

Pesticides and Volatile Organic Compounds in Ground and Surface Water of the Palouse Subunit, Washington and Idaho

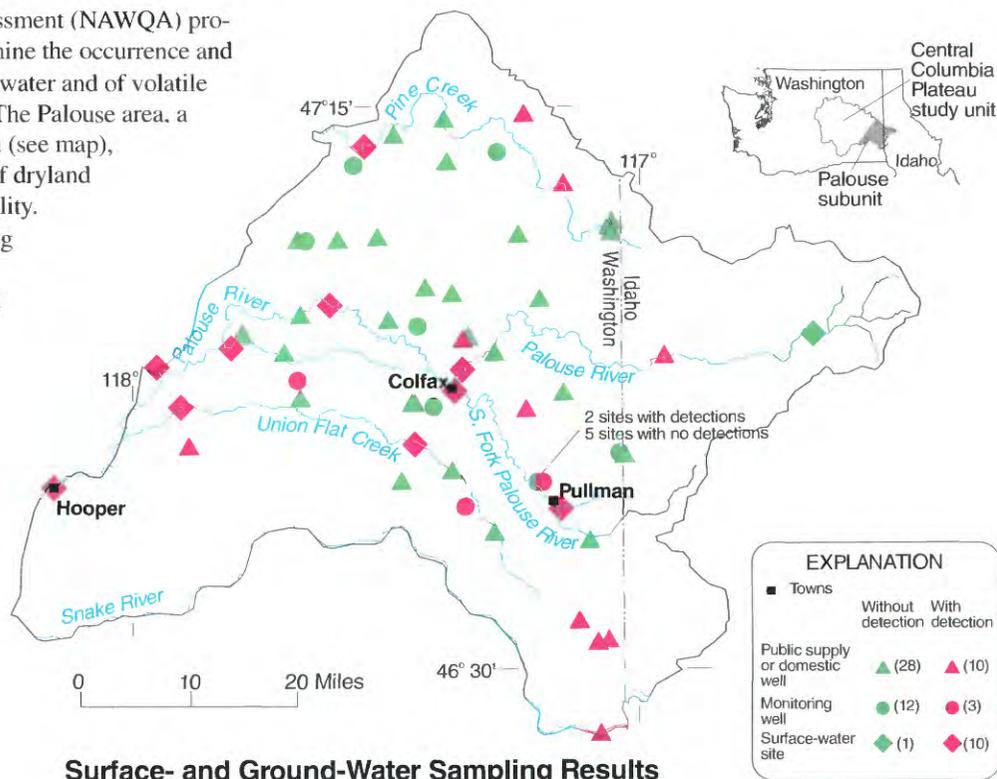


USGS Fact Sheet 204-96

One goal of the National Water-Quality Assessment (NAWQA) program of the U.S. Geological Survey is to determine the occurrence and distribution of pesticides in ground and surface water and of volatile organic compounds (VOCs)* in ground water. The Palouse area, a subunit of NAWQA's Central Columbia Plateau (see map), was chosen to investigate the potential effects of dryland farming of wheat and small grains on water quality.

Samples from 53 wells (15 shallow monitoring wells and 38 deeper public supply or domestic wells) and 11 surface-water sites were collected between 1993 and 1995 and analyzed for 84 pesticides. Ground water (but not surface water) was also analyzed for 60 VOCs. All of the wells were sampled one time; Palouse River at Hooper was sampled one to three times a month from March 1993 to May 1994 and up to six times a month during storms between November 1994 and February 1995, and the other 10 surface-water sites were sampled during storms and periods of low flow.

*VOCs are generally associated with industrial activities but are also used as inert ingredients in pesticides and as fumigants.



Surface- and Ground-Water Sampling Results

Commonly used pesticides in the Palouse subunit

[Y, yes; N, no; --, not analyzed]

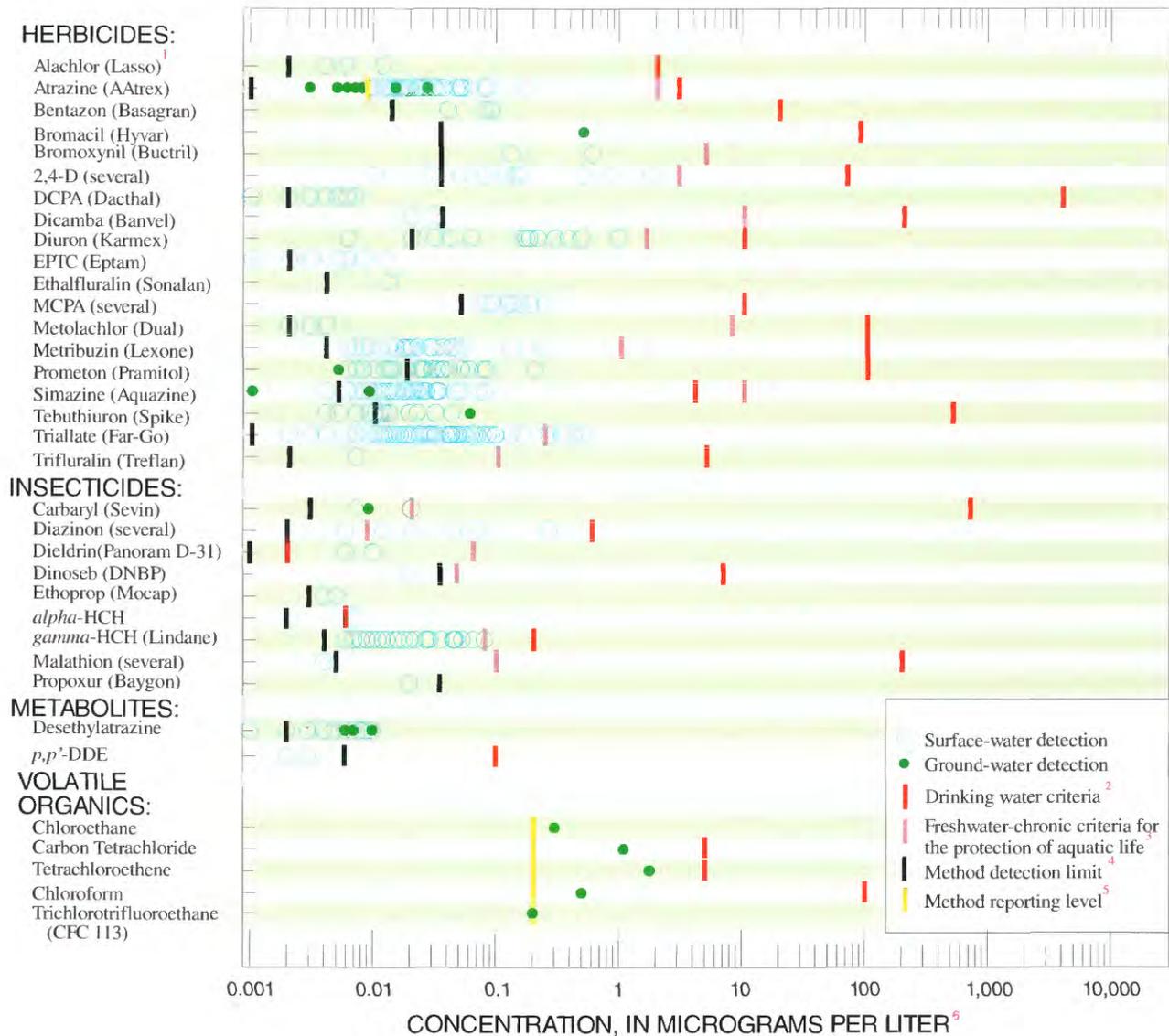
Pesticide	Active ingredient applied (lbs/year) ¹	Detected in	
		surface water?	ground water?
Triallate	236,800	Y	N
2,4-D	102,400	Y	N
Diuron	80,200	Y	N
Imazethapyr	36,700	--	--
Bromoxynil	36,000	Y	N
MCPA	33,000	Y	N
Glyphosate	26,700	--	--
Thiabendazole	23,400	--	--
Benomyl	21,300	--	--
Diclofop	19,600	--	--
Paraquat	14,900	--	--
Disulfoton	14,200	N	N
Metribuzin	11,400	Y	N
Dicamba	11,300	Y	N
Dimethoate	8,600	--	--
Trifluralin	7,400	Y	N
DCPA	5,700	Y	N
Thiophanate methyl	5,700	--	--
Phosmet	5,700	--	--
Ethalfuralin	5,100	Y	N

¹ From Anderson and Gianessi (1995)

Significant findings

- Six pesticides, one pesticide breakdown product (metabolite), and five VOCs were detected in samples from ground water, and 29 pesticides or their breakdown products were detected in surface-water samples.
- Pesticides or VOCs were detected in 25 percent of ground-water samples. Pesticides were detected in 97 percent of surface-water samples; they were detected at all surface-water sites except for the site in the headwaters of the Palouse River.
- No pesticides were found in ground water (the only source of drinking water in the area) at concentrations that exceeded drinking-water standards or guidelines, but four pesticides were found in surface water at concentrations that exceeded the freshwater-chronic criteria for protection of aquatic life (see other side).
- None of the pesticides analyzed for and commonly used in the area were detected in ground water, but 10 of these were detected in surface water (see table at left).

Concentrations of pesticides and VOCs detected in ground and surface water in relation to human health and aquatic-life criteria



¹Trade names (in parentheses) are used for descriptive purposes and do not imply endorsement by the U. S. Government. ²Maximum contaminant level (MCL), lifetime health advisory (HA), or risk-specific dose health advisory (RSD) associated with a 10^{-6} cancer risk (U.S. Environmental Protection Agency, 1996, and Nowell and Resek, 1994). The HA or RSD is used if an MCL has not been established for a compound. ³From Nowell and Resek, 1994. ⁴A statistically based minimum concentration reported for an analyte (U.S. Environmental Protection Agency, 1992). ⁵The minimum concentration reported for an analyte, generally a higher concentration than the method detection limit. Used only for reporting concentrations of volatile organic compounds and atrazine in surface water in this study. ⁶About equal to parts per billion.

References

- Anderson, J.E., and Gianessi, L.P., 1995, Pesticide use in the Central Columbia Plateau: National Center for Food and Agricultural Policy, [100] p.
- Nowell, L.H., and Resek, E.A., 1994, Summary of national standards and guidelines for pesticides in water, bed sediment, and aquatic organisms and their application to water-quality assessments: U.S. Geological Survey Open-File Report 94-44, 115 p.
- U.S. Environmental Protection Agency, 1992, Definition and procedure for the determination of the method detection limit - revision 1.11, Code of Federal Regulations, 40, Protection of Environment, CFR Part 136, Appendix B, p. 565-567.
- U.S. Environmental Protection Agency, February 1996, Drinking water regulations and health advisories: Washington D.C., Office of Water, U.S. Environmental Protection Agency, EPA 822-R-96-001, 14 p.

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is designed to describe current water-quality conditions for a large part of the Nation's ground and surface water, to describe how water quality is changing over time, and to improve our understanding of the natural and human factors that affect water quality.

October 1996

Fact Sheet 204-96
 by Lonna M. Roberts and Richard J. Wagner

For further information contact:
 Project Chief, Central Columbia Plateau NAWQA
 U. S. Geological Survey

1201 Pacific Ave., Suite 600 Tacoma, WA 98402
 (206) 593-6530 ext 235 E-mail: nawqa_ccpt_wa@usgs.gov
 World Wide Web: <http://www.dwatcm.wr.usgs.gov/ccpt>