



STATE OF  
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206/753-2353

Publication No. 79-e35

WA-34-1030

M E M O R A N D U M

April 3, 1979

To: Claude Sappington

From: Bill Yake

Subject: Toxic Substances: Analytical Results of Samples from Palouse Producers (Colfax) Drainage Ditch and Fish Collected from the Palouse River at Hooper

Water and sediment samples were collected from the Palouse Producers' agricultural chemicals distribution site on September 11, 1978. This site is located on the south bank of the Palouse River in west Colfax, Washington. A drainage ditch drains the equipment storage yard (Figure 1) and routes this flow to the Palouse River by way of a culvert located on the south stream bank.

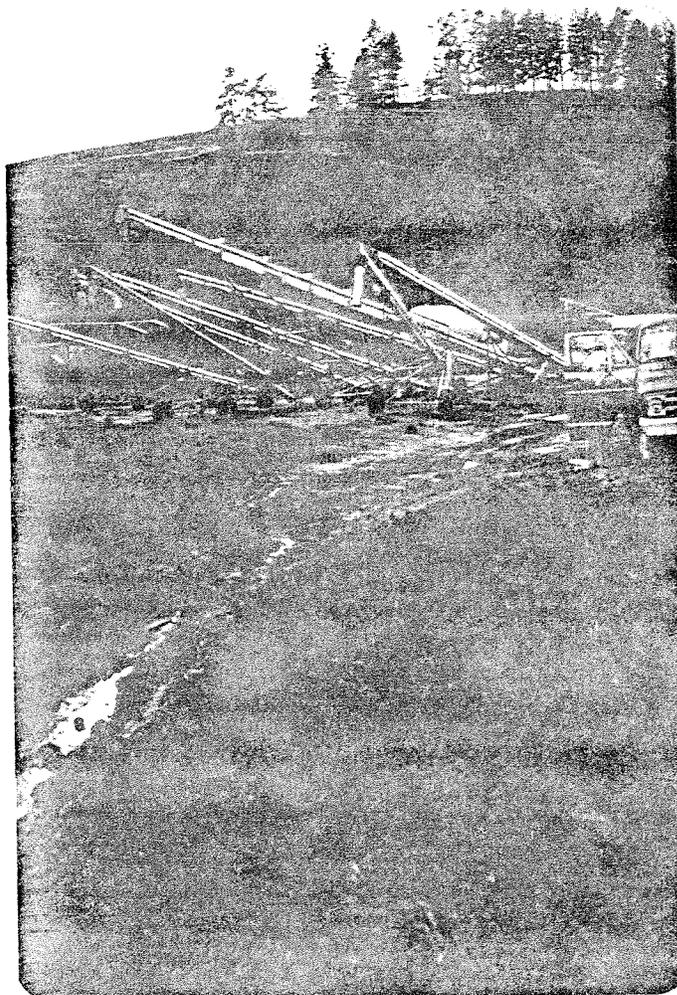


Figure 1 - Equipment Storage and Drainage Ditch - Palouse Producers

Memo to Claude Sappington  
April 3, 1979  
Page Two

One-quart sediment samples were collected from the bottom and side of the ditch. At the time of collection, water was standing in the ditch. A quart sample of this standing water was also collected. These three samples were shipped on ice to USEPA Region X laboratories in Seattle. The results of these analyses are given in Table 1.

On September 27, 1978, fish samples were collected from the Palouse River at Hooper, Washington (DOE/USGS cooperative station 34A070). Three largescale suckers (*Catostomus macrocheilus*) 16-1/2 to 18-1/2 inches long were collected and shipped to USGS laboratories in Denver for analysis. Whole fish and liver tissues were analyzed for a range of chlorinated pesticides. Whole fish and gill tissues were analyzed for six trace metals. These results are also given in Table 1.

Table 1 summarizes all analytical results and, where information is available, compares these results with "guidepost" values. Based on these values, it appears that the drainage ditch is contaminated with several herbicides which are toxic to fish (specifically; 2,4-D; dinitro-s-butylphenol; and bromoxynil). In addition, a relatively high concentration (8.2 µg/l) of toxaphene (a chlorinated hydrocarbon) was detected in the water standing in the ditch. By comparison, a 96-hour TLM of 7.8 µg/l is reported for the three-spine stickleback (*Gasterosteus aculeatus*).<sup>1</sup>

In addition to the contaminants found in sediment and water samples, the presence of a drainage ditch leading directly from Palouse Producers to the Palouse River substantially increases the possibility of fertilizer, herbicide, or pesticide residues or spills reaching the river, particularly during periods of high runoff.

The results of the fish tissue analyses provide perhaps our first background data on toxic substances in this drainage. Based on this preliminary data, the residue of greatest concern appears to be hexachlorobenzene which was found in concentrations higher than 75% of samples collected primarily in the midwest.<sup>2</sup> Other toxics which approached 75% levels were dieldrin, DDT and its degradation products, and chromium. The only other material isolated which may be of concern is methoxychlor. No comparative values were found to assess the residual methoxychlor concentration.

Hopefully, this information will aid you in formulating an alternative to Palouse Producers' drainage ditch and assessing toxics in the Palouse River drainage.

BY:cp

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<sup>1</sup>USEPA, no date. *Effects of Pesticides in Water, a Report to the States.*

<sup>2</sup>Anon., 1978. *STORET Maps, Fish Tissue Levels for 29 Priority Pollutants*, Handout to Standing Work Group, USEPA Basic Water Monitoring Program.

Table 1. Toxic Substances, Palouse Producers Drainage Ditch (Colfax) and Fish (Palouse River at Hooper).

Parameter	Palouse Producers Drainage Ditch			Palouse River at Hooper - Fish Tissue			Criteria Levels <sup>1</sup> ug/l	Maximum Concentration Found in U.S. Waters <sup>2</sup> ug/l	Residues in Aquatic Organisms Killed by Toxics <sup>3</sup> mg/kg	75% of Whole Fish Samples Below This Concentration <sup>4</sup> mg/kg wet wt.	Remarks
	Water ug/l	Sediment Side of Ditch mg/kg dry wt.	Sediment Bottom of Ditch mg/kg dry wt.	Whole Fish mg/kg wet wt.	Gills mg/kg wet wt.	Liver mg/kg wet wt.					
<b>Chlorinated Pesticides</b>											
Endrin	N.D.	N.D.	N.D.	N.D.	--	N.D.	.004	0.133	0.02-0.27	0.064	"Extremely toxic to fish"
Aldrin	N.D.	N.D.	N.D.	N.D.	--	N.D.	.003	0.085	0.22-0.54	0.01	"Not for sale in U.S., do not contaminate lakes, streams, or ponds"
Dieldrin	N.D.	[.01]	N.D.	[.08]	--	[.126]	.003	0.407	1.25-38.D	0.189	"Not for sale in U.S., do not contaminate lakes, streams, or ponds"
Hexachlorophenol	--	--	--	--	--	--	--	--	--	--	Fungicide "toxic to fish"
a-BHC isomer	N.D.	N.D.	N.D.	.001	--	.002	--	--	--	0.02	
g-isomer	--	--	--	.000	--	.001	--	--	--	0.05	
Hexachlorobenzene	N.D.	N.D.	N.D.	[.033]	--	[.032]	--	--	--	0.02	"Toxic to fish", Fungicide
Methoxychlor	N.D.	N.D.	N.D.	[.080]	--	[.125]	.03	--	--	--	"Toxic to fish"
Lindane	N.D.	N.D.	N.D.	--	--	--	.01	0.112	--	--	"Toxic to fish"
Toxaphene	[6.2]	N.D.	Interference	--	--	--	.005	--	9.0	1.80	"Toxic to fish"
Total DDT	N.D.	[.025]	N.D.	[.505]	--	[.209]	.001	1.206	--	--	"No longer used in U.S. except on emergency basis"
o,p'-DDE	N.D.	.009	N.D.	.008	--	.006	--	--	--	--	
p,p'-DDE	N.D.	.002	N.D.	[.372]	--	[.153]	--	--	--	0.811	
o,p'-DDD	N.D.	N.D.	N.D.	.010	--	.008	--	--	--	--	
p,p'-DDD	N.D.	.042	N.D.	.045	--	.017	--	--	--	0.289	
o,p'-DDT	N.D.	.004	N.D.	N.D.	--	N.D.	--	--	--	--	
p,p'-DDT	N.D.	.024	N.D.	[.070]	--	[.026]	--	--	--	0.63	
Chlorodane	N.D.	N.D.	N.D.	--	--	--	.01	0.169	--	0.27	"Use only for termite control" "Harmful to fish"
alpha-isomer	--	--	--	.007	--	.004	--	--	--	--	
gamma-isomer	--	--	--	.010	--	.013	--	--	--	--	
Nonachlor	--	--	--	--	--	--	--	--	--	--	
cis isomer	--	--	--	N.D. <sup>5</sup>	--	N.D. <sup>5</sup>	--	--	--	--	
trans isomer	--	--	--	.006	--	.003	--	--	--	--	
PCB's	--	--	--	N.D. <sup>6</sup>	--	N.D. <sup>6</sup>	.001	--	--	--	
<b>Herbicides</b>											
2,4-D	[9.4]	[3.4]	[.086]	--	--	--	100*	--	--	--	
2,4,5-T	N.D.	N.D.	N.D.	--	--	--	10*	--	--	--	"Toxic to fish"
Silvex (2,4,5-TP)	N.D.	N.D.	N.D.	--	--	--	--	--	--	--	"Do not apply to flowing water or irrigation water"
Pentachlorophenol	[0.56]	N.D.	[.037]	[.7]	--	[.7]	--	--	--	--	
Bromoxynil	[3.3]	N.D.	[.059]	--	--	--	--	--	--	--	"Toxic to fish"
Difluro-S-Butylphenol	[4.7]	[.027]	[.013]	--	--	--	--	--	--	--	"Toxic to fish"
Picloram (Tordon)	0.087	N.D.	N.D.	--	--	--	--	--	--	--	"Persistent"
<b>Metals</b>											
Arsenic	20	.009	.011	N.D.	N.D.	--	50*	--	--	0.91	
Mercury	N.D.	.00007	.00004	.40	N.D.	--	0.05	--	--	0.74	
Cadmium	--	--	--	.03	.04	--	0.4-12	--	--	0.16	
Copper	--	--	--	.83	1.2	--	(20)	--	--	1.94	
Chromium	--	--	--	[.64]	[4.5]	--	50*	--	--	0.50	
Lead	--	--	--	.31	.19	--	(10)	--	--	3.82	
Percent Solids		72.1x	74.57	70.8x	--	--					
Lipid Conc. (% Fat)				0.9x	1.0x						

1) From "Quality Criteria for Water", USEPA, 1976.  
 2) From "Pesticides in Surface Waters of the United States - A Five-Year Summary, 1964-68", Litchenburg, J.J., et al., Pesticides Monitoring Journal, 1970.  
 3) From "Effects of Pesticides in Water, a Report to the States", USEPA, no date.  
 4) From "STORET Maps, Fish Tissue Levels for 29 Priority Pollutants", handout to Standing Work Group, Basic Water Monitoring.  
 5) Standards of cis - nonachlor were not available at time of analysis.  
 6) PCB's could not be confirmed by dual column analysis. Unknown peaks similar to PCN's and PCB's were observed.  
 7) A method for pentachlorophenol in fish tissue is not yet available.

[ ] Levels of Concern  
 [ ] Levels of Possible Concern  
 ( ) Approximate Values  
 N.D. = None Detected  
 \*Drinking Water Standard