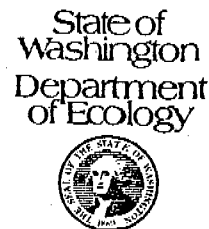


TO: Steve O'Brien
FROM: Bob Bottman *Bob B*
SUBJECT: Metals and Pesticide Levels Found in Fish Taken
From Vancouver Lake
DATE: May 19, 1977



The Vancouver Lake Pilot Dredge Study revealed concentrations of certain chemicals which could be of concern: the metals copper, zinc and mercury and the pesticides lindane and aldrin were found in significant amounts.

Consequently, DOE initiated a one-time biological sampling and analysis program to look for copper, zinc, lindane, aldrin, dieldrin, and DDT in fish tissue (analysis for mercury was done during June and September, 1976). Samples were obtained from private individuals who donated their time to angle for the fish during the week-end of March 26-27, 1977. According to the U.S. Fish and Wildlife Service, angling was the only practical way to catch the fish because several species were in shallow areas of the lake to spawn.

Once the fish were caught, they were sent to the Department of Social and Health Services' Pesticide Laboratory in Wenatchee. There, the fish were ground up and tested for pesticides. A portion of the ground fish was returned to the Tumwater DOE Laboratory for metals analyses.

The results of these analyses are shown below:

<u>Fish Sample and Number</u>	<u>Copper</u>	<u>Zinc</u>	<u>DDE</u>	<u>DDD (in ppm)</u>
Crappie (5)	0.30	25	0.070	0.056
Perch (1)	0.27	19	ND	ND
Bullhead Catfish (1)	0.63	23	0.038	0.044
Carp (1)	1.75	67	0.011	ND

No aldrin, dieldrin or lindane were detected in these samples.

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By way of comparison, the following pesticide residuals and metals concentrations have been found in other work:

<u>Source</u>	<u>Copper*</u>	<u>Zinc*</u>	<u>DDE</u>	<u>DDD (in ppm)</u>
<u>Yellow Perch</u> ² (Lateral Lakes, Coeur d'Alene River and Bell's Lake, Idaho.)	0.52	58.3		
<u>Yellow Perch</u> ² (Coeur d'Alene Valley Lakes, Idaho.)	0.45	51.0		
<u>Black Crappie</u> ² (Coeur d'Alene Valley Lakes, Idaho.)	2.2	39.7		
<u>Bullhead</u> ² (Coeur d'Alene Valley Lakes, Idaho.)	1.6	67.6		
<u>Meat, Fish and Poultry</u> ¹ (FDA grocery composite taken 1973-74.)		28.0		
<u>Fish Fillet</u> ¹ (FDA grocery composite taken 1973-74.)			0.012- 0.044	ND
<u>Tuna or Salmon</u> ¹ (FDA grocery composite taken 1973-74.)			0.003- 0.012	0.008- 0.10
<u>Meat, Fish and Poultry</u> ¹ (FDA grocery composite taken 1972-73.)			0.012	
<u>Atlantic Herring</u> ¹ (Eastern Canada)			0.059 0.085	0.042 0.049
<u>Perch</u> ¹ (Eastern Canada)			0.089	

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<u>Source</u>	<u>Copper*</u>	<u>Zinc*</u>	<u>DDE</u>	<u>DDD (in ppm)</u>
<u>Perch</u> ¹ (Ontario, Canada)			0.057	0.010
			0.279	0.097
			0.082	0.040
			0.143	0.045
<u>Brown Bullhead</u> ¹ (Ontario, Canada)			0.026	0.015
			0.280	0.170
			0.051	0.019
			0.296	0.092
<u>Crappies</u> ¹ (Ontario, Canada)			0.056	0.041
			0.071	0.052
<u>Carp</u> ¹ (Ontario, Canada)			0.140	0.080
<u>Catfish</u> ¹ (Southern U.S.)			1.07 total residues** (i.e. DDTR=DDT+DDE+DDD)	

* Includes muscle levels only; liver values were higher.
** FDA Action Limit is 5.0 ppm total DDT residues (DDTR)³.

Although I found no data on fish from the lower Columbia River System, the above information tends to show that both metals and pesticide residues found in the Vancouver Lake fish were comparable to, or less than, concentrations found in the same species elsewhere. However, undue significance should not be attached to such a comparison.

The Food and Drug Administration has set an "action limit" of 5 ppm total DDT residues (DDTR) for fish. The fish taken from Vancouver Lake contain a maximum of 0.126 ppm DDTR, well below this limit.

DDT and its residues will accumulate in the food chain. A bioaccumulation factor of up to two million times has been found in Lake Michigan fish. A factor of 100,000 times was found at the National Water Quality Laboratory in Duluth, Minnesota. Other laboratory work has found a 25,000 times bioaccumulation factor. Using the lowest of these multipliers and the greatest level of DDT residues found in the fish, a possible level of DDT residues in Vancouver Lake may be determined: $0.126 \text{ ppm DDTR} \div 25,000 = 0.005 \text{ ppb}$. This level would be five times EPA's recommended criteria for

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freshwater aquatic life (0.001 ppb); for domestic supply, EPA cautions human exposure to a minimum. Again, this calculated level is hypothetical and would probably be somewhat lower in reality.⁴

It is expected that DDT residues in aquatic life will gradually decrease over the years since it has been taken out of use. In fact, research has shown that DDE levels in Atlantic herring dropped by about 70% over a period of a year. This indicates the possibility that these residues are excreted from fish at a measureable rate.¹

The conclusions drawn from data available at the present time are that:

1. The fish taken from Vancouver Lake on March 26-28, 1977 do not contain levels of DDT residues which would cause a public health concern.
2. No aldrin, dieldrin or lindane were detected in these fish.
3. The DDT residues were bioaccumulated in the lake's foodchain, showing highest levels in fish at the top of the chain (crappie) and lower levels in the bottom feeders (bullhead and carp).
4. The opposite is the case with copper and zinc. These metals tend to accumulate in the bottom feeders and to a lesser degree in other fish.
5. The presence of DDT residues in Vancouver Lake fish indicate that this chemical was used around the lake or in the drainages flowing into it. However, DDT has been used so widely that this is not surprising.

RPB:rr

cc: District IV
Chuck Clarke
Barbara Blau
Dick Gorini

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Volume 10, Number 4, March 1977.
2. Funk, William K., et.al. An Integrated Study On the Impact of Metallic Trace Element Pollution in the Coeur d'Alene - Spokane Rivers - Lake Drainage System. August 1975. Washington State University/University of Idaho.
3. Mr. Groth - Food and Drug Administration. Personal Communication. May 17, 1977.
4. U.S. Environmental Protection Agency. Quality Criteria For Water. July 1976.

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TO: Merley McCall
Water Quality Lab
Department of Ecology
P.O. Box 829
Olympia, WA 98504

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POINT OF VIEW

Report of Analytical Results

Date of Report: May 9, 1977

Date Sample Received: April 7, 1977

Sample Identification: Fish

Analytical Results:

<u>Lab Number</u>	<u>Sample</u>	<u>Residue Detected</u>	<u>Level ppm</u>
77L0030	Crappie (5)	p,p'-DDE	0.070
		p,p'-DDD	0.056
77L0031	Perch (1)	None above MRL*	
77L0032	Bullhead		
	Catfish (1)	p,p'-DDE	0.038
		p,p'-DDD	0.044
77L0033	Carp (1)	p,p'-DDE	0.011

*0.010 ppm Minimum Reporting Level
(also for aldrin, dieldrin and lindane.)

Albert L. Robbins

Albert L. Robbins
Regional Laboratory Director

Stan Comer

Stan Comer, Chief Chemist

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B. Rehrman
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WATER QUALITY LABORATORY

DATA SUMMARY

Source LAKE VANCOUVER Fish

Collected By _____

Date Collected 3-28-77

NO other chlorinated pesticides detected

Log No.	Station	WENATCHEE NO.	COPPER	ZINC		ppDDE	ppDDD*	
7-2479	5 CRAPPIE	77L0030	0.30	25.	}	0.070	0.056	} ppm
80	1 PERCH	77L0058	0.27	19.		ND	ND	
81	1 BULLHEAD CATTISH	770032	0.63	23.		0.038	0.044	
82	1 CARP	770033	1.75	67.		0.011	ND	
				mg/kg dry wgt.				

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Note: All results are in PPM unless otherwise specified. ND is "None Detected"

* Data received May 10, 1977
from Wenatchee Pesticides
Lab.

Summary by S. Bell Date 5-6-77

CC: Steve O'Brien - Barbara Blair - Dick Gering - Nancy Turner