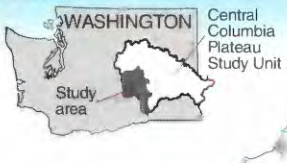
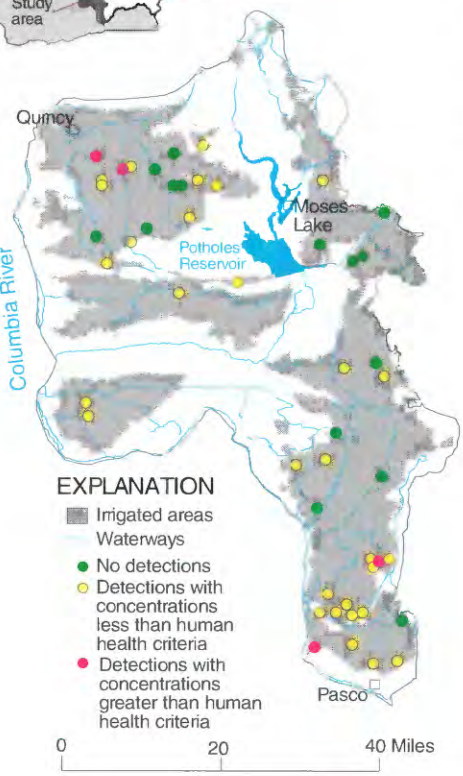
U.S. Department of the Interior
U.S. Geological Survey
Fact Sheet 240-95
Revised

Agricultural Pesticides Found in Ground Water of the Quincy and Pasco Basins





- **Low concentrations of pesticides were found in 69% of ground water samples collected during 1993-94 from 49 wells (30 shallow domestic wells and 19 monitoring wells).**
- **Of the 144 compounds that were looked for, only EDB and dieldrin exceeded their human health criteria for drinking water.**
- **There were 24 compounds (pesticides, pesticide degradation products, or impurities in active ingredients) detected in ground water underlying irrigated row crops.**

Most commonly detected compounds[1]

Compound	Percentage of wells with detections	Maximum concentration(µg/L)[2]
Atrazine	45	0.97
Desethylatrazine	37	0.12
Simazine	12	0.011
1,2-dichloropropane	12	0.5
Metribuzin	10	0.028
Metolachlor	10	0.009
1,2,2-trichloropropane	8	0.55
EDB(1,2-dibromoethane)	7	1.1
1,2,3-trichloropropane	6	1.0
EPTC	6	0.012
Alachlor	6	0.008

[1]Detected in more than 5 percent of samples
[2]Micrograms per liter, or parts per billion (ppb)

Major pesticides used on row crops in the study area

[I, insecticide; H, herbicide; F, fungicide; O, other; Ah, alfalfa hay; A, asparagus; C, carrots; Cs, carrot seed; Co, feed corn; B, dry beans; G, grapes; M, mint; On, onions; Po, potatoes; R, radish seed; Sc, sweet corn; W, wheat; N, not detected; D, detected; --, not analyzed for]

Pesticide	Type	Estimated amount applied[1] (tons/yr)	Major target crops	Sample result
1,3-dichloropropene	O	2,247	Po,C	N
Metam Sodium	O	1,758	Po	--
Sulfuric Acid	O	525	Po	--
Chloropicrin	O	169	Po	--
Maleic Hydrazide	O	17	Po,On	--
Methamidophos	I	37	Po	--
Propargite	I	36	Po,M,B	N
Disulfoton	I	36	Po,A,R	N
Phorate	I	33	Po	N
Ethoprop	I	22	Po,Sc	N
Chlorpyrifos	I	17	A,Sc,Ah	N
EPTC	H	78	Ah,Po,B	D
Metribuzin	H	21	Po,Ah,A	D
2,4-D	H	17	W,Co,A	D
Alachlor	H	16	Sc,B,Co	D
Diuron	H	12	W,A,G	D
DCPA	H	12	On,R,Cs	N
Sulfur	F	35	Po,M,G	--
Mancozeb	F	31	Po,A,On	--
Chlorothalonil	F	21	Po,C,On	N

[1]Amount of active ingredient (based on information from Anderson, J.E. and Gianessi, L.,1995, *Pesticide use in the Central Columbia Plateau*; National Center for Food and Agricultural Policy).

Major row crops in the study area

Crop	Estimated acres cultivated	Estimated total pesticides applied (tons/yr)	1994 State cash value rank[1]	Most heavily applied pesticide[2]
Wheat	94,500	40	4	2,4-D
Potatoes	59,800	4,693	5	1,3-dichloropropene[4]
Hay[3]	149,100	50	7	EPTC
Onions	3,900	12	14	DCPA
Asparagus	12,900	39	16	Chlorpyrifos
Sweet Corn	17,600	25	17	Alachlor
Feed Corn	56,100	34	18	EPTC
Mint	10,600	54	19	Sulfur[5]
Barley	6,400	2	25	Triallate
Carrots	2,800	161	26	1,3-dichloropropene[4]

[1]Washington Agricultural Statistics Service [1995], *Washington Agricultural Statistics 1994-1995*, p.6
[2]Compounds in red were detected in ground water [3]Sum of alfalfa hay and other hay [4]Volatile compounds present in early formulations of this nematocide were detected; see below [5]Not targeted for analysis

Pesticides most heavily applied to some of the top cash row crops in the study area were detected in ground water.

Herbicides:

2,4-D (the most heavily applied pesticide for wheat) was detected at low concentrations in two wells. **EPTC** (the most heavily applied pesticide for alfalfa and other hay) was detected at low concentrations in three wells. **Atrazine** was the most frequently detected pesticide despite its low agricultural usage rate in the study area. **Desethylatrazine** (a degradation product of atrazine) was the second most frequently detected compound.

Fumigants:

1,3-dichloropropene (the most heavily applied pesticide for potatoes) was not detected. However, compounds were detected that were included either as active ingredients or as manufacturing by-products in early formulations of 1,3-dichloropropene-based fumigants. The active ingredient **1,2-dichloropropane**, which was banned in 1976, was detected at low concentrations in six wells. The manufacturing by-products **1,2,3-trichloropropane** (found in three wells), **1,3-dichloropropane** (found in one well) and **1,2,2-trichloropropane** (found in four wells) were detected at low concentrations. These compounds may be present in current 1,3-dichloropropene formulations at very low concentrations. **EDB**, another discontinued fumigant, was found in three wells at concentrations ranging from just below the MCL to over 20 times the MCL; more detections of EDB below the MCL (0.05µg/L) would be expected if the detection level were lower than the current value of 0.04 µg/L.

Concentrations and detection frequencies of compounds in ground water

[µg/L, micrograms per liter; --, no value available; MDL, method detection limit; MRL, minimum reporting level; NA, not available]

Compound	Trade name	Percentage of wells with detections	Detection threshold MDL or MRL[1] (µg/L)	Median concentration of detections (µg/L)	Maximum concentration (µg/L)	Human health criteria[2] (µg/L)	Percentage of wells over health criteria	Agricultural pesticide usage rank[3]
			Herbicides					
Atrazine	AAtrex	45	0.001	0.017	0.97	3 (mcl)	0	28
Simazine	Princep	12	0.005	0.008	0.011	4 (mcl)	0	47
Metribuzin	Lexone, Sencor	10	0.004	0.013	0.028	200 (ha)	0	12
Metolachlor	Dual	10	0.002	0.003	0.009	100 (ha)	0	25
Alachlor	Lasso	6	0.002	0.006	0.008	2 (mcl)	0	17
EPTC	Eptam, Eradicane	6	0.002	0.006	0.012	--	--	5
2,4-D	several	4	0.035	0.275	0.54	70 (mcl)	0	16
Diuron	Karmex, Direx	2	0.02	--	2.0	10 (ha)	0	20
Bromacil[4]	Hyvar, Urox B	2	0.035	--	1.8	90 (ha)	0	--
Ethalfluralin	Sonolan	2	0.004	--	0.09	--	--	53
2,4-DB	none	2	0.035	--	0.06	--	--	40
Bentazon	Basagran	2	0.014	--	0.07	20 (ha)	0	26
Prometon[4]	Pramitol	2	0.018	--	0.005	100 (ha)	0	--
Linuron	Lorox, Linex	2	0.002	--	0.001	--	--	30
			Insecticides					
Dieldrin	Panoram D-31	4	0.001	0.01	0.013	0.002 (rsd)	4	discontinued
			Degradation products					
Desethylatrazine	none	37	0.002	0.007	0.12	--	--	NA
2,6-diethylanaline	none	4	0.003	0.004	0.008	--	--	NA
p,p'-DDE	none	2	0.006	--	0.001	0.1 (rsd)	0	NA
			Fumigants and associated compounds					
1,2-dichloropropane[5,6]	none	12	0.2	0.25	0.5	5 (mcl)	0	discontinued
1,2,2-trichloropropane[5,7]	none	8	0.2	0.26	0.55	--	--	NA
EDB[8]	Bromofume	7	0.04	0.31	1.1	0.05 (mcl)	5	discontinued
1,2,3-trichloropropane[5]	none	6	0.2	0.5	1.0	--	--	NA
1,3-dichloropropane[5]	none	2	0.2	--	0.5	--	--	NA
Bromoform	none	2	0.2	--	0.12	--	--	NA

[1]The MDL is reported for the herbicides, insecticides, and degradation products; the MRL is reported for the fumigants. [2]Human health criteria are either the maximum contaminant level (MCL), set by the EPA to be the maximum concentration allowed in drinking water, the lifetime health advisory level (HA), which is the maximum concentration in drinking water that would not cause adverse human-health effects, excluding cancer (based on a 150-pound adult consuming about 2 quarts of water per day for 70 years), or the risk-specific dose (RSD), which is the concentration that corresponds to an increase of a 1 in one million chance of developing cancer. [3]Calculated from the amount of pesticide applied to irrigated row crops in the study area in tons per year out of 103 pesticides [4]Nonagricultural herbicide [5]Many of the chlorinated propanes are by-products of manufacturing 1,3-dichloropropene and may be present in 1,3-dichloropropene-based formulations such as Telone II and D-D 92. [6]1,2-dichloropropane was an active ingredient in some nematocide formulations (Telone, Shell D-D) until it was discontinued in 1976. [7]Values for this compound are estimated. [8]EDB(1,2-dibromoethane) was analyzed for in 41 wells.

In June 1996 the USGS National Water Quality Laboratory completed adjustments to the pesticide data base from schedules 2001/2010 and 2050/2051 covering sample dates from 1992 through February 29, 1996. Corrected method detection limits (MDLs) were assigned to nondetect values and E (estimate) codes were assigned more consistently. Also, all dimethoate values were deleted from the data base due to this compound's poor performance in analytical tests. While making these adjustments to the data base, it was discovered that some compounds detected at very low concentrations had been inadvertently reported as nondetections. These are now reported as detections. This most frequently occurred for desethylatrazine, simazine, and dieldrin.

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