encountering horse manure.

Horses spend most of their time in pastures or paddocks where the majority of their excrement is deposited, collected and managed. Horse manure is about 70-80% liquid and 20-30% solids¹⁶. The liquid portion is quickly retained by soil or vaporizes rapidly into the atmosphere. In composted scenarios, total mineralization (breakdown into CO₂ and H₂O) occurs within 21 days with more than 50% of the total CO₂ produced during the first 6 days.¹⁷ There are no documented studies of decomposition rates under ambient conditions because the large number of variables (temperature, wind, moisture, direct sun, disturbances, etc.) would be difficult to control in scientific experiments. According to Jeffrey Schaffer, wilderness writer, "700 backpackers in Desolation Wilderness (West of Lake Tahoe) contribute about a ton of human waste per week. Whereas horse and cattle excrement lying on the ground decomposes rapidly, buried human excrement takes longer, for in mountain soils, subsurface decomposers such as bacteria and fungi are not abundant".¹⁸

Dr. Aaron Wildavsky, Professor at UC Berkeley has written, "The richest, longest-lived, best protected, most resourceful civilization is on its way to becoming the most frightened. Government has contributed to this process by taking responsibility for risk management away from individuals." People are exposed to a variety of risks every day of their lives and must make decisions about which risks to ignore and which ones to manage actively. We believe that exposure to horse manure is one fear people can cross off of their list of things to worry about.

People vastly outnumber horses likely to be found on trails in both the United States and California. Because horses are encountered infrequently by most people, it is likely that their perceived risk of exposure to horse manure is actually much higher than their true risk. As we have seen, manure is physically handled by only a few people with no notable health effects reported. It desiccates and decomposes rapidly in the environment. There are no known toxic effects on humans due to the exposure to horse manure. It is unlikely that the average hiker practicing conventional hygiene will experience adverse effects from exposure to horse manure on a trail. We believe that based on the information currently available, the exposure of people to untreated horse manure on trails is an acceptable health risk.

Conclusion

Horse manure is a solid waste excluded from federal EPA solid waste regulation because it neither contains significant amounts of hazardous chemicals, nor exhibits hazardous characteristics. The chemical constituents of horse manure are not toxic to humans. Horse guts do not contain significant levels of the two waterborne pathogens of greatest concern to human health risk, *Cryptosporidium* or *Giardia*, neither do they contain significant amounts of the bacteria *E. coli* 0157:H7 or *Salmonella*. Fungus, viruses, bacteria and worms found in horses have never been shown to infect humans and are unlikely to be zoonotic. Finally, the reality is that there are very few horses, and even fewer numbers of them that frequent trails. People seldom encounter or handle horse manure. People who do have occasion to handle horse manure have never been infected by this intimate contact. Humans and other sources within the environment (e.g. wild animals and birds) with their overwhelming population numbers are far more likely than horses to contribute to human health risks.

While horse manure may not be aesthetically pleasing, it should not be harmful to human health nor pose a significant health risk to people when they encounter it on public trails.

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Acknowledgments, References & Tables

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Dr. Barbara Baum Taylor, Engineer & President, META Environmental, Inc.

Dr. Janice Yager, Toxicologist

Mr. Mark Graham, Research Librarian

Numerous reviewers who helped tighten up concepts and language

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Table 1. - MAXIMUM CONCENTRATION OF
CONTAMINANTS FOR THE TOXICITY CHARACTERISTIC

EPA HW No. ¹	Contaminant	CAS No. ²	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D018	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	5.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	*200.0
D024	m-Cresol	108-39-4	*200.0
D025	p-Cresol	106-44-5	*200.0
D026	Cresol		*200.0
D016	2,4-D	94-75-7	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	*0.13
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	*0.13
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lincane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-6	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D043	Vinyl chloride	75-01-4	0.2

¹ Hazardous waste number

² Chemical abstracts service number.

³ Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

⁴ If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.

Table 2
Fresh Manure Production & Characteristics Per 1,000 kg/lb Live Animal Mass per Day

Manure Production & Characteristics

American Society of Agricultural Engineering

Adopted by the ASAE
Dec. 1976, 1992 & revised 6-14-73

ASAE Data: D384.1
(Data Excerpted for Horses Only)

Parameter* - mean	1000 lb in pounds (450kg)
Total Manure (79.5% water)	45 or 0.75ft ³ /da
Urine	10
Density lb/ft ³	60
Total Solids	9.4
Volatile Solids	7.5
5 day biochem O ₂ demand	1.7
Chemical O ₂ demand	-
pH	7.2
Total Kjeldahl Nitrogen (No Ammonia Nitrogen)	0.27
Phosphate P ₂ O	0.105
Potassium K ₂ O Potash	0.205
Calcium	0.29
Magnesium	0.057
Sulfur	0.044
Sodium	0.036
Chloride and Lead	-
Iron	0.016
Manganese	0.0028
Boron	0.0012
Molybdenum	0.00083
Zinc	0.0022
Copper	0.00053
Cadmium	0.0000051
Nickel	0.00062

(Per Dr. Meyer UC Davis,
may be overstated by 25%)

*Feces & urine as voided. All values wet basis from a typical live animal

USDA Agricultural Waste Management Field Handbook Ch 4-17 concurs:

Wt lb/da/1000# horse	50.0
Vol ft ³ /da/1000#	.8
TS lb/da/1000#	11.0
VS "	9.35
FS "	1.65
N "	0.28
P "	0.05
K "	0.19
C:N ratio	19.0

TABLE 3
Pathogens excreted by livestock and transmitted
to humans through water

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List of pathogens of primary concern that can be shed in the feces of livestock and transmitted to humans through water.

Waterborne protozoa pathogens of primary concern (known livestock component)	Special concerns and comments
<i>Cryptosporidium parvum</i>	Low infectious dose; environmentally resistant oocysts; oocyst 5 x 5 microns
<i>Giardia duodenalis</i>	Low infectious dose; environmentally resistant cysts; zoonotic potential under debate; cysts approximately 12 x 15 microns
Waterborne bacterial pathogens of primary concern	size ranges from 0.2 x 1.5 to 1.5 x 6.0 microns
<i>Campylobacter</i> spp.	Common in livestock and wild birds
<i>Salmonella</i> spp.	Common in livestock feces
Pathogenic strains of <i>E. coli</i>	Can be highly virulent for humans
<i>Yersinia</i> spp.	Swine are considered a primary reservoir; apparent low annual incidence in humans

Pathogens of secondary concern whereby livestock have either no role or an unclear role in human waterborne infection have also been listed.

Waterborne protozoa pathogens of secondary concern	
<i>Toxoplasma gondii</i>	Felines are the definitive host, not livestock
<i>Balantidium coli</i>	Swine suspected, but no clear role
<i>Entamoeba histolytica</i>	Human reservoir
<i>Cyclospora cayentanensis</i> and microsporidia (<i>Enterocytozoon bieneusi</i> , <i>Septata intestinalis</i>)	Unknown reservoir and livestock not known to shed these protozoa at this time
Waterborne bacterial pathogens of secondary concern	
<i>Clostridium perfringens</i> types A & C	Waterborne transmission unclear
<i>Listeria monocytogenes</i>	Waterborne transmission unclear; human infection typically foodborne
<i>Brucella</i> spp.	Waterborne transmission unclear
<i>Leptospira interrogans</i>	Waterborne transmission unclear; human infection typically by direct contact
Waterborne viral pathogens from livestock	Little scientific evidence that viruses shed in the feces of livestock pose a health threat to humans in the U.S.A.