



ROE ECOLOGICAL SERVICES, LLC

2 May 2006

Mr. Phillip Stoffey
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530

CERTIFIED MAIL 7005 0390 0003 3908 8773

**Re: Results from soil and tissue samples and request for concurrence or further input
Valmont Butte Site, Boulder, CO.**

Dear Mr. Stoffey:

We are in the process of developing the management plan for the prairie dogs within the tailings ponds on the Valmont Butte site. This letter is a report of various metals in soil and prairie dog tissue samples. We are requesting the Hazardous Materials and Waste Management Division's (Division) concurrence with this report (or its further input) as well as its comments on movement of the remaining prairie dogs off of the subject site.

SOIL BACKGROUND LEVELS BASED ON SAMPLING

Soil samples were collected from within the primary tailings pond, secondary tailings pond and the pond edge. Control samples were collected east of the secondary tailings pond and from a non-industrial site more than 10 miles away. Surface soil samples were collected from prairie dog mounds.

In addition, we understand that Terracon obtained an additional six soil samples from the Valmont Butte site to further determine background levels. The results of these samples are discussed below.

ARSENIC

Arsenic levels in the offsite control sample ranged from 5.9 to 8.9 mg/kg (ppm). Arsenic levels in the onsite control sample ranged from 4.1 to 6.0 mg/kg. The results of Terracon's additional soil samples indicate arsenic concentrations in soil ranging up to 9.4 mg/kg. These background levels are notably higher than the background level of 1.9 mg/kg provided in the Division's letter of 4 January 2006. Mr. Walter Avramenko of the Division, in a teleconference with RES on or about 22 February 2006, indicated

PO Box 1168, Berthoud, CO 80513 PHONE: (970) 532-1305 FAX: (970) 532-1306
TOLL FREE: (866) 4-Wildlife (494-5354)

EMAIL: res@yourwildlife.com VISIT US ONLINE AT: www.YourWildlife.com

his belief that background levels of arsenic within Front Range soils are often higher than this. He stated that up to 10 mg/kg, in his opinion, is a realistic background level. In light of this statement, we request your concurrence that cleanup of Valmont Butte site soils to an arsenic level of 10 mg/kg or less will be acceptable to the Division.

LEAD

Lead levels in the offsite control samples ranged from 19 to 25 mg/kg. Lead levels in the onsite control samples ranged from 92 to 160 mg/kg. We concur with the Division's lead level objective of 400 mg/kg.

URANIUM

Uranium levels in the offsite control samples ranged from 1.3 to 2.6 mg/kg. Uranium levels in the onsite control samples ranged from 1.4 to 2.8 mg/kg. Although we understand that the Division uses picocuries per gram of radium-226, our data are in ug/kg or mg/kg. We therefore request the Division's concurrence that 3.0 mg/kg is an appropriate background uranium level for soils on the Valmont Butte site.

TISSUE SAMPLE BACKGROUND LEVELS BASED ON SAMPLING

Prairie dogs were trapped and euthanized from within the primary tailings pond, secondary tailings pond, the tailings pond edge, an onsite control site east of the secondary tailings pond and the same offsite control as the offsite soil samples. Pelt, liver and muscle samples were taken from each prairie dog and analyzed.

ARSENIC

The maximum arsenic level detected in tissue samples was 0.2 mg/kg-wet weight, and detectable levels were found only in pelt samples. Background tissue samples taken from animals at both the onsite and offsite controls points showed maximum arsenic levels of 0.1 mg/kg. This value is within the range of background levels established for the soil samples (0 to 10 mg/kg). In addition, during a review of the limited scientific literature on arsenic and wildlife we found that:

1. There have been no scientific studies on either food chain mobility or toxic effects of arsenic on the health of wild animals;
2. In the older literature, mammalian tissue arsenic concentrations in excess of 1.0 ug/g¹ (0.1 mg/kg) seem to have been considered toxic. In the more recent literature, researchers have found up to 3.2 ug/g¹ (0.32 mg/kg) in small mammal body content at a control site;
3. Arsenic concentrations are often highest in the spleen and bone, with muscle and liver showing the lowest concentrations;
4. Arsenic may be deposited over the long term in skin, hair and bone; and
5. Small mammals have been shown in laboratory studies to excrete arsenic rapidly via the renal pathway.

Based on this review of the scientific literature, the fact that the maximum arsenic level found in prairie dogs at the Valmont Butte site is below control-site background levels and that arsenic was not detected in the muscle or liver of these prairie dogs, it does not appear to us that these tissues would be toxic to a predator on these prairie dogs.

LEAD

The maximum lead level in the tissue samples was 29 mg/kg-wet weight, and detectable levels were found only in pelt samples. The onsite control sample showed a maximum background level of 2.0 mg/kg-wet weight in a pelt sample. Because it was unknown whether the lead was in the hair itself or in dust on the skin surface, additional pelt samples were collected from the six prairie dogs that showed elevated lead levels and tested at Paragon Analytics, of Fort Collins, CO. Of the samples that were washed with dish soap and warm water, all showed a decrease in lead to below 10 mg/kg-wet weight. Our review of the scientific literature on toxic levels of lead in wildlife revealed that:

1. Lead bioaccumulating in prey species will cause increased lead toxicosis in predators, which can have an impact on survival and reproduction of those species (particularly when the levels in small mammals equal or exceed doses that cause direct mortality), increased susceptibility to disease, behavioral abnormalities or reproductive impairment;
2. Liver concentrations are important in the determination of lead toxicosis;
3. Generally, liver lead concentrations of < 2 mg/kg-wet weight in raptors are believed to represent normal exposure to background levels which does not impair normal biological functioning;
4. Liver lead concentrations for raptors being acutely poisoned by lead exceeded 6 mg/kg wet weight;
5. Liver lead concentrations between 2 and 6 mg/kg-wet weight for avian species may indicate sublethal lead poisoning;
6. Liver lead concentrations in waterfowl suspected of dying from lead poisoning generally exceeded 60 mg/kg;
7. Particulate lead, the least toxic form of lead, is believed to pass through the gastrointestinal tract with little absorption; and
8. Although, with regard to susceptibility to lead toxicosis, interspecies variation may exist among raptors, American kestrels fed up to 50 mg/kg particulate lead for 5 to 7 months showed liver lead residues up to only 3.8 mg/kg-wet weight, with the birds showing no signs of lead toxicosis.

Based on our literature review, we conclude as follows:

1. Although lead can bioaccumulate in prey to a point where it causes lead toxicosis in predators, the fact that liver lead concentrations in Valmont Butte site prairie dogs were below 2.0 mg/kg appears to indicate that these tissues would not be toxic to a predator on these animals; and
2. It is unlikely that the levels of lead shown in the pelt samples, even without washing, would cause lead toxicosis in any predators, particularly avian, even if those predators fed on the prairie dogs frequently over many months in the wild.

URANIUM

The maximum uranium level detected in the tissue samples was 0.21 mg/kg. Detectable levels were found primarily in pelt samples on or immediately adjacent to the tailings ponds. Two muscle samples showed detectable levels of uranium. Additional muscle samples from those prairie dogs were sent to Paragon Analytics for testing. Paragon Analytics found no evidence of uranium in these samples.

In addition, because it was unknown whether or not the uranium was in the hair itself or merely in dust on the surface on the skin, additional pelt samples were collected from six of the prairie dogs with more elevated levels of uranium. Of the samples that were washed with dish soap and warm water, all showed a decrease in uranium levels to ≤ 0.15 mg/kg-wet weight.

Like lead and arsenic, the value of 0.025 ppm of uranium is well below background levels established for soil samples. In addition, background tissue samples taken from animals at both the onsite and offsite control points showed a uranium level of up to 0.02 mg/kg. Further, we have found no scientific literature purporting to show that these uranium levels are toxic to wildlife.

CONCLUSION – VALMONT BUTTE SITE PRAIRIE DOGS ARE NOT TOXIC TO PREDATOR SPECIES

Based on our review of the scientific literature and on the results of this study, we believe that the transport and release of prairie dogs alive from this site to another site in Boulder County would not be deleterious to predator species. We request the Division's concurrence with this conclusion.

Should you have any questions, or require further discussion of our findings, please contact me.

Sincerely,



Kelly A. Roe
Certified Wildlife Biologist

cc: Bill Boyes, City of Boulder, Facilities and Asset Management, Public Works, PO Box 791,
Boulder, Colorado 80306-0791

Susanne A. Cordery-Cotter, P.E. Senior Project Engineer, Terracon, 301 North Howes, Fort
Collins, Colorado 80521