



United States
Department of
Agriculture
Forest Service

COOPERATIVE FORESTRY

Technology Update

Southern Region, USDA Forest Service, 1720 Peachtree Rd., N.W., Atlanta, Ga. 30367

No Herbicide Residues Found in Smoke from Prescribed Fires

By Charles K. McMahon and P. B. Bush¹

Some concerns have been expressed by forest workers conducting prescribed burns on forest lands treated with herbicides. The major concern has been based on speculation that hazardous levels of airborne herbicide residues may be present in the smoke near breathing zones of forest workers. Much of this speculation is based on flie hazard caution statements found on product labels and material safety-data sheets. While these cautions are appropriate in connection with fires near herbicide storage sites, they were not intended to apply to fires following application on forest sites. In these cases, on a given acre, only a few ounces or pounds of active ingredient are spread over several tons of ground litter and forest vegetation, which becomes the dominant fuel for the prescribed fire.

Modeling assessments, coupled with indoor laboratory experiments, have shown that the herbicide risks to forest workers are insignificant, even if the fires occur immediately after herbicide application.

A field validation study was conducted in Georgia in August-October 1988 to measure breathing zone concentrations of smoke particles, herbicide residues, and carbon monoxide (CO) on 14 operational site-preparation prescribed fires. The sites were operationally burned within a time period between 30 and 169 days after herbicide application. Smoke was monitored on sites treated at labeled rates with Arsenal (imazapyr);

Garlon 4 (trichlorpyr); **Pronone 10G** granular and Velpar ULW granular (hexazinone); and Tordon **K** liquid (picloram). Tract size ranged from 3 to 380 acres.

Personal monitors and area monitors employing glass fiber filters and polyurethane foam collection media were developed and validated for use in the study. The personal monitors were worn by forest workers and research personnel to measure airborne herbicide and "respirable" smoke particulate matter under a normal operational scenario. The area monitors were placed in zones of high smoke concentrations to measure airborne herbicide and total smoke particulate matter concentrations under a worst-case operational scenario.

Seventy personal monitors and 70 area monitors were employed in the study. The sensitivity of the monitoring methods used were in **a range that is** several hundred to several thousand times below any known herbicide inhalation risk level. **No herbicide residues were detected in the smoke samples from any of the fires in the study.**

As expected, particulate matter and CO concentrations varied highly. The effects depend on the fire condition and the location of the personnel. Research personnel experienced discomfort when deploying the area monitors at some test sites. The particulate concentrations there often exceeded those tolerable for long-duration working conditions. The respiratory distress and eye irritation associated with the higher **values** would prompt most **workers** to retreat to areas of lower smoke concentration after only a few minutes' exposure.

¹The authors are Project Leader, USDA Forest Service, Auburn, AL, and Co-Investigator, Cooperative Extension Service, University of Georgia, Athens, GA, respectively.

Worker exposure to CO ranged from 6 parts per million per hour to 30 ppm per hour, while working on the fires. **These values are well below the permissible exposure limit for CO of 35 ppm per hour, on the basis of an 8-hour shift.** The cited limits are those of the Occupational Safety and Health Administration, U.S. Department of Labor.

The results of this study further support the "no significant herbicide risk" findings of earlier USDA Forest Service studies.

REFERENCES

McMahon, C. K.; Bush; 1990. Final Report. Evaluation of worker respiratory exposure to herbicide residues in the smoke from prescribed fire in the South. FS-S0-4105-1.21 NAPIAP Project S0-30. Available from senior author, 60 p.

McMahon, Charles K.; Bush, Parshall B. [In Press] Forest worker exposure to airborne herbicide residues in smoke from prescribed fires in the Southern United States. American Industrial Hygiene Association Journal .

The use of trade names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product.

ACKNOWLEDGEMENT

The authors would like to thank Larry M. Bishop, Forest Management and Taxation Specialist for reviewing this report and facilitating its publication and distribution. The authors also thank the National Agricultural Pesticide Impact Assessment Program for sponsoring this research.