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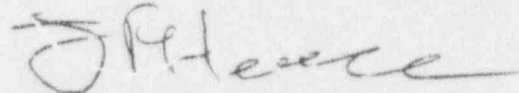
United States Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555

Attn: Dr. Donna-Beth Howe

Dear Doctor Howe,

Enclosed you will find information in response to some of the questions from our telephone conversation on June 28, 1993. I have arranged the questions within three categories so that the responses would follow some form of logical order. I hope this information, as well as that given in other phone conversations and sent by fax will help you complete your environmental assessment. Your time and attention paid to the urgency of this project is deeply appreciated.

Sincerely,



Jim Herrold
Radiation Safety Officer

Enclosures:

1. April 7, 1993 signature page
2. University of Wyoming Byproduct Materials License
3. Overview of the Sybille Wildlife Research and Conservation Unit, September, 1987
4. Index to U.S. Geological Survey Topographical Maps of Wyoming, 1992
5. Topographical map of Rock River, Wyoming
6. Information of Black Footed Ferret recovery program
7. Information on Wyoming Toad recovery program
8. May 24, 1993 letter from Tom Thorne, Wyoming Game and Fish regarding acquisition of pronghorn antelope for study
9. Scale drawing of pronghorn pens and pasture
10. Sections from Walker's Mammals of the World on Pronghorn antelope and M deer

Information on the University of Wyoming's Materials License.

1. Copy of signature page to April 7, 1993 letter provided.

A photocopy is enclosed of the cover page containing John Doerges' (RSO) signature from the April 7, 1993 license renewal document in which the amendment for the Pronghorn Antelope study first appeared.

2. Copy of University of Wyoming's Byproduct Materials License provided.

A photocopy of Amendment 30, renewing the University of Wyoming's Materials License until June 30, 1998 is enclosed.

Information on the Sybille Wildlife Research and Conservation Education Center (Sybille WRCEC)

3. What is the Sybille WRCEC?

The Sybille WRCEC is a research and conservation facility operated by the Wyoming State Game and Fish Department. Its primary objective is to provide facilities and services for research on hoofed big game species and other exotic species considered for reintroduction. A secondary objective is to provide conservation education to the public. However, the public have limited and controlled access to experimental animals. A copy of an Overview of the Sybille Wildlife Research and Conservation Unit, September 1987, is enclosed which gives a full description of the location, history, activities, objectives and management of the center.

4. Where is the Sybille WRCEC located in relation to the nearest towns or cities? Provide description and maps.

As explained in the overview cited in question 4 above, the research center is approximately 45 miles northeast of Laramie, Wyoming and approximately 34 miles southwest of Wheatland, Wyoming on State Highway 34. Refer to side B of the enclosed map entitled "Index to U.S. Geological Survey Topographic Maps of Wyoming" (1992) for location of highway 34 between Laramie and Wheatland. A topographical map of the Rock River District showing the location of the Sybille WRCEC is also enclosed.

5. What direction does Sybille Creek flow?

Sybillie Creek flows from the southwest to the northeast, draining into the Laramie River and the North Platte River drainage. The area where the pronghorn research will be conducted is near the bottom of an open-ended canyon approximately one-quarter mile at the widest point, with steep hills rising almost immediately from the back (south) side of the compound. All runoff in the canyon flows toward Sybillie creek, away from adjacent private land to the south and west. After passing the Pronghorn pens, Sybillie Creek flows at least one and a half miles through the research compound before reaching private land.

The chance that tritium contamination from the pronghorn pastures and pens could reach Sybillie creek is very slim. The pastures slope toward the pens. The pens have concrete floors with gutters that drain to a septic tank designed for disease control. The septic tank consists of a collecting tank and a drainage field which is pumped on an as-needed basis. The concrete pads are not hosed off, in general, but rain runoff might wash down into the gutters. The low average rainfall and humidity in the area ensures that most of the tritiated water excreted from the pronghorn would evaporate before having a chance to get washed down the drain.

6. How many people live at the research center?

Currently there are nine adults and two children over age two living in housing provided by the Game and Fish. All drinking water is supplied to the four residential buildings from three underground wells. Due to possible fecal contamination from cattle and other animals upstream from the compound, no human drinking water comes from Sybillie creek.

7. How many people visit the sight each year?

From records at the visitor center, it was approximated that they receive 4,000 to 6,000 visitors each year. The visitors center is open from April 1 to November 15. The heavy months are May and September, when school children travel to the center on school field trips. There is a nature walk and observatory at the visitors center from which captive deer and bighorn sheep may be viewed. In order to go inside the research area (which is locked behind an 8-foot fence) visitors must be escorted by Sybillie employees. Visitors may observe, but may not come in contact with the research animals or their quarters. Approximately one-third of the total visitors are taken on these guided tours.

8. Are there any food crops, herds or gardens in the area? If so, what is their proximity to the pronghorn study and where does the water come from?

On the compound there are no cash crops or livestock raised. One of the residences to the north and east of the pronghorn pens has a small garden. All

water for lawns, trees and gardens comes from the underground wells discussed in the overview document mentioned in question 3 above. There is a diversion dam on Sybille Creek upstream (northwest) from the pronghorn pens which provides water for a hay meadow to feed the wintering animals.

Bordering on the south and east of the compound is private ranch land, where range cattle could possibly graze. Because the land slopes sharply towards Sybille Creek, the runoff from the compound would not be able to contaminate the land to the south. The nearest private land to the east is approximately one and a half miles downstream from the pronghorn pens, with an 8 1/2-foot fence separating it from the Game and Fish property. The Overview (see question 3) mentions cattle grazing in the Johnson Creek area. This area is in a separate canyon which drains into Sybille Creek downstream from the research unit boundary.

9. Are there any other uses for Sybille Creek?

The water from the diversion dam (in question 8) is also piped to a small pond (approximately 20 feet by 10 feet) near the visitors center. The pond is primarily decorative, but it could be used for wading by center residents or a watering hole for migratory birds. There is no fishing allowed inside the compound. The nearest fishing access to Sybille Creek is one and a half miles downstream from the pronghorn pens, with the permission of the private landowner.

10. Are there any endangered species in the area which could be affected by the study?

The Sybille WRCEC is used to house and study a variety of native Wyoming species, some of which have been on the endangered list. Currently there is research on two endangered species being conducted on the compound: the Black-Footed Ferret and the Wyoming Toad. The ferrets are being bred on site for eventual reintroduction to the wild. They are isolated in a building approximately one-half mile downstream from the pronghorn area. The ferrets are kept indoors at all times, given only well water to drink and fed prairie dogs which are brought in and quarantined to protect the ferrets from diseases. They are never released in the Sybille Creek area. A pamphlet describing the Black Footed Ferret is enclosed.

The Wyoming Toads are kept in a building next to the ferret facility. They are housed on site while they are in hibernation, then they are moved to reintroduction sites in other areas of Wyoming and Nebraska for a few weeks so that breeding in the wild can occur, then they are returned to the enclosure at Sybille. They are never kept or released out of doors in the Sybille Creek area. Because both of these species are kept in quarters with strict environmental control and public access, it is highly unlikely that they would be affected by the radioactive materials used in the pronghorn study. Pages from the Wyoming Toad

recovery plan are enclosed.

There are no endangered species in the wild with critical ranges that include the Sybille Creek area. There are, however, some migrant species which might pass through the canyon or the Platte River valley:

Bald Eagles are native to Wyoming, and may fly through the area, but there are no known nests in Sybille Canyon. The Bald Eagle feeds on small mammals, birds and fish. A worst-case scenario would be that an eagle would pass through the canyon and capture a pronghorn fawn used for the lactation study (eagles would not prey on adult pronghorns). This is highly unlikely due to the narrow canyon walls and the abundance of high fences and ground cover protecting the fawns. Eagles generally need an area open for 50 to 100 yards to swoop and carry off their prey. Between fences and buildings, the largest open area in the pronghorn pasture is about 40 yards across. Historically, there have been no cases at Sybille where pronghorn fawns have been carried off by eagles.

The Peregrine Falcon is also a Wyoming endangered species which might pass through the canyon, but there are no known nests in the area. Falcons do not feed on young pronghorn, but there is a remote chance that a falcon or eagle could capture a ground squirrel or bird which has received contamination inside the pronghorn pen.

Whooping Cranes have been known to migrate along the Platte River, but hardly ever venture up the smaller tributaries, and have never been seen in Sybille Canyon. By the time the small amounts of tritium used in this study could travel over 40 miles to the North Platte, the effect on the Whooping Crane's ecosystem would be almost nonexistent.

The Least Turn may frequent the waterways to the east, and may occasionally pass through the Sybille area, but no sightings have been noted.

The following animals and birds are classified as category 2 species of concern, and might pass through the Sybille Canyon, though no major populations are known:

- Ferruginous Hawk (rare, usually a plains bird)
- Mountain Plover
- Long-billed Curlew
- 13-Line Ground Squirrel (subspecies *alleni*)
- Meadow Jumping Mouse
- Swift Fox (Platte Valley, Wheatland Plains)

Information on the pronghorn antelope lactation study:

11. Where will the research animals come from?

The one remaining pronghorn to be used for the 1993 study was raised in captivity at the Sybille Center. Arrangements have been made with the Colorado Division of Wildlife, Foothills Wildlife Research Facility in Fort Collins, Colorado to have six impregnated doe pronghorn transferred to Sybille. The pronghorn that give birth will be used in the proposed study for the summer of 1994. At the end of the four-month season, the adult pronghorn will be held for sufficient biological half-lives to bring the levels of tritium to within baseline levels, then returned to the Colorado facility. The fawns born at Sybille will remain there to be used in later years. In the spring of 1993, ten fawn pronghorn were captured or otherwise brought to Sybille to be raised in captivity and tamed for use in this and other types of studies.

12. What will happen to the pronghorn when they will no longer be used for this study?

Pronghorn fawns raised in captivity as research animals are never released because they cannot adapt to the wild. These pronghorn are either kept at the Sybille facility for their useful lives or euthanized. Pronghorn which die or are killed are taken to the Wyoming State Vet Lab in Laramie to undergo necropsy and to be incinerated. Pronghorn meat from Sybille is never given to the public or used for human consumption. By the University of Wyoming's materials license, no animals used for experiments with licensed materials may be used for human consumption.

13. Size and location of pronghorn pens and pastures more defined.

The pens and pastures discussed in the April 27, 1993 letter to Jack Whitton, NRC Region IV, are part of the isolation and holding pen complex described in section II.B.8.i. (page 14) of the Sybille Overview enclosed. A scale drawing has also been supplied of these enclosures (with the heading "Wildlife Holding/Handling Facilities"). The pens and pasture to be used for the lactation study are shaded in yellow on the map. Three pens, the first and second from the left and the fourth one nearest the lab building, and the L-shaped pasture which opens off of the fourth pen will be used for the lactation study. The third pen from the left and the square "fawn pasture" are currently being used to raise the 10 fawns captured from the wild for use in future studies. Once a week research pronghorn will be herded through the door at the back of fourth pen, through the corridor into a chute leading into the second pen to be weighed. That portion of the corridor which might also be used by employees or the general public will be wipe tested,

and decontaminated or treated if necessary, to keep the levels of removable contamination as low as reasonably achievable. The general public will not be allowed to pass through the corridor until the area is certified free of removable contamination. If levels cannot be brought to within the limits allowed by the University's Materials License (<100 cpm above background for tritium) the hallway will become a restricted access area.

Because of the extensive work already done to prepare these pens and pastures, in addition to the proximity to the laboratory building and the availability of water, it has been decided that the 5-acre fenced area originally proposed in the April 7, 1993 letter will not be used. If more pasture is needed during the 1994 and 1995 field seasons, approximately 2 acre of native sagebrush/grassland on the hillside southeast of the L-shaped pasture can be opened up for the pronghorn. This pasture would be within the main boundary of the compound and fenced similarly to the existing pasture.

14. Expand on statement in first paragraph of the project summary regarding the selection of pronghorns.

Pronghorns differ from other ungulates in that the balance is very fine-tuned between maintaining a good enough maternal body condition to successfully ovulate and conceive, and maximizing fawn survival rates with enough high quality milk. Energetically, pronghorns are subjected to costly demands. They are the fastest North American ungulate, they continually move in search of forage during winter, and they endure wide extremes in harsh weather conditions. Fawn birth weights as a percentage of maternal weight represent the highest known reproductive effort among ungulates. Adult females have minimal fat storage to meet these demands, unlike similar-sized ungulates such as the mule deer. High fat reserves have generally been assumed to be necessary for successful ovulation, conception, carrying a viable fetus to term, and producing a large enough offspring to permit survival. Yet this does not appear to be true in pronghorns. The proposed study concentrates on lactation, the most demanding activity of the energetic cycle, and will examine the factors of female body condition and milk output on fawn birth weights and growth rates.

15. How many animals will be used? Will there be an increase in the number of study animals in the future?

The proposed study will involve one adult female pronghorn and her offspring during the summer of 1993, contained in the L-shaped 1/4-acre paddock. The six most tractable animals from among the six pronghorns imported from Colorado and the preceding adult female from the 1993 season will be selected for the 1994 field season. An additional year of data may be collected during summer 1995 to assess different nursing strategies between male and female offspring; six tame animals will be chosen from the group of pronghorn fawns that are currently being

raised for research purposes. Depending on the results obtained during this phase of the research, we may need to conduct several additional field seasons to determine the effects of varying nutritional intake. This would involve two separate planes of nutrition, with six animals on each plane, effectively doubling the levels of tritium usage above the 1994 and 1995 seasons.

16. Why was tritium/deuterium chosen, and what will be the doses administered? How often will the injections be done, and why was this frequency chosen?

300 microcuries TOH per 50 kg adult female pronghorn will be injected every two weeks; 1 g D₂O per kg fawn will be given on the same days. Such low doses of tritium are acceptable for this study because large volumes of water (urine) can be obtained for analysis. Two hydrogen isotopes are necessary to be able to accurately monitor water turnover in the female and the neonate, and then the transfer of TOH from the adult to the fawn. Milk intake is calculated from the amount of TOH in the fawn, corrected for the fawn's water turnover. Oxygen-18, which can be lost from an organism by both water and respiratory carbon dioxide, cannot be used to measure only water turnover. There are no other isotopes that label just the hydrogen in water.

An interval of two weeks was chosen for two reasons: (1) We need to describe the shape of the milk intake curve. In deer and elk, intake peaks at three weeks of age before declining until weaning at about 3-4 months old. In caribou, peak intake occurs during the first week of life, declining exponentially until weaning. Isotopic administration should be at close enough intervals that a peak is not entirely missed because of infrequent sampling. (2) From water turnover studies using the same TOH dosage rate in lactating caribou and deer, tritium was no longer detectable above background levels after approximately ten days. Isotopic turnover rates of caribou, which also live in relatively arid environments (arctic desert), averaged 0.01066 L/hour, which corresponds to a biological half-life of 2.7 days. Because the 12.3-year radiological half-life of tritium is considerably long in relation to the water turnover rate, this factor can be essentially ignored in the calculation of biological half-life. The calculation of tritium usage based on administering isotopic water every two weeks from June through September is a maximum value since it is unlikely that fawns will continue to nurse through September. Although there are limited data available, it is more likely that fawns will be weaned by early September.

17. What are the possible alternatives to the methods proposed in this study?

The first alternative to using two water isotopes for quantifying milk intake in the outdoor environment is to confine the animals to an indoor laboratory or environmental chamber. In the proposed study, the animals are not in an entirely natural environment because they are not free-ranging. Nonetheless, the sagebrush/grassland enclosure is as natural as possible while still confining the

animals. the observers in observation towers are virtually ignored by the animals which appear to behave naturally. Pronghorns are not easily restrained and would likely pace continually if housed inside. Behaviors would be very atypical and milk intake would most likely be reduced. This is not considered a practical alternative to the study.

The second alternative is to use an extremely accurate scale, weighing animals before and after periods of milk intake. This is impractical for several reasons: animals are not allowed to behave naturally outdoors; it would be impossible to weigh animals before and after all nursing bouts throughout the day (especially since the scale is indoors), and all nursing bouts are not equal in length or the amount consumed is not uniform, so data could not be extrapolated to a daily or weekly basis. This alternative could not be used in the study.

Another alternative is the denial of the license amendment. This would adversely affect the collection of quantitative data needed to understand the role of adult body condition and neonatal survival. This information ties in with other ungulate studies, but the pronghorn antelope is unique in that it does not exhibit a body fat reserve cycle as commonly exhibited in other species. As the only member of its family and genus, it may have survival strategies that have not been measured in other species. Data on lactation strategies of the adult female and growth rates of the neonates will increase the understanding of herd recruitment and contribute to effective management of the pronghorn. The benefit of gathering previously unknown scientific information far outweighs the slight risks of possible contamination from the relatively small amounts of radioactive materials used in this study.