

Appendix K

Risk Assessment For Herbicide Application

Tebuthiuron

Tebuthiuron, marketed under the trade name of Spike, is a soil-applied herbicide used for various vegetation management purposes. Spike 20P consists of small clay pellets containing 20 percent active ingredient of tebuthiuron. It is used primarily for sagebrush control on rangeland and can be applied with either aerial or ground equipment.

Tebuthiuron is a substituted urea herbicide that, when absorbed by roots, moves to the leaves where it inhibits photosynthesis, the process by which plants make food. Susceptible plants die when their carbohydrate reserves are exhausted. This process may take two or more years. Desirable grasses, forbs, and certain woody species are tolerant to Spike at rates effective to control sagebrush. Herbaceous vegetation typically increases at least two or three times when sagebrush is controlled due to the increased available moisture and nutrients.

Tebuthiuron not used by plants is absorbed and metabolized by soil micro-organisms or eventually decomposes. The half-life of tebuthiuron in the soil is 12 months or more; however, it will not accumulate because of biodegradation and the many years between required applications. The long half-life serves to control the establishment of sagebrush seedlings following treatment. Because it is root absorbed, tebuthiuron may be effectively applied anytime the ground is not frozen. The first rain after application normally will melt the pellets and move the active ingredients into the soil where it is held on soil particles. Heavy rains with large surface flow shortly after application could move small amounts of tebuthiuron off site before it is absorbed by the soil. Because of its strong absorption to soil particles, low application rate, infrequency of application, and the fact that big sagebrush does not grow in high water tables, it is very unlikely that tebuthiuron would ever leach into ground water. No residues of tebuthiuron have been detected in ground water.

Tebuthiuron is classed by the Environmental Protection Agency (EPA) as moderate to slightly toxic to animals. It is classed in the same toxicity category as table salt, bleach, aspirin and vitamin E3. It is much less toxic than such well-known products as 2,4-D, caffeine, or nicotine. Tebuthiuron technical material has an LD50 of 644 mg/kg for rats. This is the dosage of toxicant, expressed in milligrams of toxicant per kilogram of body weight (mg/kg), which is lethal to 50 percent of the animals in the test population. The higher the LD50, the safer the compound. As a comparison, the LD50 of 2,4-D amine is 375; 2,4-D ester is 620; caffeine is 200; and nicotine has a LD50 of 50 (See Multi-Regional Risk Assessment, Table III-C-1).

Risk Assessment

The Forest Service contracted with Labat-Anderson, a toxicological firm in Arlington, Virginia which specializes in Risk Assessments, to evaluate the risks of twenty-one

herbicides that may be used for vegetation management. The assessment is published in a 400-page technical document entitled “Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4 and 10 and on Bonneville Power Administration Sites,” referred to hereafter as the “multi-regional risk assessment.” The assessment details the hazard and potential exposure from the use of each herbicide and calculates the risk to the public, application crews, and non-target species. This document is available for viewing at the Supervisor’s Headquarter’s Office in Idaho Falls, Idaho. Table and page references that follow are from that document.

Risk is calculated by determining the toxicity, or hazard of a chemical as determined in laboratory test animals. It also considers any health effects that have been observed in humans. This data is then applied to the dose, or exposure, which humans or other animals may receive in various possible scenarios. A margin of safety (MOS) is then determined by calculating the separation between the no observable effect level (NOEL) of a chemical on the most sensitive test animal and the dose, or exposure, estimated to be safe for humans ($MOS = NOEL/dose$). All NOEL’s used in the risk analysis are based on, or considered, long-term exposure. The risks are listed as low, medium, or high. A risk is considered low when the margin of safety is 100 or greater. A moderate risk is when the margin of safety is 10-100. A high risk is when the margin of safety is less than 10. The Forest Service strives to maintain low risk on all herbicide projects.

The typical scenario used in the multi-regional risk assessment for tebuthiuron application on rangelands is .5 pounds of active ingredient (AI) per acre (Table II-B-1). The typical drift distance to surface water and edible berries is 100 feet for aerial application, 20 feet for back pack application, and 50 feet from ground mechanical application (Table III-D-2). A typical drift distance, to humans, of 600 feet for aerial application, 50 feet for back pack application, and 100 feet for ground mechanical application, was used in exposure estimates (Table III-D-2). It should be noted that drift distance calculations were based on liquid application. Spike 20P is a pelletized product that does not drift. The effect from drift will be negligible. Typical daily treatment of 320 acres for aerial, 100 acres for ground mechanical, and 10 acres for hand applications were used in the worker exposure scenario (Table III-D-8).

Taken from Beaver Creek Drainage
Vegetation Management Plan EA 1998