

of an Interstate highway. Since lead is cumulative poison and the highway has been in its present location more than 50 years, there was concern for the welfare of the deer which may inhale motor vehicle exhaust and ingest vegetation that may contain lead. In addition, those deer are subject to human consumption; hence, a concern for human health. An appropriate research site was selected, and a collection permit was obtained to collect five mule deer. The first specimen was collected within an hour after it was killed by a vehicle, and the remaining four were shot with a high-powered rifle. In addition, portions of two adult males were collected at some distance from major roads.

Whole deer organs and fetuses were dried and samples of plant and animal tissue were ashed. Lead content of plant and animal tissue was determined by using atomic absorption spectrophotometry. Concentrations of lead compounds in randomly selected samples were also verified by the Wyoming State Chemistry Laboratory. A paired difference test and paired test were used to statistically compare lead in deer and plant tissues, respectively.

Levels of lead in sagebrush up to 90 m from the Interstate were significantly higher than in plants growing in the area 6.5 km north of the highway. Values ranged from a high of 20 $\mu\text{g/g}$ dry weight 15 m from the Interstate and decreased to control values at 90 m from the highway. Baseline levels were established to be 1-4 $\mu\text{g/g}$. Levels of lead in true mountain mahogany near the Interstate were not significantly different from those found in plants from the control area, but they were much lower than those found in big sagebrush growing in similar sites. It was found that deer from the Interstate area contained significantly more lead than deer from the control area. Levels of lead in deer from the Interstate area ranged from trace amounts in the hip muscle to 10.8 $\mu\text{g/g}$ dry weight in the antlers of the young male. Bones, kidneys, and livers contained more lead than other organs. Composite samples of the near-term fetuses contained amounts equivalent to those found in the livers of the adult deer.

Lead is a cumulative poison, building up in bones and taking the place of calcium. Thus, the relatively higher levels found in the antlers of one of the deer in this study was not unexpected. Antler-shedding could be a pathway to rid the body of some of the lead burden. In bone salt form it is not toxic, but during high calcium metabolism, as probably occurs in the growth of mule deer fawns, skeletal lead may be modeled and acute lead toxicity may result.

The data for fetuses suggest an even stronger possibility for toxicity to mule deer fawns, which apparently absorb lead across the placenta during fetal development. In addition, a considerable part of the maternal dose can be transmitted via milk to suckling rats and mice, in which case subclinically dosed mothers may give birth to chronically poisoned offspring. The manifestations of such a problem for a wild ungulate population would likely go unnoticed because of the confounding effects of mortality due to other causes. The levels in deer tissue are not considered a threat for human consumption. However, the possibility may exist for lead poisoning of other wild ungulates in areas with higher levels of traffic.

states involves the uncontrolled growth of trees and underbrush on the rights-of-way, which eventually obscure legally maintained commercial advertising signs. In some areas, this uncontrolled growth of volunteer vegetation can render an otherwise valuable advertising sign useless in a matter of several years, thereby depriving the owner of the sign and the owners of the land on which the sign is placed rental income that would otherwise accrue to them. If the sign produces income of several hundred dollars a month, which many do, the loss of a number of such signs through undergrowth blockage can be severe. The problem is relatively new. With the advent of the Interstate program in 1956, its wide rights-of-way, and the ever-increasing costs of maintenance, many highway departments discontinued fence-to-fence mowing. Scrub pine and other volunteers grew and the problem became severe. One solution is for the highway department to permit trimming and cutting on the right-of-way under carefully controlled conditions. Six states now have procedures to accomplish this and others have them under consideration. The work of clearing and thinning should be done under carefully controlled conditions. These must provide for the safety of the traveling public and the restoration of the area to a condition environmentally equal to or superior to that which existed prior to the work.

In South Carolina the outdoor advertising company must furnish a scale drawing of the site and a list of vegetation to be trimmed or removed. All work is under the direct supervision of the highway department and is accomplished from the sign side of the right-of-way. At the company's expense, a reputable landscaping firm must prepare the list of vegetation to be trimmed or removed and a sketch of replacement plantings. The company must produce a performance bond and agree to reimburse the highway department for the costs of supervision and inspection. Replacement plantings must be nursery-grown stock and the company must agree to replace any plant that dies within 1 year. In one project, the vegetation removed consisted of about 200 scrub pine, and the replacement plantings consisted of 100 creep myrtle and 100 oleander.

A benefit of vegetation control is highway safety. According to the National Highway Traffic Safety Administration, 27 percent of the national fatality toll in 1978 was caused by collisions with roadside hazards. Trees and shrubbery presented the greatest overall hazard. Fatal collisions with trees claimed 3260 lives in 1978. In 1979, it increased to 3299. The Federal Highway Administration's Handbook of Highway Safety Design and Operating Practices notes, "The clear roadside concept has gained wide acceptance and many research studies have confirmed the effectiveness of removing trees and utility poles, and making shoulders and slopes traversable." Vegetation control, including tree removal, is not contrary to good highway landscaping practices. The Guide for Highway Landscape and Environmental Design, prepared by the Operating Committee on Roadside Development of the American Association of State Highway and Transportation Officials, contains guidelines for the selective thinning of trees "to create a natural transition between the open clearing of the site and the undisturbed woods, to form bays and open areas in woods, to thin heavy stands, to remove undesirable species, and to open views to vistas." We believe that vegetation control to provide visibility to legal outdoor advertising displays can be done in a safe and effective manner and will benefit the motorist, the highway department, and the outdoor advertising company.

ACCOMMODATING BILLBOARDS ALONG ROADSIDES
George McInturff

A problem of serious proportions in a number of