

DEPARTMENT OF ECOLOGY

December 2, 1997

(November 7, 1995 - draft)

TO: Jim Milton
WQ - CRO

FROM: Art Johnson, ^{ad} Dave Serdar, and Dale Davis
EILS - HQ

SUBJECT: DDT Sources to the Okanogan River and Lake Osoyoos

Waterbody WA-49-1010

Summary of Findings

DDT and/or its breakdown products DDE and DDD were detected in seven of twelve Okanogan River/Lake Osoyoos tributaries sampled in July - August 1995. Concentrations substantially exceeded the state chronic surface water quality standard of 0.001 ug/L (parts per billion) in Tallant Creek (0.19 - 0.50), Nine-Mile Creek (0.0054 - 0.0064) and an un-named creek in Omak (0.0055 - 0.0080). Except for Tallant Creek, these concentrations are similar to other state waters contaminated with DDT from historical use.

Under the low flow conditions surveyed, the load of total DDT compounds (DDT + DDE + DDD) to the river was estimated at about 0.3 gram/day, Tallant Creek being the major contributor. Field observations suggest the survey included most of the tributary inflows at this time of year.

Recommendations

- 1) Consult with the local Conservation and Irrigation Districts on the possible sources of and remedies to the high level of suspended solids and associated DDT compounds in Tallant Creek and the un-named creek sampled in Omak.
- 2) During a period of increased runoff and suspended solids, re-sample selected tributaries to better evaluate their significance as sources

- 3) Determine if there are discrete irrigation returns to the Okanogan River or Lake Osoyoos not identified in the present survey, and sample as needed
- 4) Add Tallant Creek and Nine-Mile Creek to the 303(d) water quality limited list for two excursions beyond state standards for total DDT

Introduction

The Department of Ecology 1994 Needs Assessment for the Okanogan Watershed identified DDT contamination of the Okanogan River and Lake Osoyoos as a potential problem requiring further investigation (Milton, 1995). This memorandum describes results of a survey conducted by Environmental Investigations and Laboratory Services (EILS) to identify tributaries that may be of DDT or its breakdown products DDE and DDD. EILS also conducted a survey of DDT concentrations in Lake Osoyoos fish, the results to be reported separately (Serdar, in prep.)

Agricultural use of DDT peaked in 1959 and declined during the 1960s due to development of insect resistance and environmental damage. EPA banned the use of DDT in 1972 based on its persistence in soil and water, wide dispersion in the environment, and potentially hazardous accumulations in humans and wildlife (EPA, 1975). A series of measures were enacted in Canada during the early 1970s that suspended use of DDT in agriculture.

Due to long-term persistence in soil, elevated levels of DDT continue to occur in U.S. surface waters. Investigation of this problem in California led to the conclusion that DDT is "preserved" in agricultural soils, with half-lives at the upper end of the 4 – 30 year range reported in the literature (Mischke et al., 1985). Release of DDT to surface waters occurs due to agricultural practices and rainfall events. Soil residues from historical use is considered to be the major source of DDT to Washington rivers and streams (e.g., Johnson et al., 1988).

The reason for concern about DDT in the Okanogan River stemmed from analysis of fish samples collected in the Okanogan drainage between 1983 and 1994 (Table 1). By way of comparison, the statewide median and 85th percentile for total DDT (t-DDT = DDT+DDE+DDD) in freshwater fish have been calculated at 90 and 650 ug/Kg (parts per billion), respectively (Davis et al., 1995). The higher concentrations found in the Okanogan River samples are comparable to those that have led to fish consumption advisories for the Yakima River (WDOH, 1993). Both the Okanogan River and Lake Osoyoos are on the 1996 303(d) list for exceeding the criterion on t-DDT in edible fish tissue.

Table 1. Historical Data on DDT Concentrations in Okanogan/Osoyoos Fish
(ug/Kg (ppb) wet wt.)

Sample Location	Year	Species	Tissue	N =	t-DDT*	Reference	
Lake Osoyoos	1989	Largemouth Bass	Fillet	1	210	(1)	
At Okanogan	1983	Bridgelip Sucker	Whole	2	810 ; 1780	(2)	
Below Malott	1984	"	"	Fillet	1	3200	(2)
				Liver	1	15000	
" "	1984	Largemouth Bass	Fillet	1	1800	(2)	
			" "	Liver	1		3100
" "	1994	Largescale Sucker	Whole	2	910; 1340	(3)	
	1994	Carp	Fillet	1	2850		

*t-DDT = total DDT (sum of DDT and breakdown products DDE and DDD)

(1) Johnson & Norton (1990)

(2) Hopkins et al. (1985)

(3) unpublished EILS data (Dale Davis)

Description of the Survey

Tributaries were selected for sampling based on a GIS analysis of erosion potential of agricultural land, done by EILS' Joy Denkers and John Tooley; examination of USGS 7 5 minute quadrangle maps; and recommendations from Ecology's Central Regional Office, Randy Kelly of the Okanogan Conservation District, and Gary Passmore of the Colville Tribe. Appendix A has descriptions of each sampling site. No discrete irrigation returns could be identified for sampling.

Two sets of water samples were collected. The first were taken July 24-25, 1995 from nine tributaries and one site on the lower Okanogan main stem (Figure 1). An effluent sample was also obtained from the Okanogan sewage treatment plant. A Class II inspection in 1988 had found elevated concentrations of DDT compounds in the plant's sludge (Reif, 1990).

Those tributaries where DDT compounds were detected in July were re-visited August 30-31, 1995, along with four additional sites not sampled previously. The lower main stem was also re-sampled. Flow and total suspended solids (TSS) concentrations were determined for all locations.

Field and Laboratory Methods

Water samples were collected as composites from quarter-point transects or, for smaller creeks, as simple grabs from mid-stream. Sample containers for DDT analysis were one-gallon glass bottles with teflon lid liners, certified as organic-free. TSS samples were collected in one-liter polyethylene bottles. Flow was measured with a Swiffer meter, except for the Similkameen River and mainstem Okanogan where flow data were obtained from the U.S. Geological Survey. Samples were placed on ice immediately after collection and transported to the Ecology/EPA Manchester Laboratory for analysis.

Water samples were extracted with methylene chloride and analyzed by EPA method 8080 using dual capillary column, gas chromatography (GC) with electron capture detection (ECD). Target compounds were limited to 4,4' and 2,4' isomers of DDT, DDE, and DDD. Restricting the analysis to DDT compounds enabled the laboratory to achieve detection limits at or slightly below the state chronic water quality standard of 0.001 ug/L (parts per billion) for DDT and breakdown products.

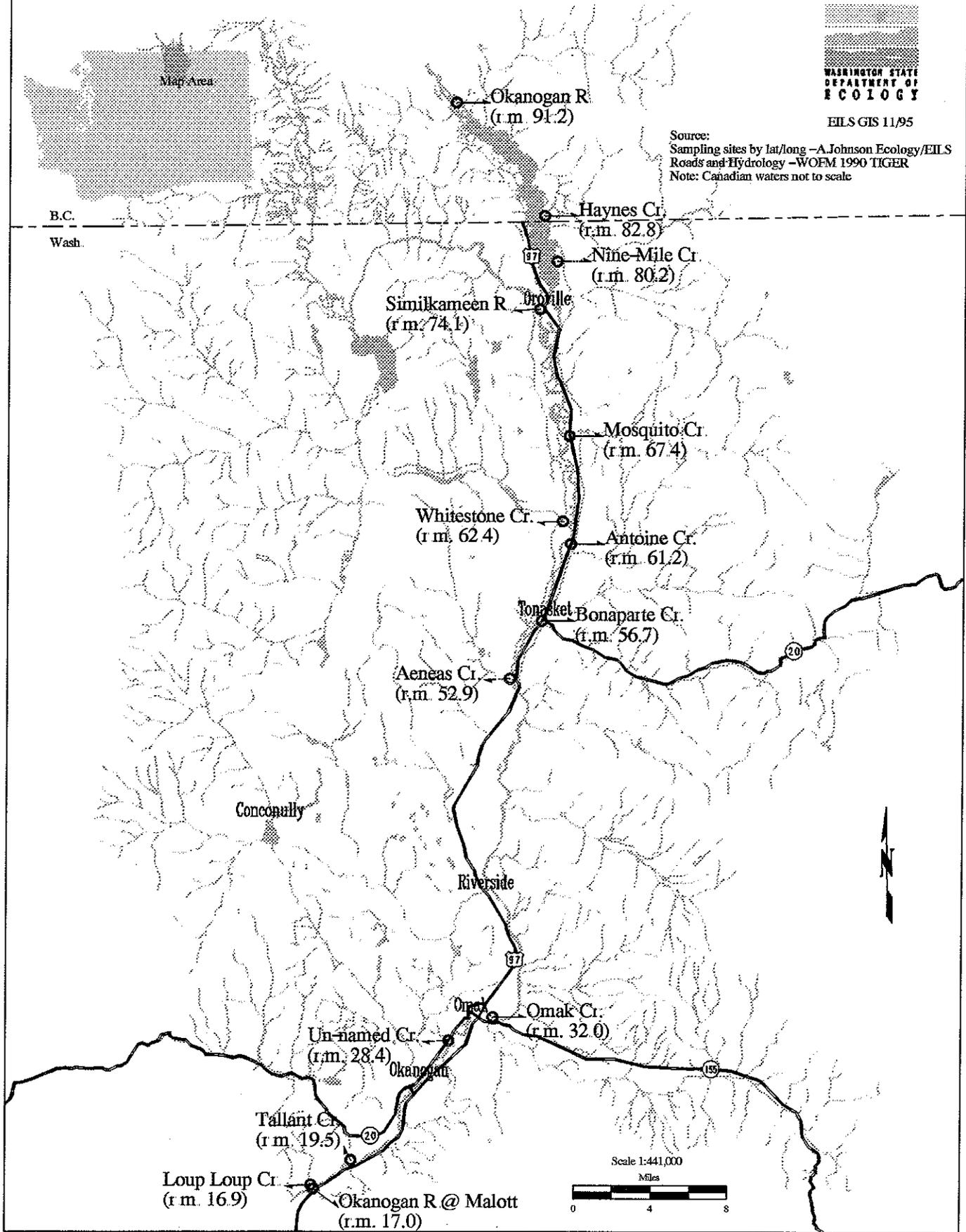
Quality of the Data

Manchester Laboratory prepared written reviews on the quality of the DDT data. These assessed adherence to sample holding times, results on method blanks, and recoveries of DDT surrogates and matrix spikes. No problems were identified with the analyses. The data reviews and complete DDT data are in Appendix B.

The potential contribution of analytical and environmental variability to the precision of the survey data was estimated for two sampling sites. At each site, two pairs of split (duplicate) samples were prepared to give an estimate of laboratory precision. The total variability (analytical + environmental) was estimated from results on two pairs each of separately collected (replicate) samples.

The results show good precision (Table 2). Based on these data, concentration differences between samples on the order of 20% or less may be due to laboratory and/or short-term environmental variability.

Figure 1.
 Location of July/August, 1995 Water Samples Analyzed for DDT compounds



WASHINGTON STATE
 DEPARTMENT OF
 ECOLOGY

EILS GIS 11/95

Source:
 Sampling sites by lat/long - A. Johnson Ecology/EILS
 Roads and Hydrology - WOFM 1990 TIGER
 Note: Canadian waters not to scale

Table 2. Precision of DDT Data (t-DDT in ug/L (ppb))

Location	Date	Split (Duplicate) Samples			Separate (Replicate) Samples		
		#1	#2	RPD*	#1**	#2	RPD
Nine-Mile Creek	7/24	0.0070	0.0059	17%	0.0064	0.0064	0%
Nine-Mile Creek	8/31	0.0057	0.0054	5%	0.0056	0.0053	6%
Tallant Creek	7/24	0.486	0.574	17%	0.530	0.464	13%
Tallant Creek	8/31	0.197	0.198	< 1 %	0.198	0.178	11%

*RPD = relative percent difference (range/mean x 100)

**mean of split sample

Results and Discussion

Survey results are shown in Table 3. DDT compounds were detected in seven of the twelve tributaries sampled, with t-DDT concentrations ranging from 0.0006 to 0.50 ug/L. For the five tributaries sampled in both July and August, similar results were obtained. This agreement suggests the data are representative of contaminant levels under the low flow conditions surveyed.

DDT compounds were below detection limits at both sites on the main stem Okanogan and in the Similkameen River. DDT compounds were also not detectable in effluent from the Okanogan sewage treatment plant (Appendix B). However, the detection limit for the effluent sample (0.008 ug/L) would have masked some of the lower concentrations measured in the creeks.

Of the tributaries identified as DDT sources, Haynes, Mosquito, Whitestone, and Antoine Creeks had t-DDT concentrations at or only slightly above the chronic water quality criterion of 0.001 ug/L. Nine-Mile Creek and an un-named creek in Omak had concentrations approximately five times the criterion. t-DDT concentrations in Tallant Creek were high at 0.19 and 0.50 ug/L, the latter being approximately half the acute criterion of 1.1 ug/L.

TSS were much higher in Tallant Creek and the Omak creek than in other tributaries. Because DDT compounds have a strong affinity for particulate matter, the high solids concentrations are likely a contributing factor to the elevated levels of DDT compounds. Judging from their locale and appearance -- Tallant was dark and the creek in Omak milky -- these creeks may have largely consisted of irrigation return flows.

Table 3. DDT Compounds Detected in Okanogan River Tributaries, 1995 (ug/L (ppb))

Sample Location	Date	Flow (cfs)	TSS (mg/L)	4,4'-DDE	4,4'-DDD	4,4'-DDT	t-DDT
Okanogan River, B.C	8/30	na	3	nd	nd	nd	nd
<u>Haynes Creek, B.C.</u>	8/30	0.2	2	0.0026	nd	nd	0.0026
<u>Nine-Mile Creek</u>	7/24	0.7	2	0.0031	0.0014	0.0019	0.0064
	8/31	0.3	1	0.0025	0.0015	0.0014	0.0054
Similkameen River	7/24	1360	3	nd	nd	nd	nd
<u>Mosquito Creek</u>	8/31	1.0	11	0.0016	0.0016	nd	0.0032
<u>Whitestone Creek</u>	7/24	4.3	27	0.001 J	nd	nd	0.001
	8/31	5.1	14	0.0006 J	nd	nd	0.0006
<u>Antoine Creek</u>	7/24	1.6	25	0.0015	nd	nd	0.0015
	8/31	2.3	26	0.0007 J	nd	nd	0.0007
Bonaparte Creek	7/25	0.4	4	nd	nd	nd	nd
Aeneas Creek	8/31	2.0	1	nd	nd	nd	nd
Omak Creek	7/24	6.8	3	nd	nd	nd	nd
<u>Un-named creek in Omak</u>	7/25	1.2	41	0.0031	nd	0.0024	0.0055
	8/31	2.2	156	0.0056	nd	0.0024	0.0080
<u>Tallant Creek</u>	7/24	0.3	122	0.18	0.037	0.28	0.50
	8/31	0.3	28	0.074	0.020	0.094	0.19
Loup Loup Creek	7/24	1.1	6	nd	nd	nd	nd
Okanogan River @ Malott	7/25	1740	5	nd	nd	nd	nd
	8/31	1510	2	nd	nd	nd	nd

na = not available

nd = not detected at a detection limit of 0.001 ug/L

J = estimated value

With the exception of Tallant Creek, the concentrations found in this survey appear typical of other Washington rivers and streams contaminated with DDT. Table 4 summarizes recent data on four waterbodies where the chronic DDT criterion has been exceeded. With the exception of Granger Drain on the Yakima River -- where a high t-DDT concentration (0.36 ug/L) has also been reported -- concentrations range from 0.004 - 0.060 ug/L, comparable to those found in the Okanogan drainage.

Table 4. DDT Levels Typical of Other Waterbodies Exceeding Standards (ug/L (ppb))

<u>Sample Location</u>	<u>Period of Record</u>	<u>t-DDT Concentrations Detected</u>	<u>Detection Frequency*</u>	<u>Reference</u>
Yakima Basin:				
Moxee Drain	1992-93	0.005 - 0.060	4/5	(1,2)
Granger Drain	1995	0.009 - 0.36	4/4	(3)
Sulphur Creek	1995	0.005 - 0.012	4/4	(3)
Spring Creek	1995	0.005 - 0.010	4/4	(3)
River @ Euclid Bridge	1995	0.004	1/4	(3,4)
Wenatchee Basin:				
Mission Creek	1993-94	0.004 - 0.025	3/7	(2,4)
Lake Chelan:				
Stink Creek	1994	0.02	1/3	(4)
Grays Harbor:				
Grayland Creek	1994-95	0.014 - 0.019	2/5	(4)

*samples detected/total samples

(1) Davis (1993)

(2) Davis & Johnson (1994)

(3) unpublished EILS data (Joe Joy)

(4) unpublished EILS data (Dale Davis)

The long-term persistence of DDT is illustrated by the finding that undegraded 4,4'-DDT accounted for 26 - 56% of the t-DDT in Tallant Creek, the un-named Omak creek, and Nine-Mile Creek (Table 3). 2,4' isomers of DDT, DDE, and DDD were also detected in the Tallant Creek samples (Appendix B). However, concentrations were in the 0.001 - 0.0096 ug/L range resulting in only about a 1% increase if included in the t-DDT sum.

Tributary flows were uniformly low. In creeks where DDT compounds were detected, discharge ranged from 0.2 - 5.1 cfs. Using average values for sites sampled twice, the t-DDT load to the Okanogan River was estimated at 0.3 gram/day. Tallant Creek accounted for more than 80% of the loading.

During the field surveys, an effort was made to check for flow in all tributaries and intermittent streams shown on USGS 7.5 minute maps of the drainage. As near as could be determined, other creeks not sampled during this survey were either dry or near dry. Several of these -- Tonasket Creek (r.m. 77.8), Johnson Creek (r.m. 40.6), and Salmon Creek (r.m. 25.7) -- were originally slated for sampling. These are potential additional sources of contamination at other times of the year.

Acknowledgements

The extra efforts and attention to detail that Bob Reick (EPA) and Norman Olson (Ecology) of Manchester Laboratory devoted to this project are very much appreciated.

References

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AJ:jl

cc: Larry Goldstein, Joe Joy

Appendices

Appendix A. Description of Sampling Sites

Name	Location Description	Okanogan		
		River Mile	Latitude (N)	Longitude (W)
Okanogan River, B.C.	Above Lake Osoyoos @ Rd. 22 bridge	91.2	49 05.4	119 32.1
Haynes Creek, B.C.	@ Brookdale campsite, on corner of 16th and 45th	82.8	49 00.3	119 26.2
Nine-Mile Creek	@ road just west of Lake Osoyoos Rd.	80.2	48 58.26	119 25.2
Similkameen River	@ county road bridge to Oroville (r.m. 5.0)	74.1	48 56.12	119 26.4
Mosquito Creek	@ Hwy 97	67.4	48 50.4	119 24.5
Whitestone Creek	@ River Loop Rd.	62.4	48 46.6	119 25.0
Antoine Creek	@ Hwy 97	61.2	48 45.5	199 24.5
Bonaparte Creek	Tonasket @ Hwy 97	56.7	48 42.2	199 26.5
Aeneas Creek	Near mouth on west shore road	52.9	position not recorded	
Omak Creek	0.1 mi. downstream of Burlington Northern RR	32.0	48 24.4	119 30.0
Un-named Creek	0.5 mi. south of Mid Valley Hospital, Omak on Hwy 215	28.4	48 23.4	119 33.0
Tallant Creek	@ Old 97 Hwy	19.5	48 18.1	119 39.7
Loup Loup Creek	Malott @ Old 97 Hwy	16.9	48 17.0	119 42.4
Okanogan River @ Malott	@ Hwy 97 bridge	17.0	48 16.7	119 24.1

Appendix B

MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive E , Port Orchard Washington 98366

CASE NARRATIVE

August 17, 1995

Subject: Okanogan DDT
Samples: 95 - 308080 to -308092
Case No. 2065 - 95
Officer: Art Johnson
By: Dickey D Huntamer
Organics Analysis Unit

CHLORINATED PESTICIDES/PCB

ANALYTICAL METHODS:

Water samples were prepared by extracting with methylene chloride. Analysis was done by EPA Method 8080 using dual column capillary GC analysis with Electron Capture detectors (ECD). Only 4,4'-DDT, DDD and DDE were requested.

HOLDING TIMES:

All sample extraction and analysis holding times were met

BLANKS:

No target compounds were detected in the laboratory blanks

SURROGATES:

Water surrogate recoveries were all greater than 50% for all surrogates except dibutylchlorodate in samples, -308080,-308083, -308086 and -308091 Decachlorobiphenyl was below 50% recovery in samples, -308083 and -308086 Since the other surrogates were within acceptable limits no qualifiers were added

MATRIX SPIKE AND MATRIX SPIKE :

No matrix spikes were analyzed with these samples. Duplicate analyses were done on samples, -308081 and -308090.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308080

Date Received: 07/26/95

Method: SW8080

Field ID: LOUPLoup

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	0.001	U
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	68	%
4,4-Dibromooctafluorobiphenyl	64	%
Dibutylchloendate	49	%
Decachlorobiphenyl	70	%

Authorized By: V. Hunter

Release Date: 8/14/95

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308081 (Duplicate - LDP1)

Date Received: 07/26/95

Method: SW8080

Field ID: TALLANT

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	0.21	
4,4'-DDD	0.044	
4,4'-DDT	0.32	
2,4'-DDE	0.0036	
2,4'-DDD	0.013	
2,4'-DDT	0.033	

Surrogate Recoveries

Tetrachloro-m-xylene	74	%
4,4-Dibromooctafluorobiphenyl	83	%
Dibutylchlorodate	55	%
Decachlorobiphenyl	78	%

Authorized By: De Hunter

Release Date: 8/14/95

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308083

Date Received: 07/26/95

Method: SW8080

Field ID: OKAN STP

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	0.008	U
4,4'-DDD	0.008	U
4,4'-DDT	0.008	U

Surrogate Recoveries

Tetrachloro-m-xylene	110	%
4,4-Dibromooctafluorobiphenyl	89	%
Dibutylchlorodate	9	%
Decachlorobiphenyl	42	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308085

Date Received: 07/26/95

Method: SW8080

Field ID: ANTOINE

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.0015	
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	83	%
4,4-Dibromooctafluorobiphenyl	92	%
Dibutylchloroendate	57	%
Decachlorobiphenyl	74	%

Authorized By: _____

D. Hunt

Release Date: _____

8/14/95

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308087

Date Received: 07/26/95

Method: SW8080

Field ID: NO NAME

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	0.0031	
4,4'-DDD	0.001	U
4,4'-DDT	0.0024	

Surrogate Recoveries

Tetrachloro-m-xylene	77	%
4,4-Dibromooctafluorobiphenyl	85	%
Dibutylchlorodate	67	%
Decachlorobiphenyl	76	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308089

Date Received: 07/26/95

Method: SW8080

Field ID: BONAPART

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.001	U
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	57	%
4,4-Dibromooctafluorobiphenyl	69	%
Dibutylchlorodate	72	%
Decachlorobiphenyl	69	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308090 (Duplicate - LDP1)

Date Received: 07/26/95

Method: SW8080

Field ID: NINEMILE

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.0029	J
4,4'-DDD	0.0012	J
4,4'-DDT	0.0018	J

Surrogate Recoveries

Tetrachloro-m-xylene	67	%
4,4-Dibromooctafluorobiphenyl	74	%
Dibutylchlorodate	80	%
Decachlorobiphenyl	86	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: 95308092

Date Received: 07/26/95

Method: SW8080

Field ID: NINEMILE

Date Prepared: 07/28/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 07/31/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	0.0030	
4,4'-DDD	0.0015	
4,4'-DDT	0.0019	

Surrogate Recoveries

Tetrachloro-m-xylene	75	%
4,4-Dibromooctafluorobiphenyl	83	%
Dibutylchlorodate	73	%
Decachlorobiphenyl	86	%

Authorized By: *O. P. [Signature]*

Release Date: 8/14/95

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT

LIMS Project ID: 2065-95

Sample: BLN52619

Blank ID: BW5209D

Project Officer: Art Johnson

Date Prepared: 07/28/95

Date Analyzed:

Method: SW8080

Matrix: Water

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	.003	U
4,4'-DDD	.003	U
4,4'-DDT	.003	U

Surrogate Recoveries

Tetrachloro-m-xylene	79	%
4,4-Dibromooctafluorobiphenyl	81	%
Dibutylchlorodate	80	%
Decachlorobiphenyl	93	%

Authorized By: _____

D. Huts

Release Date: 8/14/95

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MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive E , Port Orchard Washington 98366

CASE NARRATIVE

September 20, 1995

Subject: Okanogan DDT - September 95

Samples: 95 - 358250 to -358263

Case No 2159 - 95

Officer: Art Johnson

By: Dickey D. Huntamer 
Organics Analysis Unit

CHLORINATED PESTICIDES/PCB

ANALYTICAL METHODS:

Water samples were prepared by extracting with methylene chloride. Analysis was done by EPA Method 8080 using dual column capillary GC analysis with Electron Capture detectors (ECD). Only 4,4'-DDT, DDD and DDE were requested. The 2,4'-DDT, DDD and DDE were also reported when detected.

HOLDING TIMES:

All sample extraction and analysis holding times were met.

BLANKS:

No target compounds were detected in the laboratory blanks.

SURROGATES:

Water surrogate recoveries were ranged from 17% to 98%. Dibutylchloroendate in samples, -358250 to -358253, -358255, and -358257 to -358263 was below 50% and tetrachloro-m-xylene (TMX) was also below 50% in some samples. Since at least one or more of the other surrogates were within acceptable limits no qualifiers were added.

MATRIX SPIKE AND MATRIX SPIKE :

Matrix spikes recoveries ranged from 52% to 75% and the Relative Percent Differences (RPD) ranged from 1.9% to 4.7%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358250

Date Received: 09/01/95

Method: SW8080

Field ID: OKANOGAN

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	0.001	U
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	66	%
4,4-Dibromooctafluorobiphenyl	69	%
Dibutylchlorendate	45	%
Decachlorobiphenyl	78	%

Authorized By: Art Johnson

Release Date: 9/14/95

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Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358252

Date Received: 09/01/95

Method: SW8080

Field ID: HAYNES

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.0026	
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	46	%
4,4-Dibromooctafluorobiphenyl	50	%
Dibutylchlorodate	34	%
Decachlorobiphenyl	65	%

Authorized By: _____

[Signature]

Release Date: _____

9/19/95

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Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358254

Date Received: 09/01/95

Method: SW8080

Field ID: 9MILE

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.0027	
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4,4'-DDD	0.0016	
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4,4'-DDT	0.0014	
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Surrogate Recoveries

Tetrachloro-m-xylene	66	%
4,4-Dibromooctafluorobiphenyl	80	%
Dibutylchlorodate	61	%
Decachlorobiphenyl	94	%

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Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358256

Date Received: 09/01/95

Method: SW8080

Field ID: 9MILE REP

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	0.0024	
4,4'-DDD	0.0015	
4,4'-DDT	0.0014	

Surrogate Recoveries

Tetrachloro-m-xylene	78	%
4,4-Dibromooctafluorobiphenyl	91	%
Dibutylchloroendate	55	%
Decachlorobiphenyl	83	%

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Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358258

Date Received: 09/01/95

Method: SW8080

Field ID: WHITESTU

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	0.0006	J
4,4'-DDD	0.001	U
4,4'-DDT	0.001	U

Surrogate Recoveries

Tetrachloro-m-xylene	35	%
4,4-Dibromooctafluorobiphenyl	36	%
Dibutylchloroendate	37	%
Decachlorobiphenyl	48	%

Authorized By: E. Hinton

Release Date: 9/19/95

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Analysis Report for

Organochlorine Pesticides

Project Name: Okanogon DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358260

Date Received: 09/01/95

Method: SW8080

Field ID: TALLAUT

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
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4,4'-DDE	0.076	
4,4'-DDD	0.021	
4,4'-DDT	0.10	
2,4'-DDE	0.0012	
2,4'-DDD	0.0060	
2,4'-DDT	0.0107	

Surrogate Recoveries

Tetrachloro-m-xylene	44	%
4,4-Dibromooctafluorobiphenyl	47	%
Dibutylchlorodate	20	%
Decachlorobiphenyl	57	%

Authorized By: _____

A. Johnson

Release Date: _____

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Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358262

Date Received: 09/01/95

Method: SW8080

Field ID: TALLAUT REP

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	0.071	
4,4'-DDD	0.019	
4,4'-DDT	0.088	
2,4'-DDE	0.0011	
2,4'-DDD	0.0052	
2,4'-DDT	0.0101	

Surrogate Recoveries

Tetrachloro-m-xylene	62	%
4,4-Dibromooctafluorobiphenyl	62	%
Dibutylchlorodate	41	%
Decachlorobiphenyl	77	%

Authorized By:

D. White

Release Date:

9/19/95

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: 95358263 (Matrix Spike - LMX1) Date Received: 09/01/95 Method: SW8080
Field ID: MATRIX Date Prepared: 09/06/95 Matrix: Water
Project Officer: Art Johnson Date Analyzed: 09/07/95 Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

4,4'-DDE	52	
4,4'-DDD	73	
4,4'-DDT	65	

Surrogate Recoveries

Tetrachloro-m-xylene	60	%
4,4-Dibromooctafluorobiphenyl	60	%
Dibutylchlorodate	56	%
Decachlorobiphenyl	98	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Okanogan DDT - September 95

LIMS Project ID: 2159-95

Sample: BLN53008

Method: SW8080

Blank ID: BW5249

Date Prepared: 09/06/95

Matrix: Water

Project Officer: Art Johnson

Date Analyzed: 09/07/95

Units: ug/L

Analyte	Result	Qualifier
4,4'-DDE	0.0025	U
4,4'-DDD	0.0025	U
4,4'-DDT	0.0025	U

Surrogate Recoveries

Tetrachloro-m-xylene	49	%
4,4-Dibromooctafluorobiphenyl	49	%
Dibutylchlorodate	58	%
Decachlorobiphenyl	94	%

Authorized By: D. Nantz

Release Date: 9/15/95

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