

## Section II

### Bee Poisoning, Environmental Toxicology, Regulatory Issues

#### RESULTS OF FIRST YEAR OF WSDA PESTICIDE TESTING OF SURFACE WATERS IN THE YAKIMA VALLEY

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This presentation is taken from a recent publication from two state agencies. I serve on an advisory committee for this project.

The Washington State Department of Agriculture (WSDA) and the Washington State Department of Ecology (Ecology) designed a multi-year monitoring effort to characterize pesticide concentrations in salmonid-bearing surface waters during the typical pesticide use season. The data collected will allow WSDA and the U.S. Environmental Protection Agency (EPA) to refine exposure assessments for pesticides registered for use in Washington State. Understanding the fate and transport of pesticides used in Washington allows regulators to make appropriate decisions to protect endangered species while minimizing the economic impacts to agriculture.

Two index watersheds, representing urban and agricultural land-use patterns, were sampled from April through December 2003. Thornton Creek in the Cedar-Sammamish watershed was chosen as the urban drainage. Marion Drain, Spring Creek, and Sulphur Creek Wasteway in the Lower Yakima watershed represented agricultural land-use patterns. Sampling frequencies included weekly, every other week, and during storm events.

Concentrations of all chemicals were generally low and close to analytical detection limits. 2,4-dichlorophenylacetic acid (2,4-D) was the most commonly detected chemical; however, pentachlorophenol was most commonly detected in the urban watershed. Pesticide detections were compared to Washington State promulgated and EPA recommended aquatic life criteria. Detections were also compared to EPA Environmental Fate and Effects Division acute and chronic toxicological endpoints. One detection of endosulfan sulfate exceeded a Washington State water quality standard. Azinphos-methyl, chlorpyrifos, diazinon, and 4,4'-DDE results were above the numeric component of various standards, but data were insufficient to characterize the time component of these standards. Most chemicals had limited or no criteria available with which to compare concentrations.

Urban run-off frequently contains other chemicals in addition to pesticides and, therefore, semivolatile organic compounds (SVOCs) were analyzed in Thornton Creek. Thirty-eight compounds were detected; the majority of detections occurred during three storm events. Phthalates and polynuclear aromatic hydrocarbons were the most frequently detected compounds in the SVOC analyses.

Sampling efforts in the urban and agricultural watersheds resulted in 644 pesticide (and degradate) detections out of 153 sampling events. Each sampling event was tested for 144 pesticides. Thus, 22,032 (153\*144) chemical analyses were run in 2003.

Fifty-four sampling events were conducted within Thornton Creek (18 at each of Thornton 1, 2, and 3) between April and December 2003 (Table 3). Herbicides comprise the majority of the chemical profile. However, pentachlorophenol (0.0047 – 0.083 µg/L), a wood preservative, was the most commonly detected compound, followed by dichlobenil (0.0038 – 0.34 µg/L) and triclopyr (0.0094 – 0.19 µg/L). The most common organophosphorous insecticide, diazinon, was detected in 46% of the samples, and the maximum concentration was 0.21 µg/L at Thornton 2.

Ninety-nine sample events were conducted within the Lower Yakima watershed between April and October 2003. Several chemical classes were detected, including organophosphate and chlorinated and carbamate pesticides.

Herbicides were the most frequently detected compounds. 2,4-D, atrazine, and bromacil were detected in 87%, 58%, and 52% of all agricultural samples, respectively. Chlorpyrifos and azinphos-methyl (Guthion) were the most frequently detected organophosphate pesticides and had a detection rate of 38% and 13%, respectively. Marion Drain samples differed slightly from the average. Terbacil was the most frequently detected herbicide within Marion Drain and was present in 73% of samples. Similarly, dimethoate was the second most common organophosphate pesticide and was present in 24% of samples within the Marion drainage. Chlorinated pesticides are principally represented by  $\alpha$ -endosulfan and its degradate endosulfan sulfate. Relative to other samples collected, singular high concentrations of carbaryl (1.8 µg/L at Spring 2 and 10 µg/L at Spring 1) and 2,4-D (1.9 µg/L at Marion 1) were detected. The majority of pesticide/herbicide results were estimated between the method detection limit and the practical quantitation limit.

Forty-five sampling events were conducted in the Spring Creek drainage: 12 samples from Spring 1 (upstream), 12 samples from Spring 2 (midstream), and 21 samples from Spring 3 (downstream). Spring 3 represents the reach terminating at the confluence with the Lower Yakima River.

Herbicides account for the majority of detections, 79%, and were dominated by 2,4-D, bromacil, and atrazine. 2,4-D and bromacil were the most frequently detected chemicals and were present

in 73% and 62% of the samples, respectively. Organophosphorous pesticides made up 15% of the chemical detections. The most abundant organophosphorous pesticide, chlorpyrifos, was detected in 36% of the samples.

The Sulphur Creek Wasteway drainage had one sampling station located near the confluence of the Lower Yakima River. Sulphur 1 was tested on 21 different occasions for pesticides. Herbicides account for 81% of the chemical detections within Sulphur Creek Wasteway. 2,4-D, bromacil, and atrazine were detected in 95%, 67%, and 48% of the sampling events, respectively. Organophosphorous insecticides make up 13% of the chemical detections. The frequency of organophosphorous detection is spread between chlorpyrifos (14%), azinphosmethyl (14%), diazinon (10%), and dimethoate (10%).