PROPOSAL

Title: Assessment of the environmental distribution of TCDD following application of 2,4,5-T to forests.

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Proposal: One of the principal concerns over the use of phenoxy heribicides in California forests is the presumed presence of traces of the supertoxin impurity 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and its possible dispersion and concentration in the environment. The amount of TCDD presently allowed in commercial 2,4,5-T is 0.1 ppm, equivalent to release of about 45 micrograms/acre/lb or one nanogram/ft^2/lb. However, no data exist on the environmental levels of TCDD to be expected from the standard conifer-release application of 2,4,5-T in California or indeed whether any detectable TCDD is released at all.

The objectives of this investigation are (1) to determine the level of TCDD introduction into the forest environment; (2) to assess its immediate maximum distribution between the air, terrestrial surfaces, and water; and (3) to estimate the rate of its breakdown or dissipation. This work constitutes part of an integrated investigation of the forest application of herbicides coordinated by the California Department of Food and Agriculture (DFA) and will be conducted at the site selected by DFA. Monitoring of soil, foilage, and other natural substrates will be conducted under a separate agreement.

Work Plan: A random sampling of individual batches of commercial herbicide spray mix (as well as concentrate) will be made just prior to aerial application. The applied spray then will be trapped on replicated 4 x 4 ft Mylar panels at several locations; in most cases, one set of panels will be recovered within the first few hours after spraying, a second set approximately one day after spraying, and a third set within about 5 days. If feasible, distribution of the Mylar panels will include tree-top level, ground-level (both in the open and under trees), understory level, over water, and upwind and downwind drift; other substrate samples will be collected as required. The Mylar sheets will be packaged to avoid loss or contamination, returned to UCD and Cal Analytical Laboratories, and there extracted and analyzed for TCDD by an appropriate gas chromatographic method.

The remainder of these samples will be provided to DFA for 2,4,5-T analysis, and, if greater analytical sensitivity is required for TCDD, a limited number of TCDD analyses may be conducted by the Dow Chemical Company, Midland, Michigan, under the supervision of one of the contact personnel.

Samples of foilage, soil, and biota collected at the same site will be collected by DFA personnel in cooperation with the contract personnel for possible TCDD analysis under a separate agreement.

Budget:

Mylar Panels (60)	$ 400
Extra Mylar, extraction solvents, glass	400
TCDD Analyses	
Panels (60)	2,400
Other (spray mix, concentrate) (10)	400
Travel to site	
Preapplication site visit	300
Environmental sampling	800
Postapplication travel	500
Reporting, telephone, etc.	200
TOTAL	$5,400

Contractor: Cal Analytical Laboratories, Inc., 401 North 16th St., Sacramento, CA.

DESIGN FOR THE STUDY OF PHENOXY HERBICIDES IN CONIFER RELEASE PROJECTS

HISTORY

Members of the public and the Legislature are questioning the use of phenoxy herbicides in forests and rangeland. Allegations of harm or potential harm to human health and the environment have been made by residents close to sprayed areas. These allegations imply vast drifting of pesticide over the rural landscape resulting in human illness, deformed wildlife and plant damage. There is much concern over biomagnification in the food chain of dioxin (TCDD), which occurs at very low concentrations in 2,4,5-T. This implies the possibility of harm to man and the environment.

OBJECTIVE

This study is designed to;

1) analyze for the presence of the phenoxy herbicides, 2,4 Dichloro-phenoxyacetic acid (2,4-D) and 2,4,5-Trichloro-phenoxyacetic acid (2,4,5-T) and the impurity 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), in the environment, as a result of aerial application to forests for conifer release,
2) determine the impacts of the use of phenoxy herbicides, if any, upon man and the environment,
3) determine and recommend measures that mitigate any adverse impacts.

CRITERIA

The questions raised may be answered or further illuminated by inquring

Debris - What levels of herbicides and/or TCDD occur on site after application?

At what rate are they degrading?

Aquatic Organisms - The standards for aquatic monitoring will be developed in cooperation with the Department of Fish and Game.

SAMPLING PLAN

To properly consider these questions, the site to be sprayed must be surveyed and sampled prior to, during, and after application in order to determine levels, if any, of phenoxy herbicides.

SURVEY OF SPRAY AREA

Identify and visually survey boundaries of each spray area; orient and mark the areas on maps.

Identify and mark locations where air, soil, foliage, water, and debris samples will be taken. Identify the sites for weather recording stations.

SAMPLING METHODS AND MATERIALS

Air - Hi-volume Staplex air samplers with Amberlite XAD-4 resin or impingers with ethylene glycol will serve as collection media. Each Staplex is calibrated to determine the amount of air in cubic feet per minute that passes through a 30 gram bed of

The collector will take other appropriate measures to avoid contamination of the sample. Sampling intervals will be determined by two factors - the flow rate of the stream and proximity of the stream to the spray area. This will ensure that sampling will take place at the proper intervals following application. Stream flows will be calculated the day before herbicide application using a pygmy current meter (See Appendix A). Water temperature will also be recorded.

Soil - Samples will be taken from areas receiving maximum exposure to the spray-i.e., in open areas with n o canopy. As with other samples, monitoring will occur both near the center and downwind on the boundary of the spray site. Sample size will be one square meter in area and one centimeter deep. Soil will be placed into clean, unused paint cans and sealed tightly with lids. The soil is scooped with a garden trowel that is cleaned with acetone between sampling.

Foliage & Debris - These samples will be collected at the same sites where soil samples are taken. Flora classified as to overstory or canopy, understory, and ground cover species will be included. Debris will consist of organic matter loose on the ground. Foliage and debris samples will be placed in pastic bags (approximately one gallon capacity), sealed with twist ties, and kept on ice for storage and transportation to the laboratory for analysis.

APPENDIX A

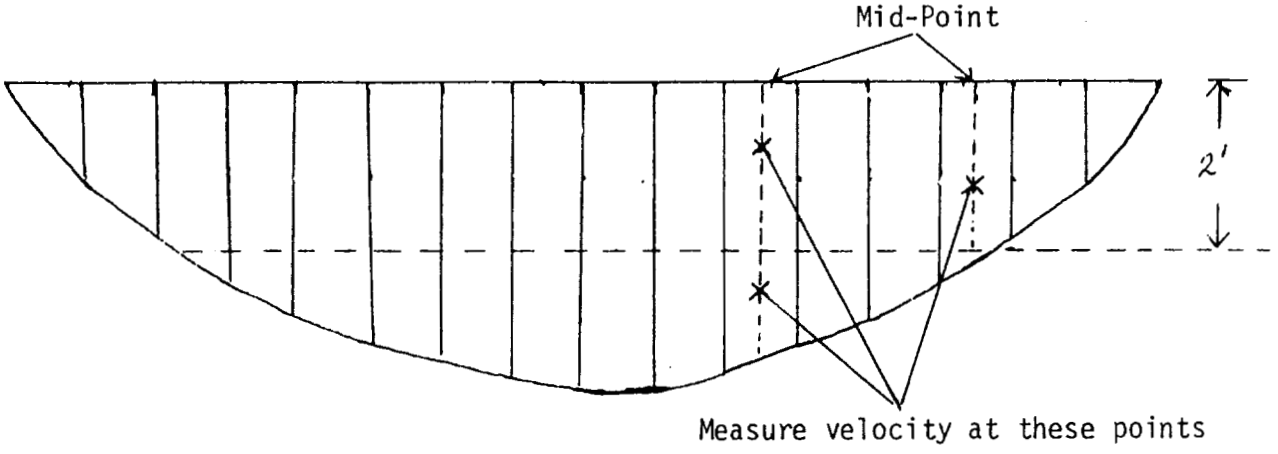
Source: Personal Communication: Ted Wooster
California Department of Fish and Game
Region III Headquarters
Yountville, California

MEASUREMENT OF STREAM FLOW

Stream flows are measured according to Geological Survey method using a current meter and stop watch. A pygmy current meter can be used for velocities less than 3 c.f.s., but for higher velocities, the revolutions are too fast to count in which case a larger meter is used. The advantages of the pygmy meter are that it has a rating of 1 to 1, that is, one revolution per second equals a velocity of one foot per second, and velocities can be measured at shallower depths than with the larger meter. For the larger meter, the revolutions per second must be looked up in a table to get the velocity of the current.

The best place to make the flow measurement is a point where the bottom is smooth, of nearly uniform depth, and the current is free from eddies.

The width should be divided into at least 16 sections and the depth and velocity measured at the mid-point of each section. The revolutions of the current meter are counted for at least 40 seconds to minimize the error caused by momentary current surges. For depths of 2 feet and less, the velocity is measured at a point .4 of the depth from the bottom. For depths greater than 2 feet, the velocity is measured at a point .2 and .8 of the depth from the bottom.



Computations:

1. The depth at the mid-point of each section = the average depth of the section.

2. The average depth of the section multiplied by the width of the section = the area of the section.