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Status Monitoring for TMDL

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Upper Yakima River Watershed DDT and Dieldrin Monitoring, 2014

Status Monitoring for TMDL

by

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Water Resource Inventory Area (WRIA) and 8-digit Hydrologic Unit Code (HUC) numbers for the study area:

WRIA

- 39- Upper Yakima

HUC number

- 17030001- Wilson Creek- Cherry Creek

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Abstract

The Washington State Department of Ecology established a suspended sediment, turbidity, and organochlorine pesticide Total Maximum Daily Load (TMDL) for the Upper Yakima River in 1999. TMDL effectiveness monitoring for total suspended solids and turbidity followed in 2006. The present study monitored chlorinated pesticides and breakdown products as called for in the TMDL schedule. The goal of this study was to determine if pesticide concentrations met the targets established in the TMDL.

Samples were collected every two weeks from March through November 2014. This sampling period bracketed the 2014 irrigation season. Analysis targeted DDT compounds, dieldrin, total suspended solids (TSS) and turbidity. Samples were collected from Cherry Creek and Wipple Wasteway (also known as Badger Creek), in the Wilson Creek drainage near Ellensburg, WA.

Though final TMDL targets have not been met, sample results show that significant progress has been made towards lowering DDT and dieldrin concentrations. Aquatic toxicity criteria were met for all dieldrin and DDT/ metabolite samples collected during this study with the exception of the June 10 sample for DDT collected at Wipple Wasteway. This sample exceeded the human health and aquatic toxicity criteria for DDE and total DDT. Cherry Creek and Wipple Wasteway consistently met the aquatic toxicity criteria for dieldrin but exceeded the human heath criteria throughout the irrigation season.

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        - Jean Maust and Joan LeTourneau for editing/formatting the final report.

Introduction

Background

The Yakima River is located in south-central Washington State (Figure 1). Flowing from Keechelus Lake to the Columbia River, the Yakima drains over 6000 square miles of the Eastern slope of the Cascades. The Yakima River basin is one of the most actively irrigated agricultural areas in the United States (Rinella et al., 1999). Land uses in this part of the state include forestry, rangeland, agriculture, and urban. Past studies and monitoring data have shown that each of these uses contributes to suspended sediment loads in the Yakima River and many of its tributaries (Joy, 2002). Even though DDT has been banned in the U.S. since 1972 and dieldrin has been banned since 1987, these persistent and toxic pesticides are slow to break down in the environment (EPA, 2011).

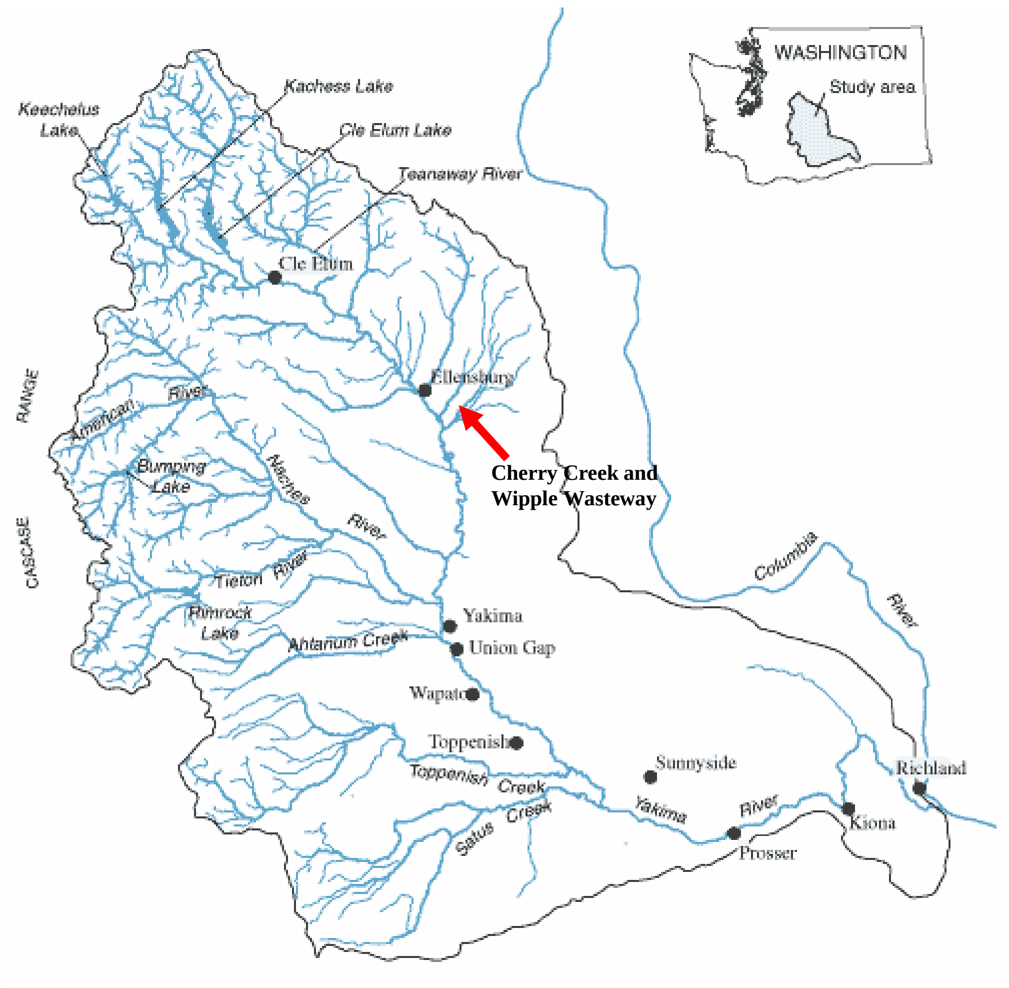

Figure 1. Yakima River Basin.
http://wa.water.usgs.gov/projects/yakimawarsmp/maps.htm

Washington State Department of Ecology (Ecology) conducted a total maximum daily load (TMDL) evaluation of the upper Yakima River basin for suspended sediment and organochlorine pesticides, as required by the federal Clean Water Act (Creech and Joy, 2002). This evaluation was an extension of the 1997 lower Yakima basin TMDL and addressed several organochlorine pesticide 303(d) listings of water column and fish tissue in the upper basin. Turbidity and suspended sediment were included as transport mechanisms for the pesticides and as pollutants themselves. Organochlorine pesticides (OCs) bind to the carbon in suspended solids. In areas where OCs have traditionally been used, they can increase concentrations of these pesticides in local waters.

The Upper Yakima basin TMDL identified elevated levels of DDT and dieldrin in Cherry Creek and Wipple Wasteway. Ecology determined that the levels of these OCs qualifies these waters to be 303(d) listed under Category 5 as being water quality-impaired for DDT and metabolites and for dieldrin. As a result, a suspended sediment, turbidity, and organochlorine pesticide TMDL is being implemented in the Upper Yakima River (Joy, 2002; Creech and Joy, 2002). This TMDL evaluation set up interim and final targets for concentrations of OCs in these waters. The goal of this project was to evaluate if these milestones have been met in Cherry Creek and Wipple Wasteway.

Cherry Creek and Wipple Wasteway are both tributaries to Wilson Creek, a waterway that flows into the Yakima River, about 5 miles south of Ellensburg. While precipitation contributes to the discharge in these two waterways, irrigation returns contribute the majority of the flow through the drier months (irrigation season in the Upper Yakima Basin is April - October). Figure 2 demonstrates that precipitation is not the major contributor to dry season discharge.

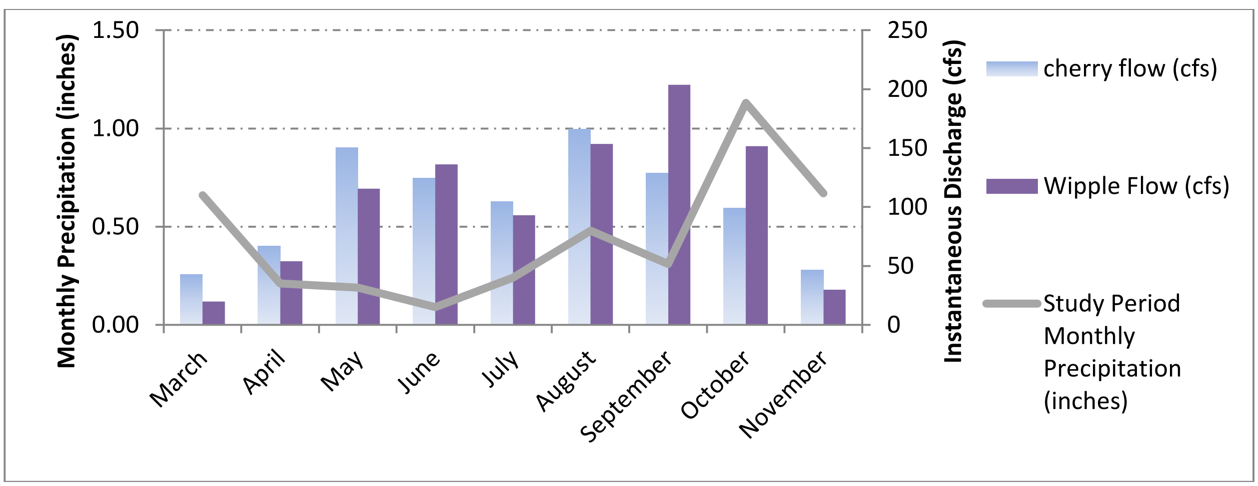

Figure 2. Study Period Precipitation and Discharge.

Irrigation returns and, to a lesser extent, runoff from precipitation contribute sediment to these waterways. This sediment is responsible for increases in turbidity and total suspended solids. Generally in agricultural lands, there are higher concentrations of OCs when TSS and turbidity are higher. OCs bind to organic carbon in soil and sediment and move into waterways during runoff and erosion events. For example, past studies conducted by United States Geologic Survey (USGS) and Ecology in the lower Yakima basin have correlated TSS and turbidity with

OCs like DDT and dieldrin (Joy and Patterson, 1997). Correlations for the same parameters in the upper Yakima TMDL were weaker. Relationships between TSS, turbidity, and OCs from 2014 samples will be addressed in the discussion section of this report.

Historical Data

DDT compounds and dieldrin in water were sampled and analyzed from Cherry Creek and Wipple Wasteway 8 to 17 years ago. It is difficult to compare concentrations of dieldrin and DDT compounds from this study to previous studies conducted so long ago, due to advances in analytical chemistry. The historical results are presented to offer a perspective as to whether DDT compounds and dieldrin concentrations are decreasing. Meeting water quality criteria is the ultimate goal of the TMDL. The results of this study will be measured against water quality criteria to evaluate the effectiveness of the TMDL in these waterbodies.

USGS, 1992

The USGS detected DDT compounds and dieldrin in whole water samples from several areas of the upper Yakima River basin during studies in 1988 and 1989 (Rinella et al., 1992). DDT compounds and dieldrin were detected in Cherry Creek at Thrall Road on six of six occasions, with a range of 0.001 to 0.039 ug/L total DDT, and 0.001 to 0.041 ug/L dieldrin.

Ecology, 1998

Four water samples collected from Cherry Creek in 1995 were analyzed for pesticides including DDT compounds and dieldrin (Davis et al., 1998). DDT compounds and dieldrin were not found in any of the samples at a quantitation limit of 0.05 ug/L (parts per billion). It is likely that there were no OCs detected at these sites during this study because detection limits were higher than ambient pesticide concentrations.

Ecology, 1999

Ecology sampled Cherry Creek and Wipple Wasteway in 1999 for the Upper Yakima suspended sediment and organochlorine TMDL. Whole water samples were collected and analyzed for DDT compounds and dieldrin. Total DDT (t-DDT) results ranged from 0.6 to 2.5 ng/L (parts per trillion). Dieldrin results ranged from 0.38 to 5 ng/L. Concentrations of DDT compounds and dieldrin in 1999 samples are displayed in Figures 3 – 5.

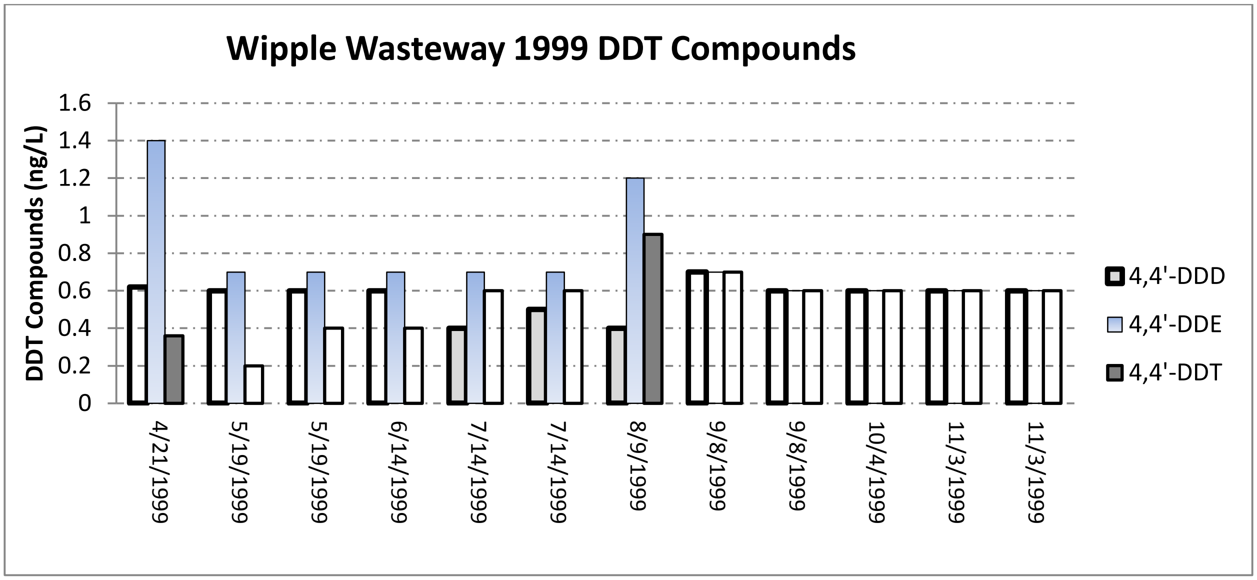

Figure 3. Wipple Wasteway DDT Compounds, 1999.

Hollow bars indicate tentatively identified or non-detected analytes.

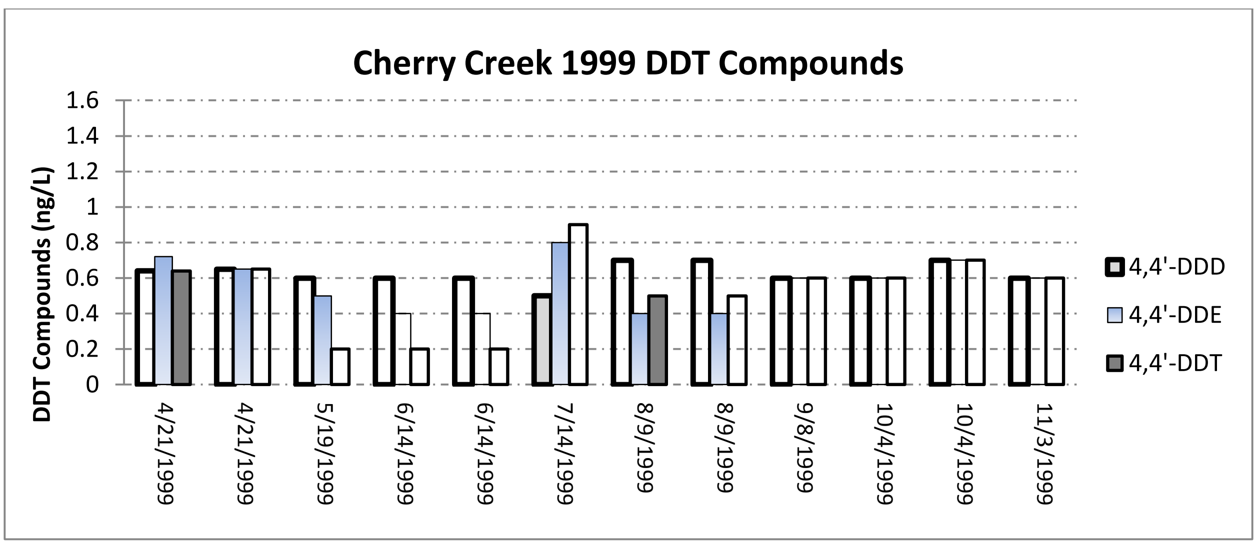

Figure 4. Cherry Creek DDT Compounds, 1999.

Hollow bars indicate tentatively identified or non-detected analytes.

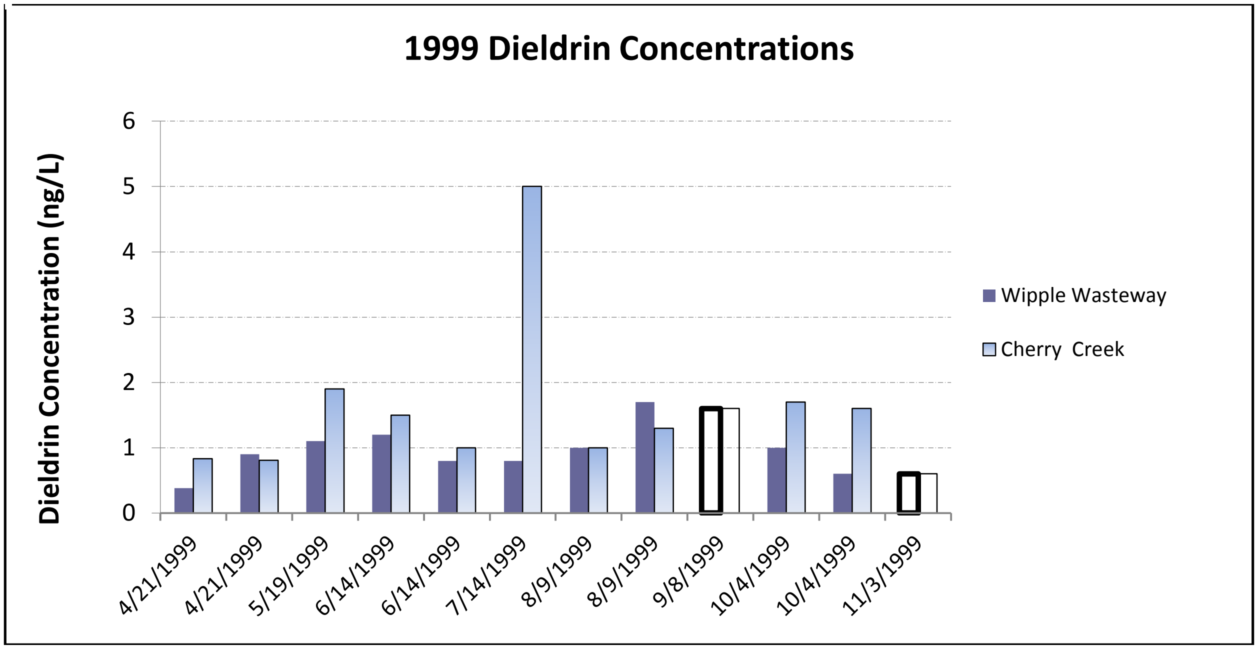

Figure 5. 1999 Dieldrin Concentrations in Wipple Wasteway and Cherry Creek.

Hollow bars indicate tentatively identified or non-detected analytes.

Methods

Project Description

Ecology's Water Quality Program requested that Ecology's Environmental Assessment Program monitor the concentrations of DDT and metabolites, and dieldrin in the surface waters of Cherry Creek and Wipple Wasteway. The purpose of this monitoring was to evaluate the levels of these pesticides in these waterways relative to target concentrations established in the TMDL (Table 1; Friese, 2014).

TSS and turbidity samples were collected to determine the strength of the relationship (correlation) between suspended solids and OCs. Bi-weekly samples were collected from March through November 2014. The study was designed to include this time period to evaluate OC and suspended solids concentrations throughout the irrigation season (April – October), including baseline conditions before and after the irrigation season.

The 2006 interim targets for this TMDL were set at the aquatic toxicity criteria (Table 1; WAC 173-201A). The 2011 final targets are for all sample concentrations to meet the human health criteria (Table 1).

Table 1. TMDL Targets for Cherry Creek and Wipple Wasteway, 2006 and 2011.

	DDT	DDE	DDD (exclusively*)	Total DDT†	Dieldrin
2006 Targets (aquatic toxicity criteria)	n/a	n/a	n/a	1.0 ng/L	1.9 ng/L
2011 Targets (human health criteria)	0.59 ng/L	0.59 ng/L	0.83 ng/L	0.59 ng/L	0.14 ng/L

*Human health criteria is 0.83 ng/L for *only* DDD (when no DDE or DDT are present).
†Total DDT (t-DDT) is the sum of DDT and its metabolites: DDD and DDE.

Ecology field crews collected pesticide grab samples using quarter point transect methodology described in the SOP, Sampling Pesticides in Surface Waters (Anderson, 2011). TSS and turbidity samples were collected using a single point simple grab from the thalweg of the waterways. Crew measured flow using a Marsh-McBirney flow meter, and depending on water levels and velocities, measured from a bridge or while wading. For bridge flows, field staff attached the flow meter to a sounding reel and a bridgeboard, as described in the Ecology SOP for Measuring Streamflow from a Bridge (Holt, 2010). When measuring flow while wading, field staff attached the flow meter to a top-setting wading rod as described in the Ecology SOP, Estimating Streamflow (Kardouni, 2013).

Samples were transported to analytical laboratories following chain of custody procedure. Manchester Environmental Laboratory (MEL) analyzed TSS and turbidity samples. The contract lab, Pacific Rim, analyzed samples for DDT compounds and dieldrin.

Pesticide samples were analyzed at the contract lab with high resolution gas chromatography/ high resolution mass spectrometry (HRGC/HRMS) and with isotope dilution and internal standard quantitation processes (EPA Method 1699). TSS and turbidity samples were analyzed at MEL (Table 2).

Table 2. Laboratory Procedures.

Analyte	Sample Matrix	Number of Samples*	Range of Results	Estimated Detection Limit	Analytical Method
4,4'-DDD	Surface water	42	0.001 - 0.0951 ng/L	0.001 - 0.0041 ng/l	EPA 1699
4,4'-DDE	Surface water	42	0.0043 - 1.25 ng/L	0.0011 - 0.0189 ng/l	EPA 1699
4,4'-DDT	Surface water	42	0.0023 - 0.245 ng/L	0.003 - 0.0065 ng/l	EPA 1699
Dieldrin	Surface water	42	0.021 - 1.17 ng/L	0.002 - 0.0445 ng/l	EPA 1699
TSS	Surface water	42	3 - 80 mg/L	1 - 6 mg/l ‡	EPA 160.2
Turbidity	Surface water	42	0.9 - 28 NTU	0.5 NTU ‡	EPA 180.1

* including field replicate samples, excluding other QA/QC samples
‡ Reporting Limit
ng/L= nanograms per liter or parts per trillion
mg/L= milligrams per liter or parts per million

Quality Assessment

All data, including DDT, DDE, DDD, dieldrin, TSS, turbidity, and flow data can be found in Appendix A.

All laboratory results for the study will be included in Ecology's Environmental Information Management (EIM) database. Public access to electronic data and the final report for the study will be available through Ecology/s Internet homepage (www.ecy.wa.gov).

Results were reviewed for qualitative and quantitative accuracy following the National Functional Guidelines for Organic Data Review under the Contract Laboratory Program (CLP). Written case narratives assessing the quality of the data reports were provided by Manchester Environmental Laboratory (MEL). These narratives included descriptions of the analytical methods, a review of sample holding times, instrument calibration checks, blank results, surrogate recoveries, matrix spike recoveries, and laboratory control samples. The case narratives and complete data reports can be obtained from the report author by request.

The quality assurance (QA) review verified that laboratory performance met most quality control specifications outlined in the analytical methods. The quality of the data reported here is appropriate for the intended uses. To verify that results generated for the study were of the quality needed, control sample results were compared to data quality objectives established in the QA Project Plan (Friese, 2014). Data quality results for the study are shown in Appendix C. Specific quality issues noted in the case narratives are discussed below.

Sample Holding

All study samples were maintained and transferred to analytical labs under chain-of-custody from the time of collection. Study samples were sent by courier to MEL, and most samples arrived in coolers on blue ice within the proper holding temperature of <6 ^{o}C. The sample collected on June 25 (1406020) arrived at the laboratory 2.2° C above holding temperature. As a result, all June 25 samples are potentially biased low and were qualified as estimates. One sample collected in July (1407023) arrived at 6.8 ^{o}C, and the two samples collected in September (1409020 and 1409021) arrived at 6.2 ^{o}C, and 6.1 ^{o}C. These samples were cooled to 4 ^{o}C immediately after they reached the lab. No qualification was necessary for these samples. Preparation and analysis of all samples was completed within method hold-time limits except for one turbidity sample, # 1409019-02. As a result of the hold-time exception, that turbidity sample was qualified as an estimate (J qualified).

Other Qualified Data

Some of the method blanks resulted in detections of analytes of interest. If the method blank was not free of any positive results, results with less than 10 times the analyte concentration in the blank were qualified as non-detects (U qualified) at the Estimated Quantitation Limit (EQL).

Some of the samples met all criteria for positive identification according to the method, EPA 1699, except gas chromatography retention time and isotopic abundance ratios. Because of this, these results cannot be used for regulatory purposes and have been qualified as NJ (analyte tentatively identified, the result is its approximate concentration).

Measurement Quality Objectives

The Measurement Quality Objectives (MQO) established in the QAPP were largely met. For DDT compounds, 92% of the Estimated Quantitation Limits (EQLs) were lower than the established MQOs. Dieldrin EQLs were below the established MQOs for 73% of the samples. Table 3 below shows the range of EQLs and MQO goals, as well as percentage of EQLs greater than MQO goals.

Table 3. Estimated Quantitation Limits and Measurement Quality Objectives.

Analyte	Sample Matrix	% of EQL > MQO	Range of EQLs	MQO	Analytical Method
4,4'-DDD	Surface water	8	0.037 - 0.215 ng/L	0.2 ng/L	EPA 1699†
4,4'-DDE	Surface water	8	0.037 - 0.215 ng/L	0.2 ng/L	EPA 1699†
4,4'-DDT	Surface water	8	0.037 - 0.215 ng/L	0.2 ng/L	EPA 1699†
Dieldrin	Surface water	27	0.037 - 0.215 ng/L	0.1 ng/L	EPA 1699†

†Laboratory modification of EPA method.

Results

Discharge

Flow measurements were taken when samples were collected to estimate discharge. Cherry Creek and Wipple Wasteway are primarily influenced by irrigation returns and Spring snowmelt. Figure 2 reflects the minimal influence that precipitation has on discharge on these waterways during the irrigation season. Fields in the Upper Yakima basin are irrigated from April – October. The frequency of irrigation is dependent on precipitation amounts. Discharge data was estimated in order to be able to calculate loads of DDT and dieldrin in Cherry Creek and Wipple Wasteway. Instantaneous discharge (flow) data is presented below in Figure 6.

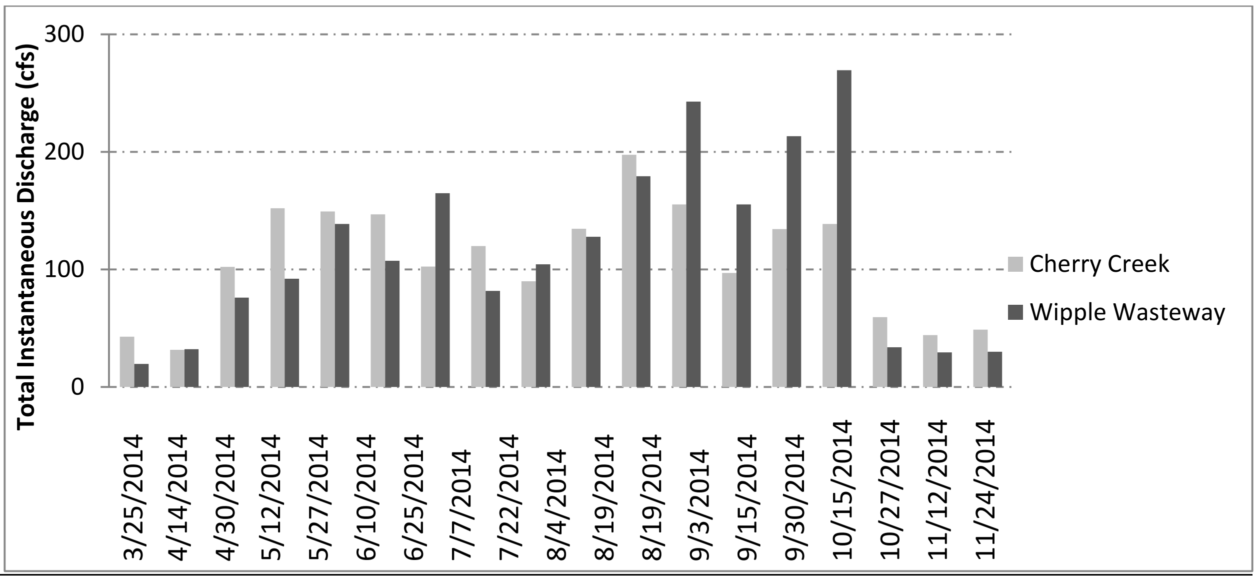

Figure 6. Estimated Total Instantaneous Discharge.

DDT and Metabolites

The 2006 targets established for DDT and metabolites in the *Upper Yakima River Basin Suspended Sediment, Turbidity, and Organochlorine Pesticide Total Maximum Daily Load Submittal Report* were met with the exception of one water sample collected from Wipple Wasteway on 6/10/2014. This sample exceeded the aquatic toxicity criteria of 1.0 ng/L with a result of 1.48 ng/L.

The target set for 2011 was for all samples to meet the human health criteria (see Table 1). The same sample that exceeded the aquatic toxicity criteria exceeded the human health criteria for DDE (0.59 ng/L) with a result of 1.25 ng/L. The ranges of concentrations of individual DDT compounds are displayed in boxplots in Figures 7 and 8.

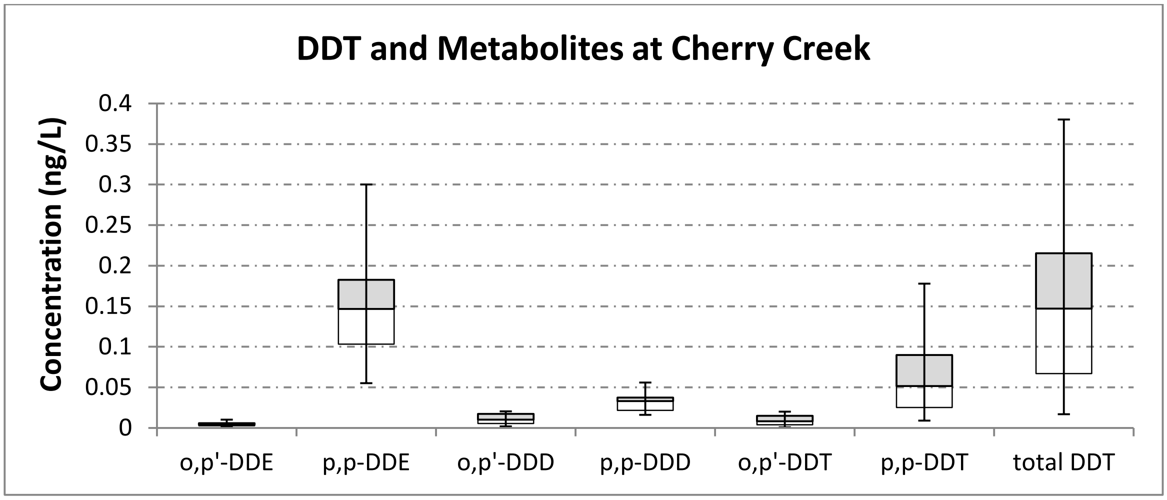

Figure 7. Boxplot of DDT Compounds in Cherry Creek, 2014.

In these plots, the box includes 75% of the data, i.e., between the first (q1) and third (q3) quartiles. (q1 = 25th percentile; q3 = 75th percentile.) The middle line in the box represents the median. The vertical line shows the upper and lower extents of all the data.

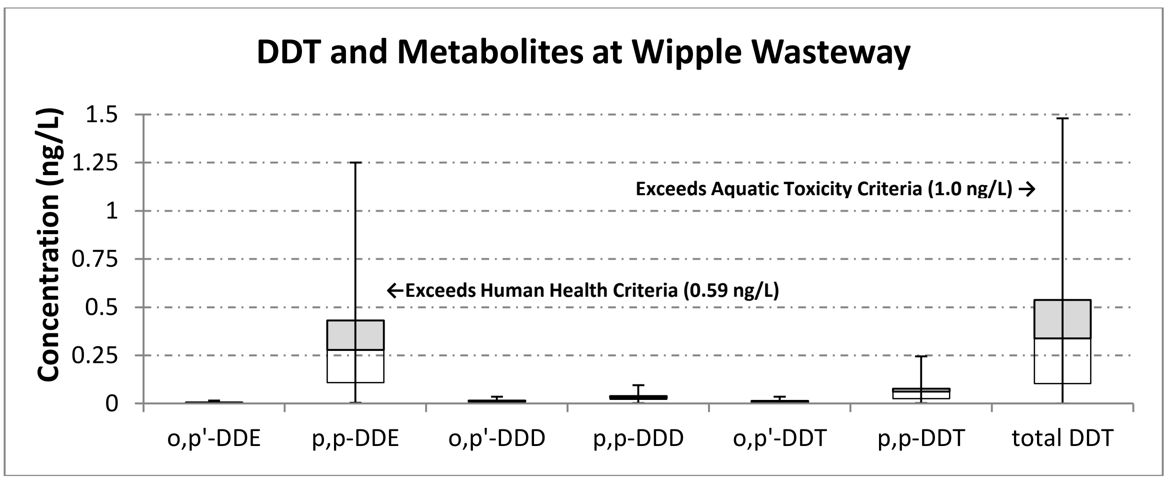

Figure 8. Boxplot of DDT Compounds in Wipple Wasteway, 2014.

All TMDL targets are in Table 1.

Total DDT (t-DDT) concentrations were calculated to evaluate if the 2006 TMDL targets (aquatic toxicity criteria) had been met. DDT compounds were summed following Toxics Studies Unit guidance on calculating total values. t-DDT is the sum of the 2,4' and 4,4' isomers of DDT, DDE, and DDD. Estimates (J qualified data) and detections are summed and contribute to total values. Since NJ qualified data is not considered acceptable for regulatory use according to EPA 1699, these results are not included in t-DDT values. Non-detect data, qualified as U or UJ, is assigned a value of zero when results being added include detections and non-detects.

All t-DDT samples met 2006 and 2011 target concentrations except the sample collected from Wipple Wasteway on 6/10/2014. This sample exceeded the aquatic toxicity criteria and the human health criteria. Results of t-DDT calculations for the study period are displayed in Figures 9 and 10.

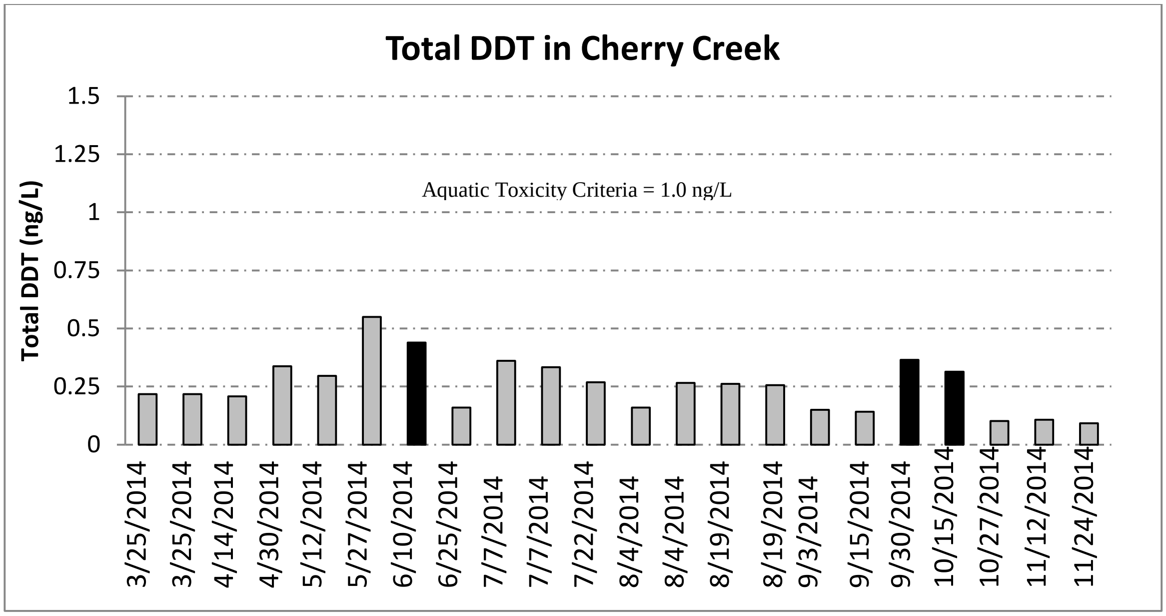

Figure 9. Total DDT in Cherry Creek.

Grayscale bars reflect J qualified data, black bars represent non- qualified detections.

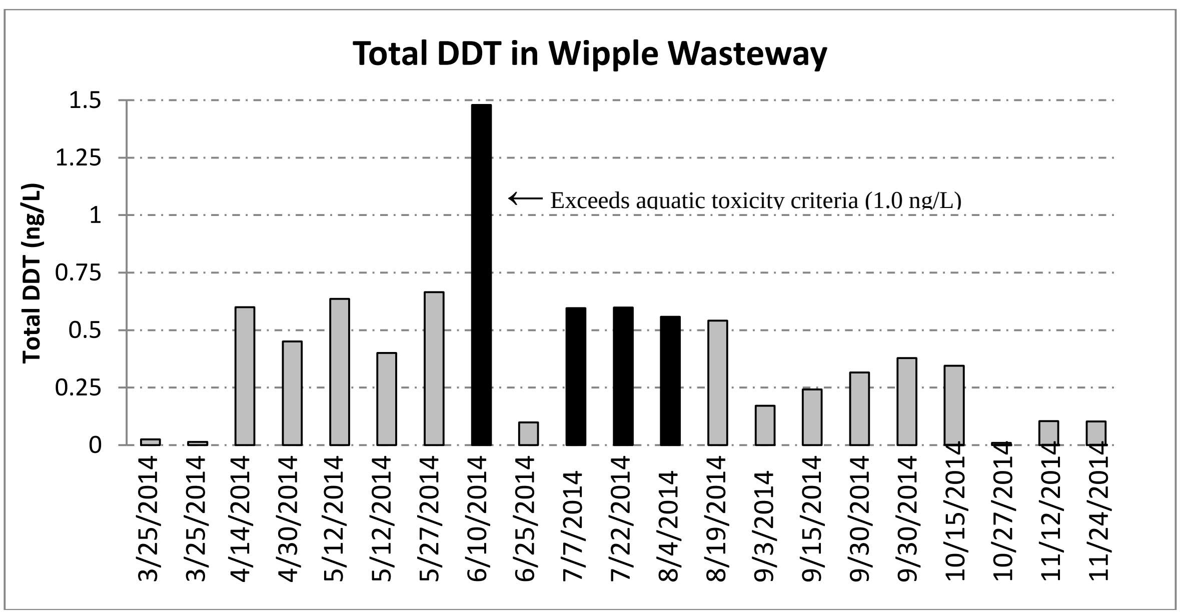

Figure 10. Total DDT in Wipple Wasteway.

Grayscale bars reflect J qualified data, black bars represent non- qualified detections.

Dieldrin

Samples collected during the 2014 study and analyzed for dieldrin all met the 2006 targets established in the 2002 TMDL (Creech and Joy, 2002). However, 2011 TMDL targets were not met on multiple occasions in both waterways. Dieldrin samples collected during the irrigation season, (April - October) consistently exceeded the human health criteria of 0.14 ng/L. Ranges of dieldrin concentrations are displayed in Figure 11. Concentrations of individual samples can be found in Appendix B.

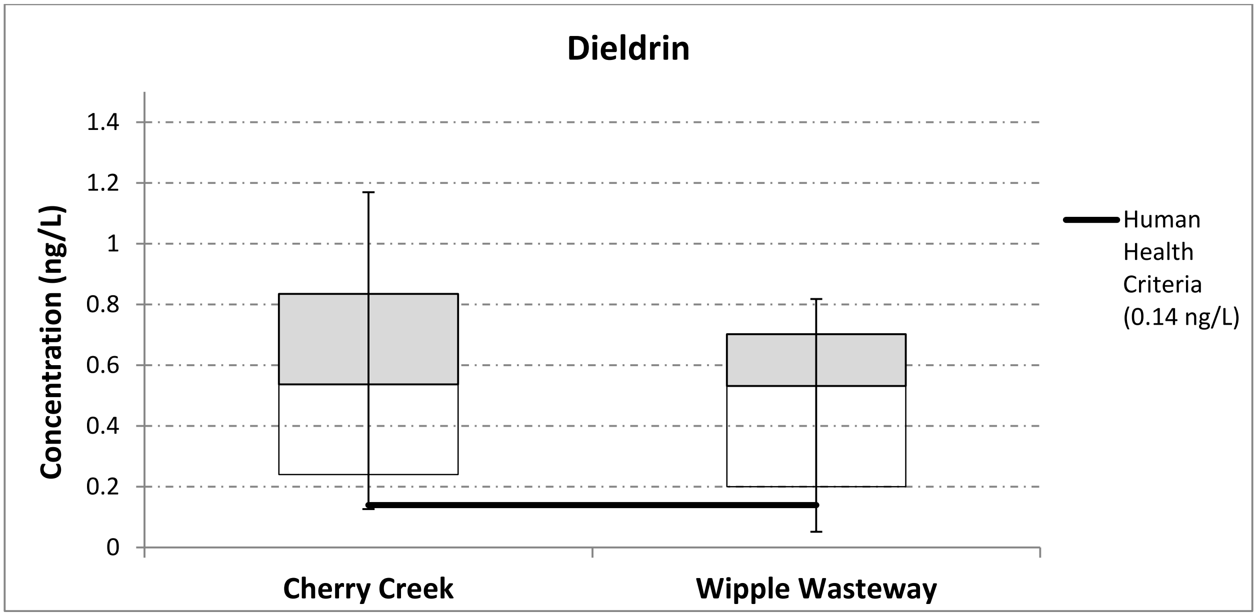

Figure 11. Boxplot of Dieldrin Concentrations.

Discussion

TMDL Schedule Targets

DDT

The concentrations of DDT compounds met both the 2006 and 2011 targets with one exception. Sample 1406019-01, collected from Wipple Wasteway on 6/10/2014, exceeded (did not meet) aquatic toxicity and human health criteria. All of the other samples collected during this 2014 study, and the associated reductions in OC concentrations suggest that the best management practices and implementation activities carried out as a result of the TMDL have been largely effective in reducing the input of DDT compounds to Cherry Creek and Wipple Wasteway.

The one DDT and DDE sample that exceeded water quality criteria was significantly higher than other results. The second highest DDT or DDE result was less than half as much as the highest result. There was no obvious reason why this one result was so much higher than all of the other results. Without additional study it is not possible to identify a specific source that contributed to high concentrations of DDT compounds in the Wipple Creek sample collected on 6/10/2014. However, one or more of the following events may have contributed to elevated concentrations of DDT compounds in Wipple Wasteway.

- Channelized watercourses and bare stream edges can contribute to stream bank erosion and sloughing. DDT and its metabolites persist in soils for many years. (ATSDR, 2002). It is possible that soil from a stream bank contaminated with high concentrations of DDT compounds eroded into the waterway.
- A field containing high sediment concentrations of DDT compounds may have been recently irrigated. Previous study by the Kittitas County Conservation District has determined that organochlorine pesticide contamination of field soils is inconsistent throughout the Yakima valley (Lael, 2000).
- The Washington State Department of Agriculture still occasionally receives old containers of DDT at their pesticide collection events (personal communication, Jane Creech).

Dieldrin

Target dieldrin concentrations established in the TMDL for 2006 were met for all samples. The 2006 target (1.9 ng/L) corresponds to the aquatic toxicity criteria that is protective of the health of aquatic organisms.

The TMDL set a more protective target water concentration to be attained by 2011. This target (0.14 ng/L) is the human health criteria established in the Washington State water quality standards. This is the highest concentration of dieldrin in water that is not expected to cause significant risk to human health. During the irrigation season (April – October) the dieldrin concentrations in Cherry Creek and Wipple Wasteway were consistently above 0.14 ng/L. Current management practices have not been adequate to reduce dieldrin concentrations below human health criteria in Cherry Creek and Wipple Wasteway.

Loading

TMDL Load Allocations

As part of the TMDL, interim and final loads were calculated and combined for Cherry Creek and Wipple Wasteway. Load allocations from the TMDL are shown in Table 4.

Table 4. Daily Load Allocations from Upper Yakima River TMDL.

Site	Interim Daily Load Allocation (g/day)		Final Daily Load Allocation (g/day)	
	T-DDT	Dieldrin	T-DDT	Dieldrin
Cherry Creek and Wipple Wasteway	0.40	0.68	0.38	0.009

To estimate DDT and dieldrin daily loads, discharge data were multiplied by pesticide concentrations, then multiplied by a unit conversion factor. The following loading equation was used to calculate daily loads:

Discharge (cubic feet per second) x concentration (ug/L) x 2.45= grams/day

DDT Daily Loads

DDT loads exceeded the interim and final daily load allocations on two occasions: 5/27/2014 and 6/10/2014. All other sample period estimated daily loads were below load allocations in the TMDL. DDT loads during irrigation season were higher than background loads calculated from samples collected during March and November. There is considerable variation of DDT loads throughout the irrigation season. Combined daily estimated loads are displayed in the stacked bar chart below (Figure 12).

Relative Contribution of DDT Loads

Though the allocated OC loads are for Cherry Creek and Wipple Wasteway combined, it is useful to evaluate the individual contributions of pesticide loads relative to the total concentration discharging to Wilson Creek. Consistent with the data presented in the Upper Yakima River TMDL (Joy, 2002), Wipple Wasteway generally contains higher concentrations and loads of DDT and DDT compounds than Cherry Creek. Wipple Wasteway contributed more than 50% of the t-DDT load to Wilson Creek for the majority of samples. Based on the loading data calculated from this study, loading for DDT and metabolites was highest during June. Figure 13 shows the relative contribution to Wilson Creek of total DDT from Cherry Creek and Wipple Wasteway.

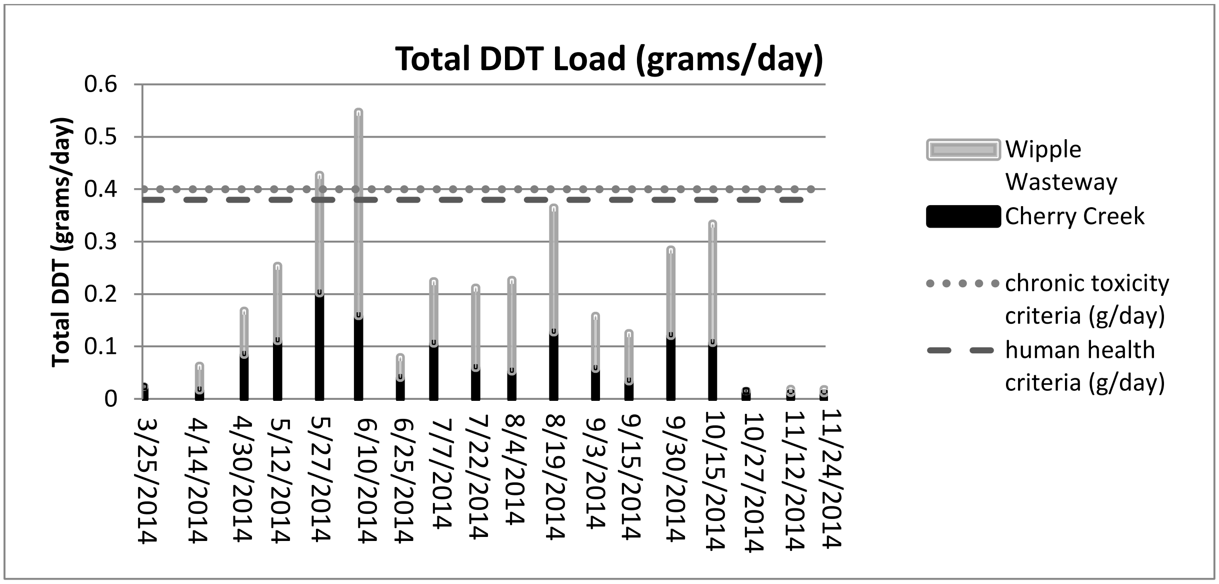

Figure 12. Total Estimated DDT Loads from Cherry Creek and Wipple Wasteway.

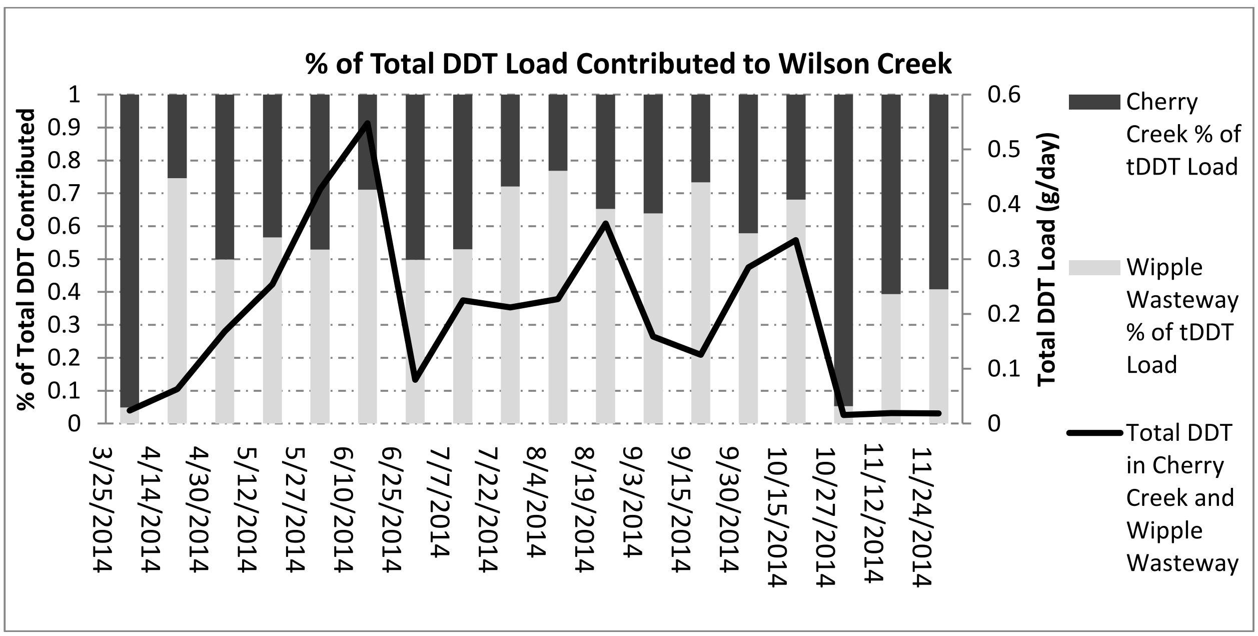

Figure 13. Percentage of Total DDT Contributed to Wilson Creek.

Dieldrin Daily Loads

Estimated daily dieldrin loads on the days sampled were well below the interim daily allocation of 0.68 grams per day. The final allocation of 0.09 grams per day was consistently exceeded throughout the irrigation season (Figure 14). The daily loads of dieldrin are relatively consistent throughout the irrigation season. Dieldrin loads calculated from background samples were below the daily load allocation from the TMDL.

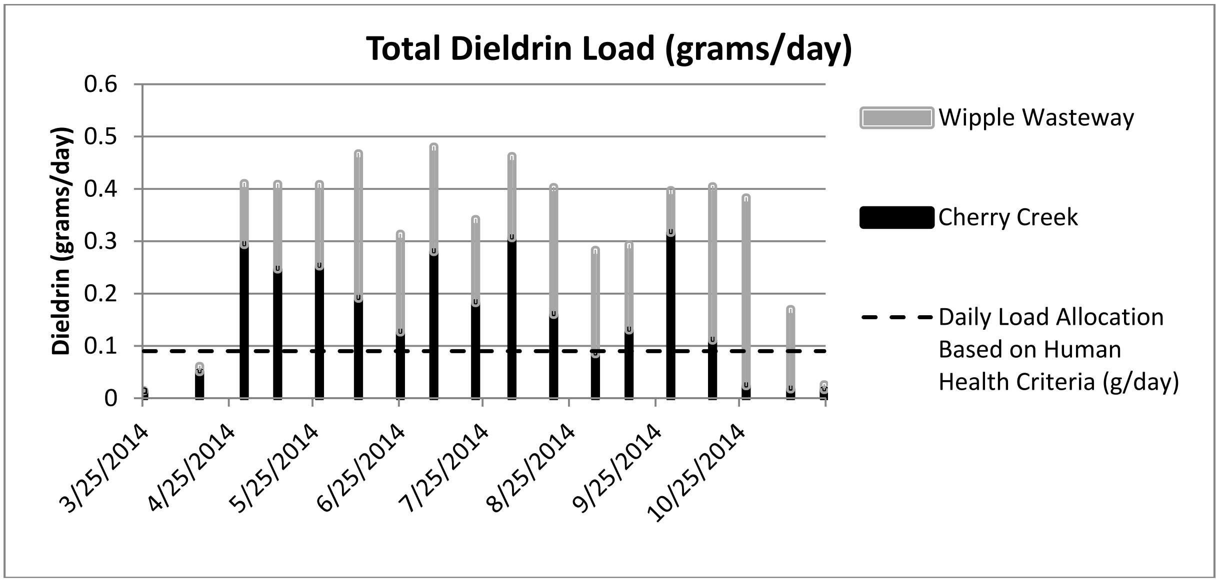

Figure 14. Estimated Daily Loads of Dieldrin.

Relative Contribution of Dieldrin Loads

Often a higher percentage of dieldrin loads were contributed by Cherry Creek. Although Cherry Creek has higher dieldrin loads 67% of the time, both Cherry Creek and Wipple Wasteway must significantly reduce dieldrin loads to meet the 2011 final load allocation of 0.09 grams/day. Figure 17 shows the contribution of dieldrin loads to Wilson Creek from each waterway.

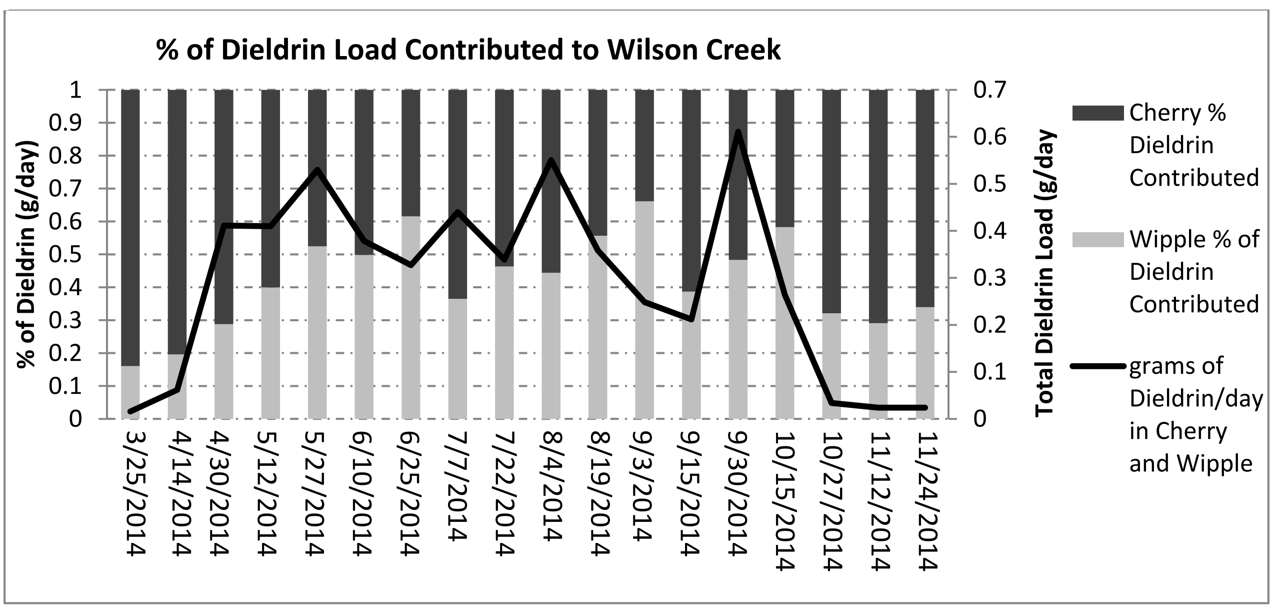

Figure 15. Percentage of Dieldrin Load Contributed to Wilson Creek.

Relationships between TSS and Turbidity and Pesticide Concentrations

Simple linear regression was used to evaluate relationships between variables. TSS and turbidity were considered the independent variables while t-DDT and dieldrin were considered the dependent variables. The correlations between variables were all positive but not very strong.

In the previous TMDL, the strongest correlation was for Wipple Wasteway t-DDT and turbidity (r^2=0.56). The present study established moderately positive linear relationships between Cherry Creek t-DDT and TSS (r^2=0.5287) and Cherry Creek t-DDT and turbidity (r^2=0.6152). All other correlations were determined to have weak linear relationships. Coefficients of determination (r^2 values) calculated from 2014 study data are displayed in Table 5. Scatterplots and slope equations are located in Appendix B.

Table 5. Coefficients of Determination for Simple Linear Regressions with Pesticide Concentrations.

Site and OC	r^2 Value	
	TSS	Turbidity
Cherry Creek dieldrin	0.2513	0.3596
Cherry Creek t-DDT	0.5287	0.6152
Wipple Wasteway dieldrin	0.1500	0.1356
Wipple Wasteway t-DDT	0.4336	0.4411

Even though r^2 values did not represent strong linear relationships, 2 of the 3 highest TSS and turbidity results from Wipple Wasteway did correspond with the highest t-DDT results measured during this study. There is a positive relationship between sediment and OCs in the Upper Yakima River Basin, but without more data it is not possible to use suspended sediment or turbidity as a surrogate for OCs in these waterways with a reliable level of precision. The organochlorine concentrations were also not well correlated with TSS, turbidity, or organic carbon concentrations at the Cherry Creek or Wipple Wasteway sites in the previous TMDL.

Conclusions

Results of this 2014 study support the following conclusions:

Cherry Creek

- Cherry Creek met all target concentrations for DDT compounds established in the Upper Yakima River Basin TMDL.
- Concentrations of dieldrin in Cherry Creek were all within the aquatic toxicity criteria. This was the 2006 target concentration established in the TMDL.
- During this study the 2011 human health criterion target set by the TMDL was exceeded in almost all dieldrin samples (91%) collected from Cherry Creek.

Wipple Wasteway

- All Wipple Wasteway samples for DDT were below the 2006 and 2011 Upper Yakima River Basin TMDL target concentrations with the exception of the sample collected on 6/10/2014.
- Wipple Wasteway dieldrin concentrations were all below the aquatic toxicity criteria, established as target concentrations in the 2006 TMDL.
- Most of the dieldrin samples (76%) collected from Wipple Wasteway exceeded 2011 targets for the human health criterion.

Cherry Creek and Wipple Wasteway (Combined) Allocated Daily Loads

- All dieldrin daily load estimates were below the 2006 interim daily load allocations in the TMDL. This load allocation is based on meeting the aquatic toxicity criteria.
- Most of the dieldrin daily load estimations from this study (72%) exceeded the 2011 final daily load allocation. This load allocation is based on meeting the human health criteria.
- DDT daily load estimates were mostly below the 2006 interim and 2011 final daily load allocations. Samples collected on 5/27/2014 and 6/10/2014 yielded daily load estimates that did not meet (exceeded) interim or final daily load allocations.

Recommendations

Results of this 2014 study support the following recommendations:

Overall the TMDL targets for DDT are being met in both Cherry and Wipple Wasteway with a few minor exceptions. Further reductions are needed in both Cherry Creek and Wipple Wasteway to meet the TMDL targets for dieldrin.

Specific recommendations include:

- Continue to implement agricultural best management practices for irrigation and sediment reduction improvements as prescribed in the 2002 TMDL:
    - Conduct a dieldrin study of area soils that may identify where erosion-reducing practices may have the most benefit.
    - Measure the concentration of dieldrin in individual irrigation return canals contributing to Cherry Creek and Wipple Wasteway. This may help pinpoint areas where irrigation practices and soil dieldrin concentrations are most negatively influencing water quality.
- Target historical potato growing areas for potential dieldrin reductions.
- Forestry best management practices should continue as specified in Forests and Fish rules.
- Kittitas and Yakima Counties and Washington State Department of Transportation should continue to manage roads and roadside ditches to reduce sediment inputs to waterways.

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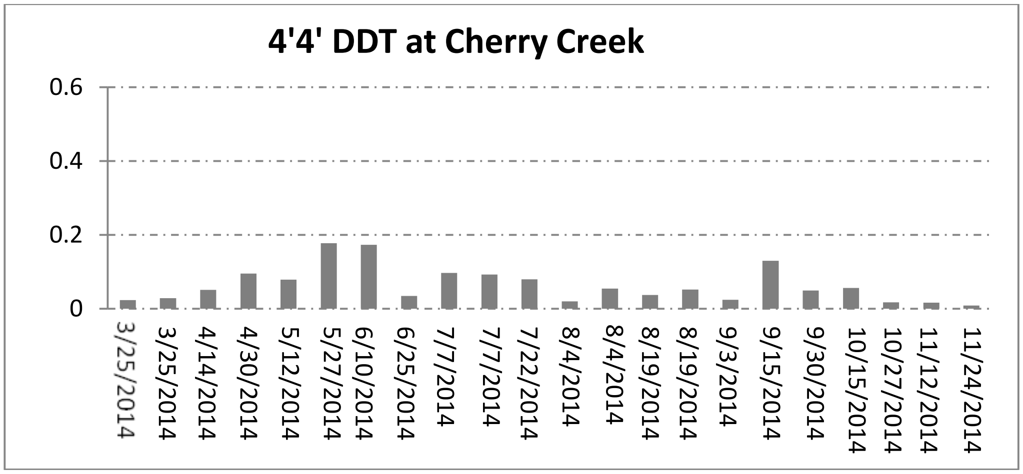
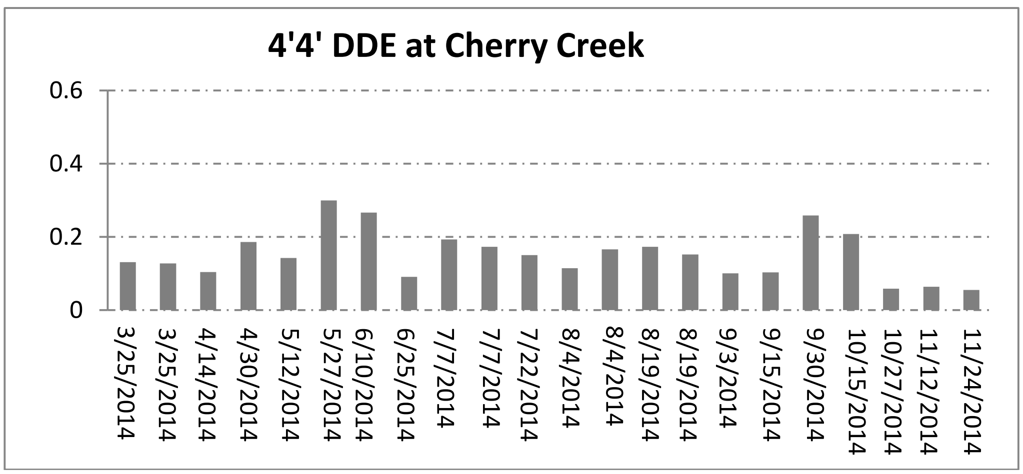
Appendices

Appendix A. DDT Compound Results

Figure A-1. Cherry Creek DDT Compound Results





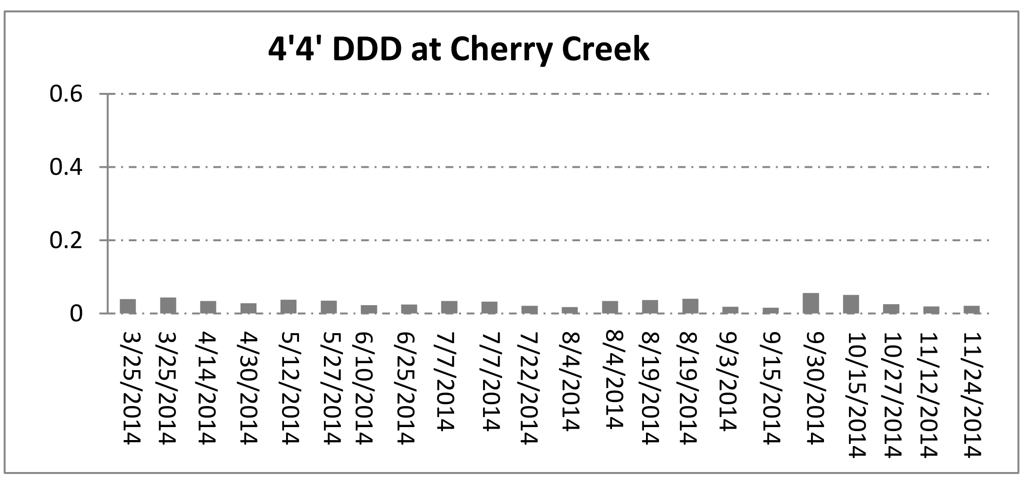
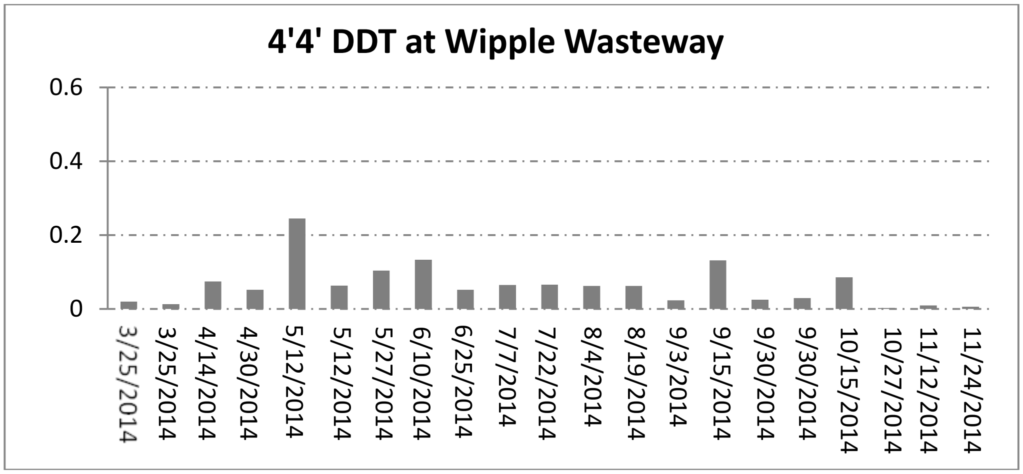
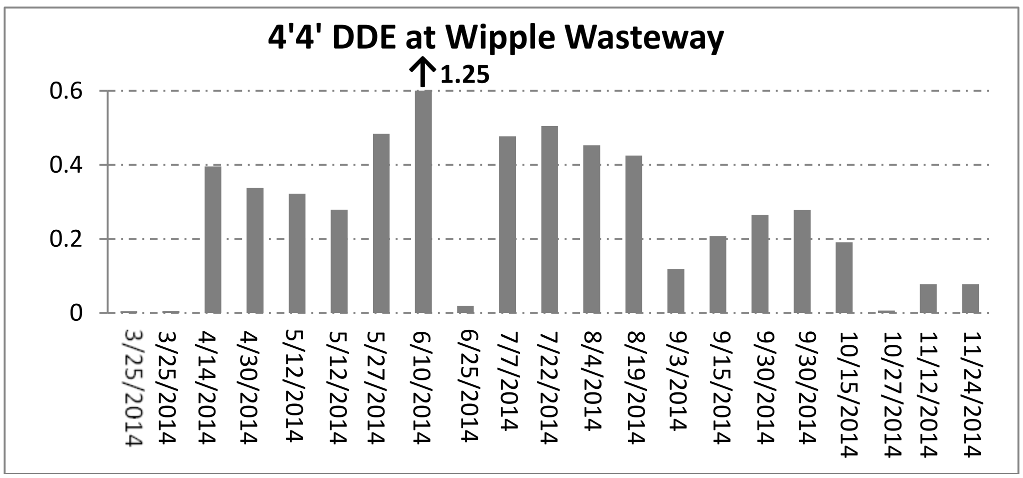
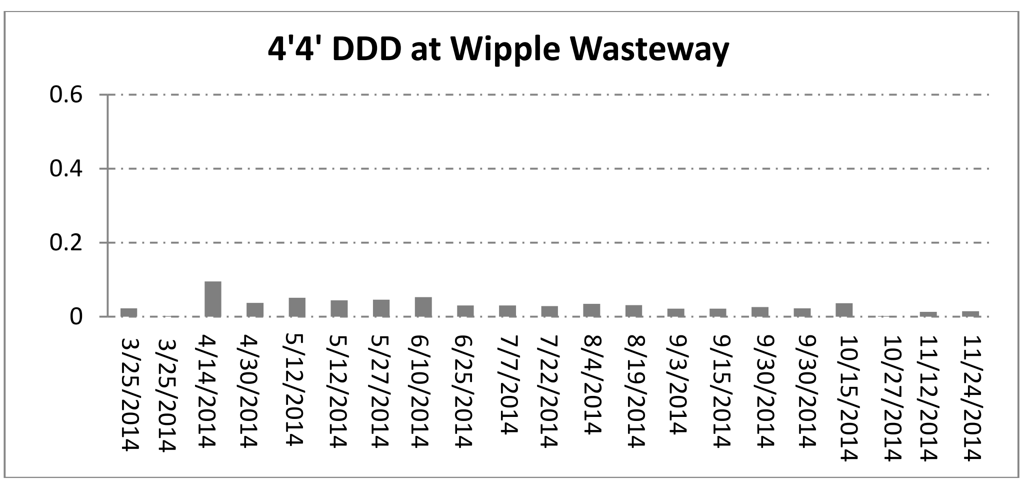


Figure A-1. Wipple Wasteway DDT Compound Results







Appendix B. Dieldrin Results

Figure B-1. Cherry Creek Dieldrin Results

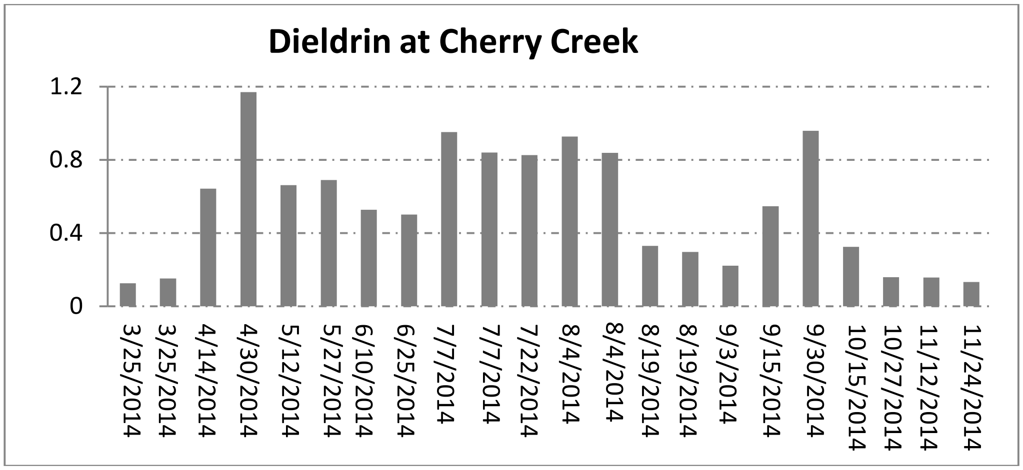
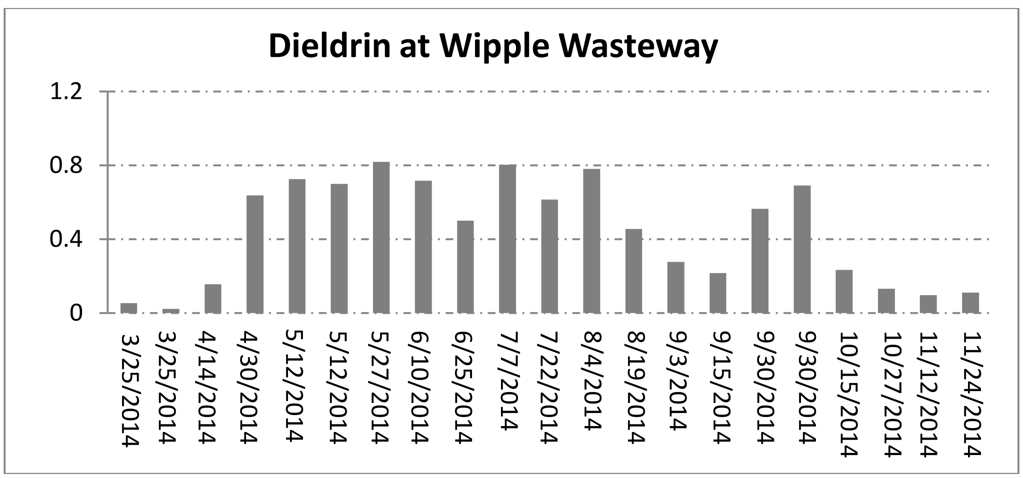


Figure B-2. Wipple Wasteway Dieldrin Results



Appendix C. Project Data

Table C-1. Field Sample, Blank, and Duplicate Results.

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1402017-05	Wipple	3/25/2014	o,p'-DDE	0.0033	ng/L	UJ	0.0033
1402017-05	Wipple	3/25/2014	p,p-DDE	0.0043	ng/L	UJ	0.0043
1402017-05	Wipple	3/25/2014	o,p'-DDD	0.0015	ng/L	UJ	0.0002
1402017-05	Wipple	3/25/2014	p,p-DDD	0.0223	ng/L	J	0.0002
1402017-05	Wipple	3/25/2014	o,p'-DDT	0.0021	ng/L	J	0.0003
1402017-05	Wipple	3/25/2014	p,p-DDT	0.0198	ng/L	NJ	0.0003
1402017-05	Wipple	3/25/2014	Dieldrin	0.0523	ng/L	UJ	0.005
1402017-06	Wipple[FB]	3/25/2014	o,p'-DDE	0.0041	ng/L	UJ	0.0041
1402017-06	Wipple[FB]	3/25/2014	p,p-DDE	0.0054	ng/L	UJ	0.0054
1402017-06	Wipple[FB]	3/25/2014	o,p'-DDD	0.0012	ng/L	NJ	0.0002
1402017-06	Wipple[FB]	3/25/2014	p,p-DDD	0.001	ng/L	NJ	0.0002
1402017-06	Wipple[FB]	3/25/2014	o,p'-DDT	0.0082	ng/L	UJ	0.0004
1402017-06	Wipple[FB]	3/25/2014	p,p-DDT	0.0133	ng/L	J	0.0005
1402017-06	Wipple[FB]	3/25/2014	Dieldrin	0.021	ng/L	UJ	0.008
1402017-03	Cherry	3/25/2014	o,p'-DDE	0.0018	ng/L	UJ	0.0018
1402017-03	Cherry	3/25/2014	p,p-DDE	0.131	ng/L	J	0.0024
1402017-03	Cherry	3/25/2014	o,p'-DDD	0.0169	ng/L	J	0.0002
1402017-03	Cherry	3/25/2014	p,p-DDD	0.0393	ng/L	J	0.0002
1402017-03	Cherry	3/25/2014	o,p'-DDT	0.0076	ng/L	J	0.0003
1402017-03	Cherry	3/25/2014	p,p-DDT	0.0233	ng/L	J	0.0003
1402017-03	Cherry	3/25/2014	Dieldrin	0.126	ng/L	J	0.006
1402017-04	Cherry[FD]	3/25/2014	o,p'-DDE	0.0033	ng/L	UJ	0.0033
1402017-04	Cherry[FD]	3/25/2014	p,p-DDE	0.128	ng/L	J	0.0043
1402017-04	Cherry[FD]	3/25/2014	o,p'-DDD	0.0173	ng/L	J	0.0003
1402017-04	Cherry[FD]	3/25/2014	p,p-DDD	0.0437	ng/L	J	0.0003
1402017-04	Cherry[FD]	3/25/2014	o,p'-DDT	0.0025	ng/L	UJ	0.0005
1402017-04	Cherry[FD]	3/25/2014	p,p-DDT	0.0286	ng/L	J	0.0005
1402017-04	Cherry[FD]	3/25/2014	Dieldrin	0.151	ng/L	J	0.007
1404041-01	Wipple	4/14/2014	o,p'-DDE	0.0073	ng/L	UJ	0.0073
1404041-01	Wipple	4/14/2014	p,p-DDE	0.396	ng/L		0.01
1404041-01	Wipple	4/14/2014	o,p'-DDD	0.035	ng/L	J	0.0012
1404041-01	Wipple	4/14/2014	p,p-DDD	0.0951	ng/L	J	0.0012
1404041-01	Wipple	4/14/2014	o,p'-DDT	0.0024	ng/L	UJ	0.0024
1404041-01	Wipple	4/14/2014	p,p-DDT	0.0743	ng/L	J	0.0027
1404041-01	Wipple	4/14/2014	Dieldrin	0.155	ng/L	NJ	0.0119
1404041-02	Cherry	4/14/2014	o,p'-DDE	0.007	ng/L	UJ	0.007
1404041-02	Cherry	4/14/2014	p,p-DDE	0.104	ng/L	J	0.0096

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1404041-02	Cherry	4/14/2014	o,p'-DDD	0.0178	ng/L	J	0.0012
1404041-02	Cherry	4/14/2014	p,p-DDD	0.0343	ng/L	J	0.0012
1404041-02	Cherry	4/14/2014	o,p'-DDT	0.0088	ng/L	UJ	0.0023
1404041-02	Cherry	4/14/2014	p,p-DDT	0.0511	ng/L	J	0.0026
1404041-02	Cherry	4/14/2014	Dieldrin	0.643	ng/L		0.0127
1404042-01	Wipple	4/30/2014	o,p'-DDE	0.0038	ng/L	UJ	0.0038
1404042-01	Wipple	4/30/2014	p,p-DDE	0.338	ng/L		0.0051
1404042-01	Wipple	4/30/2014	o,p'-DDD	0.015	ng/L	J	0.0006
1404042-01	Wipple	4/30/2014	p,p-DDD	0.196	ng/L	U	0.0006
1404042-01	Wipple	4/30/2014	o,p'-DDT	0.0091	ng/L	J	0.0009
1404042-01	Wipple	4/30/2014	p,p-DDT	0.0523	ng/L	J	0.0011
1404042-01	Wipple	4/30/2014	Dieldrin	0.637	ng/L		0.01
1404042-02	Cherry	4/30/2014	o,p'-DDE	0.0037	ng/L	UJ	0.0037
1404042-02	Cherry	4/30/2014	p,p-DDE	0.186	ng/L	J	0.0051
1404042-02	Cherry	4/30/2014	o,p'-DDD	0.0125	ng/L	J	0.0006
1404042-02	Cherry	4/30/2014	p,p-DDD	0.202	ng/L	U	0.0006
1404042-02	Cherry	4/30/2014	o,p'-DDT	0.0146	ng/L	J	0.001
1404042-02	Cherry	4/30/2014	p,p-DDT	0.0957	ng/L	J	0.0011
1404042-02	Cherry	4/30/2014	Dieldrin	1.17	ng/L		0.008
1405025-01	Wipple	5/12/2014	o,p'-DDE	0.0057	ng/L	UJ	0.0057
1405025-01	Wipple	5/12/2014	p,p-DDE	0.322	ng/L		0.0072
1405025-01	Wipple	5/12/2014	o,p'-DDD	0.0176	ng/L	J	0.0008
1405025-01	Wipple	5/12/2014	p,p-DDD	0.0509	ng/L	J	0.0008
1405025-01	Wipple	5/12/2014	o,p'-DDT	0.0015	ng/L	UJ	0.0015
1405025-01	Wipple	5/12/2014	p,p-DDT	0.245	ng/L		0.0016
1405025-01	Wipple	5/12/2014	Dieldrin	0.725	ng/L		0.0151
1405025-02	Wipple[FD]	5/12/2014	o,p'-DDE	0.0043	ng/L	UJ	0.0043
1405025-02	Wipple[FD]	5/12/2014	p,p-DDE	0.279	ng/L		0.0055
1405025-02	Wipple[FD]	5/12/2014	o,p'-DDD	0.0147	ng/L	J	0.0006
1405025-02	Wipple[FD]	5/12/2014	p,p-DDD	0.0434	ng/L	J	0.0006
1405025-02	Wipple[FD]	5/12/2014	o,p'-DDT	0.0107	ng/L	NJ	0.0011
1405025-02	Wipple[FD]	5/12/2014	p,p-DDT	0.063	ng/L	J	0.0012
1405025-02	Wipple[FD]	5/12/2014	Dieldrin	0.698	ng/L		0.0155
1405025-04	Cherry	5/12/2014	o,p'-DDE	0.0042	ng/L	UJ	0.0042
1405025-04	Cherry	5/12/2014	p,p-DDE	0.143	ng/L	J	0.0054
1405025-04	Cherry	5/12/2014	o,p'-DDD	0.0203	ng/L	J	0.0006
1405025-04	Cherry	5/12/2014	p,p-DDD	0.0377	ng/L	J	0.0006
1405025-04	Cherry	5/12/2014	o,p'-DDT	0.0163	ng/L	J	0.001
1405025-04	Cherry	5/12/2014	p,p-DDT	0.0788	ng/L	J	0.001
1405025-04	Cherry	5/12/2014	Dieldrin	0.661	ng/L		0.0147
1405026-01	Wipple	5/27/2014	o,p'-DDE	0.0052	ng/L	NJ	0.0015
1405026-01	Wipple	5/27/2014	p,p-DDE	0.484	ng/L		0.0019

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1405026-01	Wipple	5/27/2014	o,p'-DDD	0.0161	ng/L	J	0.0004
1405026-01	Wipple	5/27/2014	p,p-DDD	0.0455	ng/L	J	0.0003
1405026-01	Wipple	5/27/2014	o,p'-DDT	0.016	ng/L	J	0.0005
1405026-01	Wipple	5/27/2014	p,p-DDT	0.104	ng/L	J	0.0005
1405026-01	Wipple	5/27/2014	Dieldrin	0.818	ng/L		0.0085
1405026-02	Cherry	5/27/2014	o,p'-DDE	0.0079	ng/L	NJ	0.0016
1405026-02	Cherry	5/27/2014	p,p-DDE	0.3	ng/L		0.0019
1405026-02	Cherry	5/27/2014	o,p'-DDD	0.0178	ng/L	J	0.0004
1405026-02	Cherry	5/27/2014	p,p-DDD	0.2	ng/L	U	0.0003
1405026-02	Cherry	5/27/2014	o,p'-DDT	0.0199	ng/L	J	0.0005
1405026-02	Cherry	5/27/2014	p,p-DDT	0.178	ng/L	J	0.0005
1405026-02	Cherry	5/27/2014	Dieldrin	0.689	ng/L		0.0093
1406019-01	Wipple	6/10/2014	o,p'-DDE	0.0043	ng/L	UJ	0.0043
1406019-01	Wipple	6/10/2014	p,p-DDE	1.25	ng/L		0.0052
1406019-01	Wipple	6/10/2014	o,p'-DDD	0.0253	ng/L	J	0.0042
1406019-01	Wipple	6/10/2014	p,p-DDD	0.0527	ng/L		0.0039
1406019-01	Wipple	6/10/2014	o,p'-DDT	0.0189	ng/L	J	0.0072
1406019-01	Wipple	6/10/2014	p,p-DDT	0.133	ng/L		0.0065
1406019-01	Wipple	6/10/2014	Dieldrin	0.716	ng/L		0.0038
1406019-02	Cherry	6/10/2014	o,p'-DDE	0.0103	ng/L	J	0.0041
1406019-02	Cherry	6/10/2014	p,p-DDE	0.267	ng/L		0.0049
1406019-02	Cherry	6/10/2014	o,p'-DDD	0.0043	ng/L	UJ	0.0043
1406019-02	Cherry	6/10/2014	p,p-DDD	0.023	ng/L	NJ	0.0041
1406019-02	Cherry	6/10/2014	o,p'-DDT	0.0067	ng/L	UJ	0.0067
1406019-02	Cherry	6/10/2014	p,p-DDT	0.173	ng/L		0.0061
1406019-02	Cherry	6/10/2014	Dieldrin	0.528	ng/L		0.0038
1406020-01	Wipple	6/25/2014	o,p'-DDE	0.0158	ng/L	UJ	0.0158
1406020-01	Wipple	6/25/2014	p,p-DDE	0.0189	ng/L	UJ	0.0189
1406020-01	Wipple	6/25/2014	o,p'-DDD	0.017	ng/L	J	0.0021
1406020-01	Wipple	6/25/2014	p,p-DDD	0.0296	ng/L	J	0.0019
1406020-01	Wipple	6/25/2014	o,p'-DDT	0.0124	ng/L	UJ	0.0036
1406020-01	Wipple	6/25/2014	p,p-DDT	0.0521	ng/L	J	0.0032
1406020-01	Wipple	6/25/2014	Dieldrin	0.499	ng/L	J	0.0318
1406020-02	Cherry	6/25/2014	o,p'-DDE	0.0028	ng/L	NJ	0.0009
1406020-02	Cherry	6/25/2014	p,p-DDE	0.0909	ng/L	J	0.0011
1406020-02	Cherry	6/25/2014	o,p'-DDD	0.0019	ng/L	NJ	0.001
1406020-02	Cherry	6/25/2014	p,p-DDD	0.0245	ng/L	J	0.0009
1406020-02	Cherry	6/25/2014	o,p'-DDT	0.0102	ng/L	J	0.0014
1406020-02	Cherry	6/25/2014	p,p-DDT	0.0345	ng/L	J	0.0013
1406020-02	Cherry	6/25/2014	Dieldrin	0.501	ng/L	J	0.0157
1407022-01	Wipple	7/7/2014	o,p'-DDE	0.0023	ng/L	UJ	0.0023
1407022-01	Wipple	7/7/2014	p,p-DDE	0.477	ng/L		0.0029

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1407022-01	Wipple	7/7/2014	o,p'-DDD	0.0104	ng/L	J	0.0007
1407022-01	Wipple	7/7/2014	p,p-DDD	0.0296	ng/L	J	0.0007
1407022-01	Wipple	7/7/2014	o,p'-DDT	0.0134	ng/L	J	0.0012
1407022-01	Wipple	7/7/2014	p,p-DDT	0.0647	ng/L		0.0013
1407022-01	Wipple	7/7/2014	Dieldrin	0.802	ng/L		0.0116
1407022-02	Cherry	7/7/2014	o,p'-DDE	0.0032	ng/L	UJ	0.0032
1407022-02	Cherry	7/7/2014	p,p-DDE	0.193	ng/L		0.004
1407022-02	Cherry	7/7/2014	o,p'-DDD	0.018	ng/L	J	0.0009
1407022-02	Cherry	7/7/2014	p,p-DDD	0.0342	ng/L	J	0.001
1407022-02	Cherry	7/7/2014	o,p'-DDT	0.0176	ng/L	J	0.0017
1407022-02	Cherry	7/7/2014	p,p-DDT	0.0974	ng/L		0.0017
1407022-02	Cherry	7/7/2014	Dieldrin	0.952	ng/L		0.0126
1407022-03	Cherry[FD]	7/7/2014	o,p'-DDE	0.003	ng/L	UJ	0.003
1407022-03	Cherry[FD]	7/7/2014	p,p-DDE	0.173	ng/L		0.0037
1407022-03	Cherry[FD]	7/7/2014	o,p'-DDD	0.0181	ng/L	J	0.0009
1407022-03	Cherry[FD]	7/7/2014	p,p-DDD	0.0322	ng/L	J	0.0009
1407022-03	Cherry[FD]	7/7/2014	o,p'-DDT	0.0163	ng/L	J	0.0014
1407022-03	Cherry[FD]	7/7/2014	p,p-DDT	0.0931	ng/L		0.0014
1407022-03	Cherry[FD]	7/7/2014	Dieldrin	0.84	ng/L		0.0079
1407023-01	Wipple	7/22/2014	o,p'-DDE	0.0017	ng/L	UJ	0.0017
1407023-01	Wipple	7/22/2014	p,p-DDE	0.505	ng/L		0.0022
1407023-01	Wipple	7/22/2014	o,p'-DDD	0.0102	ng/L	NJ	0.0007
1407023-01	Wipple	7/22/2014	p,p-DDD	0.0283	ng/L	J	0.0007
1407023-01	Wipple	7/22/2014	o,p'-DDT	0.0014	ng/L	UJ	0.0014
1407023-01	Wipple	7/22/2014	p,p-DDT	0.0656	ng/L		0.0013
1407023-01	Wipple	7/22/2014	Dieldrin	0.614	ng/L		0.0055
1407023-02	Cherry	7/22/2014	o,p'-DDE	0.0023	ng/L	UJ	0.0023
1407023-02	Cherry	7/22/2014	p,p-DDE	0.15	ng/L		0.0029
1407023-02	Cherry	7/22/2014	o,p'-DDD	0.005	ng/L	J	0.0009
1407023-02	Cherry	7/22/2014	p,p-DDD	0.0212	ng/L	J	0.0009
1407023-02	Cherry	7/22/2014	o,p'-DDT	0.0131	ng/L	J	0.0016
1407023-02	Cherry	7/22/2014	p,p-DDT	0.0797	ng/L		0.0015
1407023-02	Cherry	7/22/2014	Dieldrin	0.826	ng/L		0.0074
1408022-01	Wipple	8/4/2014	o,p'-DDE	0.0017	ng/L	UJ	0.0017
1408022-01	Wipple	8/4/2014	p,p-DDE	0.453	ng/L		0.0022
1408022-01	Wipple	8/4/2014	o,p'-DDD	0.0003	ng/L	UJ	0.0003
1408022-01	Wipple	8/4/2014	p,p-DDD	0.0338	ng/L	J	0.0003
1408022-01	Wipple	8/4/2014	o,p'-DDT	0.0088	ng/L	J	0.0005
1408022-01	Wipple	8/4/2014	p,p-DDT	0.062	ng/L		0.0005
1408022-01	Wipple	8/4/2014	Dieldrin	0.781	ng/L		0.0087
1408022-02	Cherry[FD]	8/4/2014	o,p'-DDE	0.0037	ng/L	NJ	0.0033
1408022-02	Cherry[FD]	8/4/2014	p,p-DDE	0.115	ng/L		0.0042

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1408022-02	Cherry[FD]	8/4/2014	o,p'-DDD	0.0025	ng/L	NJ	0.0006
1408022-02	Cherry[FD]	8/4/2014	p,p-DDD	0.0179	ng/L	NJ	0.0006
1408022-02	Cherry[FD]	8/4/2014	o,p'-DDT	0.0038	ng/L	NJ	0.001
1408022-02	Cherry[FD]	8/4/2014	p,p-DDT	0.0202	ng/L	NJ	0.0009
1408022-02	Cherry[FD]	8/4/2014	Dieldrin	0.928	ng/L		0.0086
1408022-03	Wipple[FB]	8/4/2014	o,p'-DDE	0.0039	ng/L	UJ	0.0039
1408022-03	Wipple[FB]	8/4/2014	p,p-DDE	0.005	ng/L	UJ	0.005
1408022-03	Wipple[FB]	8/4/2014	o,p'-DDD	0.0008	ng/L	UJ	0.0008
1408022-03	Wipple[FB]	8/4/2014	p,p-DDD	0.0007	ng/L	UJ	0.0007
1408022-03	Wipple[FB]	8/4/2014	o,p'-DDT	0.0012	ng/L	UJ	0.0012
1408022-03	Wipple[FB]	8/4/2014	p,p-DDT	0.0063	ng/L	NJ	0.0011
1408022-03	Wipple[FB]	8/4/2014	Dieldrin	0.0267	ng/L	NJ	0.0098
1408022-04	Cherry	8/4/2014	o,p'-DDE	0.0025	ng/L	UJ	0.0025
1408022-04	Cherry	8/4/2014	p,p-DDE	0.166	ng/L		0.0032
1408022-04	Cherry	8/4/2014	o,p'-DDD	0.0113	ng/L	J	0.0005
1408022-04	Cherry	8/4/2014	p,p-DDD	0.0342	ng/L	J	0.0005
1408022-04	Cherry	8/4/2014	o,p'-DDT	0.0011	ng/L	NJ	0.0007
1408022-04	Cherry	8/4/2014	p,p-DDT	0.0548	ng/L		0.0007
1408022-04	Cherry	8/4/2014	Dieldrin	0.838	ng/L		0.0088
1408023-01	Wipple	8/19/2014	o,p'-DDE	0.0084	ng/L	UJ	0.0084
1408023-01	Wipple	8/19/2014	p,p-DDE	0.425	ng/L		0.0109
1408023-01	Wipple	8/19/2014	o,p'-DDD	0.0078	ng/L	J	0.0019
1408023-01	Wipple	8/19/2014	p,p-DDD	0.0309	ng/L	J	0.0018
1408023-01	Wipple	8/19/2014	o,p'-DDT	0.0155	ng/L	J	0.0027
1408023-01	Wipple	8/19/2014	p,p-DDT	0.0628	ng/L		0.0027
1408023-01	Wipple	8/19/2014	Dieldrin	0.454	ng/L		0.0063
1408023-03	Cherry	8/19/2014	o,p'-DDE	0.0062	ng/L	UJ	0.0062
1408023-03	Cherry	8/19/2014	p,p-DDE	0.173	ng/L		0.0081
1408023-03	Cherry	8/19/2014	o,p'-DDD	0.0089	ng/L	J	0.0015
1408023-03	Cherry	8/19/2014	p,p-DDD	0.0364	ng/L	J	0.0014
1408023-03	Cherry	8/19/2014	o,p'-DDT	0.0061	ng/L	J	0.002
1408023-03	Cherry	8/19/2014	p,p-DDT	0.0374	ng/L	J	0.002
1408023-03	Cherry	8/19/2014	Dieldrin	0.329	ng/L		0.0105
1408023-04	Cherry[FD]	8/19/2014	o,p'-DDE	0.0046	ng/L	UJ	0.0046
1408023-04	Cherry[FD]	8/19/2014	p,p-DDE	0.152	ng/L		0.0061
1408023-04	Cherry[FD]	8/19/2014	o,p'-DDD	0.0122	ng/L	J	0.001
1408023-04	Cherry[FD]	8/19/2014	p,p-DDD	0.0401	ng/L	J	0.001
1408023-04	Cherry[FD]	8/19/2014	o,p'-DDT	0.0045	ng/L	NJ	0.0014
1408023-04	Cherry[FD]	8/19/2014	p,p-DDT	0.0519	ng/L		0.0014
1408023-04	Cherry[FD]	8/19/2014	Dieldrin	0.296	ng/L		0.0051
1409019-01	Wipple	9/3/2014	o,p'-DDE	0.0058	ng/L	UJ	0.0058
1409019-01	Wipple	9/3/2014	p,p-DDE	0.119	ng/L		0.0076

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1409019-01	Wipple	9/3/2014	o,p'-DDD	0.007	ng/L	J	0.0013
1409019-01	Wipple	9/3/2014	p,p-DDD	0.0214	ng/L	J	0.0012
1409019-01	Wipple	9/3/2014	o,p'-DDT	0.004	ng/L	NJ	0.0018
1409019-01	Wipple	9/3/2014	p,p-DDT	0.0232	ng/L	J	0.0018
1409019-01	Wipple	9/3/2014	Dieldrin	0.276	ng/L		0.0095
1409019-02	Cherry	9/3/2014	o,p'-DDE	0.0056	ng/L	UJ	0.0056
1409019-02	Cherry	9/3/2014	p,p-DDE	0.101	ng/L		0.0073
1409019-02	Cherry	9/3/2014	o,p'-DDD	0.0075	ng/L	J	0.0013
1409019-02	Cherry	9/3/2014	p,p-DDD	0.0181	ng/L	J	0.0013
1409019-02	Cherry	9/3/2014	o,p'-DDT	0.0045	ng/L	NJ	0.0018
1409019-02	Cherry	9/3/2014	p,p-DDT	0.024	ng/L	J	0.0018
1409019-02	Cherry	9/3/2014	Dieldrin	0.221	ng/L		0.0098
1409020-01	Wipple	9/15/2014	o,p'-DDE	0.0021	ng/L	NJ	0.0008
1409020-01	Wipple	9/15/2014	p,p-DDE	0.207	ng/L		0.0011
1409020-01	Wipple	9/15/2014	o,p'-DDD	0.0081	ng/L	J	0.0002
1409020-01	Wipple	9/15/2014	p,p-DDD	0.0216	ng/L	J	0.0002
1409020-01	Wipple	9/15/2014	o,p'-DDT	0.0051	ng/L	J	0.0005
1409020-01	Wipple	9/15/2014	p,p-DDT	0.132	ng/L	U	0.0005
1409020-01	Wipple	9/15/2014	Dieldrin	0.215	ng/L		0.0028
1409020-02	Cherry	9/15/2014	o,p'-DDE	0.0032	ng/L	UJ	0.0032
1409020-02	Cherry	9/15/2014	p,p-DDE	0.103	ng/L		0.0042
1409020-02	Cherry	9/15/2014	o,p'-DDD	0.0067	ng/L	J	0.0014
1409020-02	Cherry	9/15/2014	p,p-DDD	0.0161	ng/L	J	0.0013
1409020-02	Cherry	9/15/2014	o,p'-DDT	0.0152	ng/L	J	0.0028
1409020-02	Cherry	9/15/2014	p,p-DDT	0.13	ng/L	U	0.0026
1409020-02	Cherry	9/15/2014	Dieldrin	0.546	ng/L		0.0028
1409021-01	Wipple	9/30/2014	o,p'-DDE	0.0059	ng/L	UJ	0.0059
1409021-01	Wipple	9/30/2014	p,p-DDE	0.265	ng/L		0.0076
1409021-01	Wipple	9/30/2014	o,p'-DDD	0.0081	ng/L	NJ	0.0023
1409021-01	Wipple	9/30/2014	p,p-DDD	0.0252	ng/L	J	0.0022
1409021-01	Wipple	9/30/2014	o,p'-DDT	0.0053	ng/L	UJ	0.0053
1409021-01	Wipple	9/30/2014	p,p-DDT	0.0254	ng/L	J	0.0049
1409021-01	Wipple	9/30/2014	Dieldrin	0.564	ng/L	U	0.0347
1409021-02	Wipple[FD]	9/30/2014	o,p'-DDE	0.0059	ng/L	UJ	0.0059
1409021-02	Wipple[FD]	9/30/2014	p,p-DDE	0.278	ng/L		0.0076
1409021-02	Wipple[FD]	9/30/2014	o,p'-DDD	0.014	ng/L	J	0.0025
1409021-02	Wipple[FD]	9/30/2014	p,p-DDD	0.0225	ng/L	J	0.0024
1409021-02	Wipple[FD]	9/30/2014	o,p'-DDT	0.0348	ng/L	J	0.005
1409021-02	Wipple[FD]	9/30/2014	p,p-DDT	0.0293	ng/L	J	0.0046
1409021-02	Wipple[FD]	9/30/2014	Dieldrin	0.69	ng/L	U	0.0428
1409021-03	Cherry	9/30/2014	o,p'-DDE	0.0051	ng/L	UJ	0.0051
1409021-03	Cherry	9/30/2014	p,p-DDE	0.259	ng/L		0.0066

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1409021-03	Cherry	9/30/2014	o,p'-DDD	0.0024	ng/L	UJ	0.0024
1409021-03	Cherry	9/30/2014	p,p-DDD	0.056	ng/L		0.0023
1409021-03	Cherry	9/30/2014	o,p'-DDT	0.0172	ng/L	NJ	0.0048
1409021-03	Cherry	9/30/2014	p,p-DDT	0.0495	ng/L		0.0045
1409021-03	Cherry	9/30/2014	Dieldrin	0.959	ng/L	U	0.0445
1410009-01	Wipple	10/15/2014	o,p'-DDE	0.0032	ng/L	UJ	0.0032
1410009-01	Wipple	10/15/2014	p,p-DDE	0.191	ng/L		0.0043
1410009-01	Wipple	10/15/2014	o,p'-DDD	0.0123	ng/L	J	0.0008
1410009-01	Wipple	10/15/2014	p,p-DDD	0.0358	ng/L	J	0.0008
1410009-01	Wipple	10/15/2014	o,p'-DDT	0.0206	ng/L	J	0.0012
1410009-01	Wipple	10/15/2014	p,p-DDT	0.0857	ng/L		0.0013
1410009-01	Wipple	10/15/2014	Dieldrin	0.233	ng/L		0.0147
1410009-02	Wipple[FB]	10/15/2014	o,p'-DDE	0.008	ng/L	UJ	0.008
1410009-02	Wipple[FB]	10/15/2014	p,p-DDE	0.0106	ng/L	UJ	0.0106
1410009-02	Wipple[FB]	10/15/2014	o,p'-DDD	0.0024	ng/L	UJ	0.0024
1410009-02	Wipple[FB]	10/15/2014	p,p-DDD	0.0025	ng/L	NJ	0.0025
1410009-02	Wipple[FB]	10/15/2014	o,p'-DDT	0.0041	ng/L	UJ	0.0041
1410009-02	Wipple[FB]	10/15/2014	p,p-DDT	0.012	ng/L	NJ	0.0043
1410009-02	Wipple[FB]	10/15/2014	Dieldrin	0.03	ng/L	UJ	0.03
1410009-03	Cherry	10/15/2014	o,p'-DDE	0.0058	ng/L	UJ	0.0058
1410009-03	Cherry	10/15/2014	p,p-DDE	0.208	ng/L		0.0076
1410009-03	Cherry	10/15/2014	o,p'-DDD	0.0049	ng/L	NJ	0.0017
1410009-03	Cherry	10/15/2014	p,p-DDD	0.0506	ng/L		0.0017
1410009-03	Cherry	10/15/2014	o,p'-DDT	0.0128	ng/L	J	0.0026
1410009-03	Cherry	10/15/2014	p,p-DDT	0.056	ng/L		0.0027
1410009-03	Cherry	10/15/2014	Dieldrin	0.324	ng/L		0.0202
1410010-01	Wipple	10/27/2014	o,p'-DDE	0.0046	ng/L	UJ	0.0046
1410010-01	Wipple	10/27/2014	p,p-DDE	0.0061	ng/L		0.0061
1410010-01	Wipple	10/27/2014	o,p'-DDD	0.0015	ng/L	UJ	0.0015
1410010-01	Wipple	10/27/2014	p,p-DDD	0.0016	ng/L	J	0.0016
1410010-01	Wipple	10/27/2014	o,p'-DDT	0.0022	ng/L	UJ	0.0022
1410010-01	Wipple	10/27/2014	p,p-DDT	0.0023	ng/L	J	0.0023
1410010-01	Wipple	10/27/2014	Dieldrin	0.131	ng/L		0.0167
1410010-02	Cherry	10/27/2014	o,p'-DDE	0.0072	ng/L	UJ	0.0072
1410010-02	Cherry	10/27/2014	p,p-DDE	0.0583	ng/L		0.0095
1410010-02	Cherry	10/27/2014	o,p'-DDD	0.016	ng/L	NJ	0.0024
1410010-02	Cherry	10/27/2014	p,p-DDD	0.0257	ng/L	J	0.0025
1410010-02	Cherry	10/27/2014	o,p'-DDT	0.0038	ng/L	UJ	0.0038
1410010-02	Cherry	10/27/2014	p,p-DDT	0.0178	ng/L	J	0.0039
1410010-02	Cherry	10/27/2014	Dieldrin	0.158	ng/L		0.0161
1411010-01	Wipple	11/12/2014	o,p'-DDE	0.0013	ng/L	UJ	0.0013
1411010-01	Wipple	11/12/2014	p,p-DDE	0.0771	ng/L		0.0016

MEL ID	Site	Sample Date	Parameter	Result	Unit	Qualifier	EDL (ng/L)
1411010-01	Wipple	11/12/2014	o,p'-DDD	0.0048	ng/L	J	0.0003
1411010-01	Wipple	11/12/2014	p,p-DDD	0.0123	ng/L	J	0.0003
1411010-01	Wipple	11/12/2014	o,p'-DDT	0.0006	ng/L	UJ	0.0006
1411010-01	Wipple	11/12/2014	p,p-DDT	0.0098	ng/L	J	0.0005
1411010-01	Wipple	11/12/2014	Dieldrin	0.0962	ng/L		0.0039
1411010-02	Cherry	11/12/2014	o,p'-DDE	0.002	ng/L	NJ	0.0014
1411010-02	Cherry	11/12/2014	p,p-DDE	0.0643	ng/L		0.0018
1411010-02	Cherry	11/12/2014	o,p'-DDD	0.0072	ng/L	J	0.0003
1411010-02	Cherry	11/12/2014	p,p-DDD	0.019	ng/L	J	0.0003
1411010-02	Cherry	11/12/2014	o,p'-DDT	0.0007	ng/L	UJ	0.0007
1411010-02	Cherry	11/12/2014	p,p-DDT	0.0168	ng/L	J	0.0006
1411010-02	Cherry	11/12/2014	Dieldrin	0.157	ng/L		0.0049
1411011-01	Wipple	11/24/2014	o,p'-DDE	0.0018	ng/L	UJ	0.0018
1411011-01	Wipple	11/24/2014	p,p-DDE	0.0776	ng/L		0.0023
1411011-01	Wipple	11/24/2014	o,p'-DDD	0.0047	ng/L	J	0.0004
1411011-01	Wipple	11/24/2014	p,p-DDD	0.0147	ng/L	J	0.0004
1411011-01	Wipple	11/24/2014	o,p'-DDT	0.0008	ng/L	UJ	0.0008
1411011-01	Wipple	11/24/2014	p,p-DDT	0.0064	ng/L	J	0.0007
1411011-01	Wipple	11/24/2014	Dieldrin	0.11	ng/L		0.0038
1411011-02	Cherry	11/24/2014	o,p'-DDE	0.0014	ng/L	UJ	0.0014
1411011-02	Cherry	11/24/2014	p,p-DDE	0.0553	ng/L		0.0017
1411011-02	Cherry	11/24/2014	o,p'-DDD	0.0075	ng/L	J	0.0003
1411011-02	Cherry	11/24/2014	p,p-DDD	0.0208	ng/L	J	0.0003
1411011-02	Cherry	11/24/2014	o,p'-DDT	0.0006	ng/L	UJ	0.0006
1411011-02	Cherry	11/24/2014	p,p-DDT	0.009	ng/L	J	0.0005
1411011-02	Cherry	11/24/2014	Dieldrin	0.132	ng/L		0.002

EDL = Estimated Detection Limit

[FD] Field Duplicate

[FB] Field Blank

Table C-2. Target Analyte Recovery and Blank Results.

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
BLANK	1402017	o,p'-DDE	0.0071	ng/L	UJ
BLANK	1402017	p,p-DDE	0.0093	ng/L	UJ
BLANK	1402017	o,p'-DDD	0.0017	ng/L	NJ
BLANK	1402017	p,p-DDD	0.0001	ng/L	UJ
BLANK	1402017	o,p'-DDT	0.0002	ng/L	UJ
BLANK	1402017	p,p-DDT	0.0003	ng/L	UJ
BLANK	1402017	Dieldrin	0.022	ng/L	UJ
SPIKE (LCS)	1402017	o,p'-DDE	99	%	
SPIKE (LCS)	1402017	p,p-DDE	87	%	
SPIKE (LCS)	1402017	o,p'-DDD	82	%	
SPIKE (LCS)	1402017	p,p-DDD	83	%	
SPIKE (LCS)	1402017	o,p'-DDT	87	%	
SPIKE (LCS)	1402017	p,p-DDT	89	%	
SPIKE (LCS)	1402017	Dieldrin	107	%	
BLANK	1404041	o,p'-DDE	0.0058	ng/L	UJ
BLANK	1404041	p,p-DDE	0.0078	ng/L	UJ
BLANK	1404041	o,p'-DDD	0.0009	ng/L	UJ
BLANK	1404041	p,p-DDD	0.0009	ng/L	UJ
BLANK	1404041	o,p'-DDT	0.0016	ng/L	UJ
BLANK	1404041	p,p-DDT	0.0018	ng/L	UJ
BLANK	1404041	Dieldrin	0.0077	ng/L	UJ
SPIKE (LCS)	1404041	o,p'-DDE	105	%	
SPIKE (LCS)	1404041	p,p-DDE	103	%	
SPIKE (LCS)	1404041	o,p'-DDD	106	%	
SPIKE (LCS)	1404041	p,p-DDD	111	%	
SPIKE (LCS)	1404041	o,p'-DDT	105	%	
SPIKE (LCS)	1404041	p,p-DDT	112	%	
SPIKE (LCS)	1404041	Dieldrin	95	%	
BLANK	1404042	o,p'-DDE	0.0043	ng/L	UJ
BLANK	1404042	p,p-DDE	0.0058	ng/L	UJ
BLANK	1404042	o,p'-DDD	0.0007	ng/L	UJ
BLANK	1404042	p,p-DDD	0.0043	ng/L	J
BLANK	1404042	o,p'-DDT	0.001	ng/L	UJ
BLANK	1404042	p,p-DDT	0.0012	ng/L	UJ
BLANK	1404042	Dieldrin	0.029	ng/L	J
SPIKE (LCS)	1404042	o,p'-DDE	86	%	
SPIKE (LCS)	1404042	p,p-DDE	88	%	
SPIKE (LCS)	1404042	o,p'-DDD	91	%	
SPIKE (LCS)	1404042	p,p-DDD	94	%	
SPIKE (LCS)	1404042	o,p'-DDT	80	%	
SPIKE (LCS)	1404042	p,p-DDT	93	%	

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
SPIKE (LCS)	1404042	Dieldrin	91	%	
BLANK	1405025	o,p'-DDE	0.0048	ng/L	UJ
BLANK	1405025	p,p-DDE	0.0061	ng/L	UJ
BLANK	1405025	o,p'-DDD	0.0006	ng/L	UJ
BLANK	1405025	p,p-DDD	0.0022	ng/L	NJ
BLANK	1405025	o,p'-DDT	0.0012	ng/L	UJ
BLANK	1405025	p,p-DDT	0.0013	ng/L	UJ
BLANK	1405025	Dieldrin	0.0098	ng/L	UJ
SPIKE (LCS)	1405025	o,p'-DDE	87	%	
SPIKE (LCS)	1405025	p,p-DDE	82	%	
SPIKE (LCS)	1405025	o,p'-DDD	85	%	
SPIKE (LCS)	1405025	p,p-DDD	82	%	
SPIKE (LCS)	1405025	o,p'-DDT	81	%	
SPIKE (LCS)	1405025	p,p-DDT	82	%	
SPIKE (LCS)	1405025	Dieldrin	84	%	
BLANK	1405026	o,p'-DDE	0.0029	ng/L	UJ
BLANK	1405026	p,p-DDE	0.0036	ng/L	UJ
BLANK	1405026	o,p'-DDD	0.0006	ng/L	UJ
BLANK	1405026	p,p-DDD	0.0038	ng/L	J
BLANK	1405026	o,p'-DDT	0.0034	ng/L	NJ
BLANK	1405026	p,p-DDT	0.001	ng/L	UJ
BLANK	1405026	Dieldrin	0.0074	ng/L	UJ
SPIKE (LCS)	1405026	o,p'-DDE	99	%	
SPIKE (LCS)	1405026	p,p-DDE	99	%	
SPIKE (LCS)	1405026	o,p'-DDD	73	%	
SPIKE (LCS)	1405026	p,p-DDD	96	%	
SPIKE (LCS)	1405026	o,p'-DDT	129	%	
SPIKE (LCS)	1405026	p,p-DDT	99	%	
SPIKE (LCS)	1405026	Dieldrin	97	%	
BLANK	1406019	o,p'-DDE	0.0037	ng/L	UJ
BLANK	1406019	p,p-DDE	0.0045	ng/L	UJ
BLANK	1406019	o,p'-DDD	0.0033	ng/L	UJ
BLANK	1406019	p,p-DDD	0.0031	ng/L	UJ
BLANK	1406019	o,p'-DDT	0.0057	ng/L	UJ
BLANK	1406019	p,p-DDT	0.0178	ng/L	NJ
BLANK	1406019	Dieldrin	0.0044	ng/L	UJ
SPIKE (LCS)	1406019	o,p'-DDE	107	%	
SPIKE (LCS)	1406019	p,p-DDE	99	%	
SPIKE (LCS)	1406019	o,p'-DDD	114	%	
SPIKE (LCS)	1406019	p,p-DDD	104	%	
SPIKE (LCS)	1406019	o,p'-DDT	115	%	
SPIKE (LCS)	1406019	p,p-DDT	98	%	
SPIKE (LCS)	1406019	Dieldrin	87	%	

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
BLANK	1406020	o,p'-DDE	0.0018	ng/L	UJ
BLANK	1406020	p,p-DDE	0.0021	ng/L	UJ
BLANK	1406020	o,p'-DDD	0.0017	ng/L	UJ
BLANK	1406020	p,p-DDD	0.0016	ng/L	UJ
BLANK	1406020	o,p'-DDT	0.0027	ng/L	UJ
BLANK	1406020	p,p-DDT	0.0024	ng/L	UJ
BLANK	1406020	Dieldrin	0.0039	ng/L	UJ
SPIKE (LCS)	1406020	o,p'-DDE	90	%	
SPIKE (LCS)	1406020	p,p-DDE	84	%	
SPIKE (LCS)	1406020	o,p'-DDD	100	%	
SPIKE (LCS)	1406020	p,p-DDD	94	%	
SPIKE (LCS)	1406020	o,p'-DDT	101	%	
SPIKE (LCS)	1406020	p,p-DDT	89	%	
SPIKE (LCS)	1406020	Dieldrin	83	%	
BLANK	1407022	o,p'-DDE	0.0027	ng/L	UJ
BLANK	1407022	p,p-DDE	0.0033	ng/L	UJ
BLANK	1407022	o,p'-DDD	0.0009	ng/L	UJ
BLANK	1407022	p,p-DDD	0.0009	ng/L	UJ
BLANK	1407022	o,p'-DDT	0.0014	ng/L	UJ
BLANK	1407022	p,p-DDT	0.0015	ng/L	UJ
BLANK	1407022	Dieldrin	0.0295	ng/L	NJ
SPIKE (LCS)	1407022	o,p'-DDE	81	%	
SPIKE (LCS)	1407022	p,p-DDE	72	%	
SPIKE (LCS)	1407022	o,p'-DDD	79	%	
SPIKE (LCS)	1407022	p,p-DDD	77	%	
SPIKE (LCS)	1407022	o,p'-DDT	78	%	
SPIKE (LCS)	1407022	p,p-DDT	76	%	
SPIKE (LCS)	1407022	Dieldrin	75	%	
BLANK	1407023	o,p'-DDE	0.0015	ng/L	UJ
BLANK	1407023	p,p-DDE	0.002	ng/L	UJ
BLANK	1407023	o,p'-DDD	0.0006	ng/L	UJ
BLANK	1407023	p,p-DDD	0.0046	ng/L	NJ
BLANK	1407023	o,p'-DDT	0.0012	ng/L	UJ
BLANK	1407023	p,p-DDT	0.0058	ng/L	NJ
BLANK	1407023	Dieldrin	0.065	ng/L	NJ
SPIKE (LCS)	1407023	o,p'-DDE	83	%	
SPIKE (LCS)	1407023	p,p-DDE	76	%	
SPIKE (LCS)	1407023	o,p'-DDD	83	%	
SPIKE (LCS)	1407023	p,p-DDD	79	%	
SPIKE (LCS)	1407023	o,p'-DDT	82	%	
SPIKE (LCS)	1407023	p,p-DDT	80	%	
SPIKE (LCS)	1407023	Dieldrin	73	%	
BLANK	1408022	o,p'-DDE	0.0038	ng/L	UJ

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
BLANK	1408022	p,p-DDE	0.0049	ng/L	UJ
BLANK	1408022	o,p'-DDD	0.0009	ng/L	UJ
BLANK	1408022	p,p-DDD	0.0037	ng/L	NJ
BLANK	1408022	o,p'-DDT	0.0018	ng/L	NJ
BLANK	1408022	p,p-DDT	0.0031	ng/L	NJ
BLANK	1408022	Dieldrin	0.0085	ng/L	UJ
SPIKE (LCS)	1408022	o,p'-DDE	83	%	
SPIKE (LCS)	1408022	p,p-DDE	75	%	
SPIKE (LCS)	1408022	o,p'-DDD	88	%	
SPIKE (LCS)	1408022	p,p-DDD	80	%	
SPIKE (LCS)	1408022	o,p'-DDT	67	%	
SPIKE (LCS)	1408022	p,p-DDT	81	%	
SPIKE (LCS)	1408022	Dieldrin	80	%	
BLANK	1408023	o,p'-DDE	0.0058	ng/L	UJ
BLANK	1408023	p,p-DDE	0.0076	ng/L	UJ
BLANK	1408023	o,p'-DDD	0.0014	ng/L	UJ
BLANK	1408023	p,p-DDD	0.0013	ng/L	UJ
BLANK	1408023	o,p'-DDT	0.002	ng/L	UJ
BLANK	1408023	p,p-DDT	0.002	ng/L	UJ
BLANK	1408023	Dieldrin	0.0074	ng/L	UJ
SPIKE (LCS)	1408023	o,p'-DDE	86	%	
SPIKE (LCS)	1408023	p,p-DDE	84	%	
SPIKE (LCS)	1408023	o,p'-DDD	84	%	
SPIKE (LCS)	1408023	p,p-DDD	86	%	
SPIKE (LCS)	1408023	o,p'-DDT	80	%	
SPIKE (LCS)	1408023	p,p-DDT	82	%	
SPIKE (LCS)	1408023	Dieldrin	84	%	
BLANK	1409019	o,p'-DDE	0.0053	ng/L	UJ
BLANK	1409019	p,p-DDE	0.0069	ng/L	UJ
BLANK	1409019	o,p'-DDD	0.0013	ng/L	UJ
BLANK	1409019	p,p-DDD	0.0013	ng/L	UJ
BLANK	1409019	o,p'-DDT	0.0043	ng/L	NJ
BLANK	1409019	p,p-DDT	0.004	ng/L	NJ
BLANK	1409019	Dieldrin	0.0093	ng/L	UJ
SPIKE (LCS)	1409019	o,p'-DDE	82	%	
SPIKE (LCS)	1409019	p,p-DDE	83	%	
SPIKE (LCS)	1409019	o,p'-DDD	82	%	
SPIKE (LCS)	1409019	p,p-DDD	90	%	
SPIKE (LCS)	1409019	o,p'-DDT	81	%	
SPIKE (LCS)	1409019	p,p-DDT	87	%	
SPIKE (LCS)	1409019	Dieldrin	80	%	
BLANK	1409020	o,p'-DDE	0.0008	ng/L	UJ
BLANK	1409020	p,p-DDE	0.0011	ng/L	UJ

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
BLANK	1409020	o,p'-DDD	0.0002	ng/L	UJ
BLANK	1409020	p,p-DDD	0.0028	ng/L	NJ
BLANK	1409020	o,p'-DDT	0.0004	ng/L	UJ
BLANK	1409020	p,p-DDT	0.0755	ng/L	
BLANK	1409020	Dieldrin	0.0028	ng/L	UJ
SPIKE (LCS)	1409020	o,p'-DDE	71	%	
SPIKE (LCS)	1409020	p,p-DDE	73	%	
SPIKE (LCS)	1409020	o,p'-DDD	75	%	
SPIKE (LCS)	1409020	p,p-DDD	78	%	
SPIKE (LCS)	1409020	o,p'-DDT	70	%	
SPIKE (LCS)	1409020	p,p-DDT	72	%	
SPIKE (LCS)	1409020	Dieldrin	63	%	
BLANK	1409021	o,p'-DDE	0.0058	ng/L	UJ
BLANK	1409021	p,p-DDE	0.0076	ng/L	UJ
BLANK	1409021	o,p'-DDD	0.0023	ng/L	UJ
BLANK	1409021	p,p-DDD	0.0022	ng/L	UJ
BLANK	1409021	o,p'-DDT	0.0053	ng/L	UJ
BLANK	1409021	p,p-DDT	0.0049	ng/L	UJ
BLANK	1409021	Dieldrin	0.265	ng/L	
SPIKE (LCS)	1409021	o,p'-DDE	116	%	
SPIKE (LCS)	1409021	p,p-DDE	110	%	
SPIKE (LCS)	1409021	o,p'-DDD	111	%	
SPIKE (LCS)	1409021	p,p-DDD	111	%	
SPIKE (LCS)	1409021	o,p'-DDT	119	%	
SPIKE (LCS)	1409021	p,p-DDT	107	%	
SPIKE (LCS)	1409021	Dieldrin	138	%	
BLANK	1410009	o,p'-DDE	0.0047	ng/L	UJ
BLANK	1410009	p,p-DDE	0.0062	ng/L	UJ
BLANK	1410009	o,p'-DDD	0.0012	ng/L	UJ
BLANK	1410009	p,p-DDD	0.0013	ng/L	UJ
BLANK	1410009	o,p'-DDT	0.0018	ng/L	UJ
BLANK	1410009	p,p-DDT	0.0019	ng/L	UJ
BLANK	1410009	Dieldrin	0.0269	ng/L	UJ
SPIKE (LCS)	1410009	o,p'-DDE	95	%	
SPIKE (LCS)	1410009	p,p-DDE	98	%	
SPIKE (LCS)	1410009	o,p'-DDD	96	%	
SPIKE (LCS)	1410009	p,p-DDD	102	%	
SPIKE (LCS)	1410009	o,p'-DDT	91	%	
SPIKE (LCS)	1410009	p,p-DDT	103	%	
SPIKE (LCS)	1410009	Dieldrin	104	%	
BLANK	1410010	o,p'-DDE	0.012	ng/L	UJ
BLANK	1410010	p,p-DDE	0.0159	ng/L	UJ
BLANK	1410010	o,p'-DDD	0.0034	ng/L	UJ

Sample Type	Batch #	Parameter	Result	Unit	Qualifier
BLANK	1410010	p,p-DDD	0.0035	ng/L	UJ
BLANK	1410010	o,p'-DDT	0.006	ng/L	UJ
BLANK	1410010	p,p-DDT	0.0062	ng/L	UJ
BLANK	1410010	Dieldrin	0.0156	ng/L	UJ
SPIKE (LCS)	1410010	o,p'-DDE	93	%	
SPIKE (LCS)	1410010	p,p-DDE	94	%	
SPIKE (LCS)	1410010	o,p'-DDD	92	%	
SPIKE (LCS)	1410010	p,p-DDD	96	%	
SPIKE (LCS)	1410010	o,p'-DDT	89	%	
SPIKE (LCS)	1410010	p,p-DDT	99	%	
SPIKE (LCS)	1410010	Dieldrin	98	%	
BLANK	1411010	o,p'-DDE	0.0013	ng/L	UJ
BLANK	1411010	p,p-DDE	0.0017	ng/L	UJ
BLANK	1411010	o,p'-DDD	0.0004	ng/L	UJ
BLANK	1411010	p,p-DDD	0.0004	ng/L	UJ
BLANK	1411010	o,p'-DDT	0.0007	ng/L	UJ
BLANK	1411010	p,p-DDT	0.0006	ng/L	UJ
BLANK	1411010	Dieldrin	0.004	ng/L	UJ
SPIKE (LCS)	1411010	o,p'-DDE	94	%	
SPIKE (LCS)	1411010	p,p-DDE	97	%	
SPIKE (LCS)	1411010	o,p'-DDD	94	%	
SPIKE (LCS)	1411010	p,p-DDD	98	%	
SPIKE (LCS)	1411010	o,p'-DDT	95	%	
SPIKE (LCS)	1411010	p,p-DDT	95	%	
SPIKE (LCS)	1411010	Dieldrin	96	%	
BLANK	1411011	o,p'-DDE	0.0012	ng/L	UJ
BLANK	1411011	p,p-DDE	0.0016	ng/L	UJ
BLANK	1411011	o,p'-DDD	0.0003	ng/L	UJ
BLANK	1411011	p,p-DDD	0.0003	ng/L	UJ
BLANK	1411011	o,p'-DDT	0.0005	ng/L	UJ
BLANK	1411011	p,p-DDT	0.0005	ng/L	UJ
BLANK	1411011	Dieldrin	0.0038	ng/L	UJ
SPIKE (LCS)	1411011	o,p'-DDE	99	%	
SPIKE (LCS)	1411011	p,p-DDE	99	%	
SPIKE (LCS)	1411011	o,p'-DDD	92	%	
SPIKE (LCS)	1411011	p,p-DDD	97	%	
SPIKE (LCS)	1411011	o,p'-DDT	96	%	
SPIKE (LCS)	1411011	p,p-DDT	94	%	
SPIKE (LCS)	1411011	Dieldrin	92	%	

Table C-3. Internal Standard Recoveries and Blank Results.

MEL ID	Site	Parameter	Result	Unit	MEL ID	Site	Parameter	Result	Unit
1402017-05	Wipple	13C12-p,p-DDE	72	%	1408022-01	Wipple	13C12-p,p-DDE	86	%
1402017-05	Wipple	13C12-p,p-DDD	101	%	1408022-01	Wipple	13C12-p,p-DDD	97	%
1402017-05	Wipple	13C12-p,p-DDT	95	%	1408022-01	Wipple	13C12-p,p-DDT	82	%
1402017-05	Wipple	13C12-Dieldrin	68	%	1408022-01	Wipple	13C12-Dieldrin	123	%
1402017-06	Wipple	13C12-p,p-DDE	65	%	1408022-02	Cherry	13C12-p,p-DDE	88	%
1402017-06	Wipple	13C12-p,p-DDD	130	%	1408022-02	Cherry	13C12-p,p-DDD	92	%
1402017-06	Wipple	13C12-p,p-DDT	95	%	1408022-02	Cherry	13C12-p,p-DDT	74	%
1402017-06	Wipple	13C12-Dieldrin	77	%	1408022-02	Cherry	13C12-Dieldrin	124	%
1402017-03	Cherry	13C12-p,p-DDE	97	%	1408022-03	Wipple	13C12-p,p-DDE	89	%
1402017-03	Cherry	13C12-p,p-DDD	129	%	1408022-03	Wipple	13C12-p,p-DDD	92	%
1402017-03	Cherry	13C12-p,p-DDT	129	%	1408022-03	Wipple	13C12-p,p-DDT	73	%
1402017-03	Cherry	13C12-Dieldrin	86	%	1408022-03	Wipple	13C12-Dieldrin	117	%
1402017-04	Cherry	13C12-p,p-DDE	106	%	1408022-04	Cherry	13C12-p,p-DDE	83	%
1402017-04	Cherry	13C12-p,p-DDD	148	%	1408022-04	Cherry	13C12-p,p-DDD	111	%
1402017-04	Cherry	13C12-p,p-DDT	131	%	1408022-04	Cherry	13C12-p,p-DDT	98	%
1402017-04	Cherry	13C12-Dieldrin	106	%	1408022-04	Cherry	13C12-Dieldrin	116	%
BLANK	1402017	13C12-p,p-DDE	63	%	BLANK	1408022	13C12-p,p-DDE	80	%
BLANK	1402017	13C12-p,p-DDD	87	%	BLANK	1408022	13C12-p,p-DDD	92	%
BLANK	1402017	13C12-p,p-DDT	63	%	BLANK	1408022	13C12-p,p-DDT	68	%
BLANK	1402017	13C12-Dieldrin	98	%	BLANK	1408022	13C12-Dieldrin	115	%
SPIKE (LCS)	1402017	13C12-p,p-DDE	71	%	SPIKE (LCS)	1408022	13C12-p,p-DDE	88	%
SPIKE (LCS)	1402017	13C12-p,p-DDD	85	%	SPIKE (LCS)	1408022	13C12-p,p-DDD	100	%
SPIKE (LCS)	1402017	13C12-p,p-DDT	70	%	SPIKE (LCS)	1408022	13C12-p,p-DDT	101	%
SPIKE (LCS)	1402017	13C12-Dieldrin	84	%	SPIKE (LCS)	1408022	13C12-Dieldrin	117	%
1404041-01	Wipple	13C12-p,p-DDE	64	%	1408023-01	Wipple	13C12-p,p-DDE	96	%
1404041-01	Wipple	13C12-p,p-DDD	80	%	1408023-01	Wipple	13C12-p,p-DDD	122	%
1404041-01	Wipple	13C12-p,p-DDT	49	%	1408023-01	Wipple	13C12-p,p-DDT	115	%
1404041-01	Wipple	13C12-Dieldrin	83	%	1408023-01	Wipple	13C12-Dieldrin	119	%
1404041-02	Cherry	13C12-p,p-DDE	62	%	1408023-03	Cherry	13C12-p,p-DDE	100	%
1404041-02	Cherry	13C12-p,p-DDD	76	%	1408023-03	Cherry	13C12-p,p-DDD	122	%
1404041-02	Cherry	13C12-p,p-DDT	48	%	1408023-03	Cherry	13C12-p,p-DDT	121	%
1404041-02	Cherry	13C12-Dieldrin	93	%	1408023-03	Cherry	13C12-Dieldrin	125	%
BLANK	1404041	13C12-p,p-DDE	59	%	1408023-04	Cherry	13C12-p,p-DDE	87	%
BLANK	1404041	13C12-p,p-DDD	74	%	1408023-04	Cherry	13C12-p,p-DDD	119	%
BLANK	1404041	13C12-p,p-DDT	54	%	1408023-04	Cherry	13C12-p,p-DDT	119	%
BLANK	1404041	13C12-Dieldrin	79	%	1408023-04	Cherry	13C12-Dieldrin	119	%
SPIKE (LCS)	1404041	13C12-p,p-DDE	48	%	BLANK	1408023	13C12-p,p-DDE	111	%
SPIKE (LCS)	1404041	13C12-p,p-DDD	64	%	BLANK	1408023	13C12-p,p-DDD	142	%
SPIKE (LCS)	1404041	13C12-p,p-DDT	41	%	BLANK	1408023	13C12-p,p-DDT	136	%
SPIKE (LCS)	1404041	13C12-Dieldrin	79	%	BLANK	1408023	13C12-Dieldrin	109	%
1404042-01	Wipple	13C12-p,p-DDE	68	%	SPIKE (LCS)	1408023	13C12-p,p-DDE	92	%

MEL ID	Site	Parameter	Result	Unit	MEL ID	Site	Parameter	Result	Unit
1404042-01	Wipple	13C12-p,p-DDD	75	%	SPIKE (LCS)	1408023	13C12-p,p-DDD	118	%
1404042-01	Wipple	13C12-p,p-DDT	68	%	SPIKE (LCS)	1408023	13C12-p,p-DDT	122	%
1404042-01	Wipple	13C12-Dieldrin	100	%	SPIKE (LCS)	1408023	13C12-Dieldrin	120	%
1404042-02	Cherry	13C12-p,p-DDE	69	%	1409019-01	Wipple	13C12-p,p-DDE	103	%
1404042-02	Cherry	13C12-p,p-DDD	72	%	1409019-01	Wipple	13C12-p,p-DDD	125	%
1404042-02	Cherry	13C12-p,p-DDT	68	%	1409019-01	Wipple	13C12-p,p-DDT	130	%
1404042-02	Cherry	13C12-Dieldrin	91	%	1409019-01	Wipple	13C12-Dieldrin	121	%
BLANK	1404042	13C12-p,p-DDE	66	%	1409019-02	Cherry	13C12-p,p-DDE	105	%
BLANK	1404042	13C12-p,p-DDD	73	%	1409019-02	Cherry	13C12-p,p-DDD	125	%
BLANK	1404042	13C12-p,p-DDT	67	%	1409019-02	Cherry	13C12-p,p-DDT	121	%
BLANK	1404042	13C12-Dieldrin	100	%	1409019-02	Cherry	13C12-Dieldrin	128	%
SPIKE (LCS)	1404042	13C12-p,p-DDE	72	%	BLANK	1409019	13C12-p,p-DDE	104	%
SPIKE (LCS)	1404042	13C12-p,p-DDD	72	%	BLANK	1409019	13C12-p,p-DDD	127	%
SPIKE (LCS)	1404042	13C12-p,p-DDT	70	%	BLANK	1409019	13C12-p,p-DDT	126	%
SPIKE (LCS)	1404042	13C12-Dieldrin	90	%	BLANK	1409019	13C12-Dieldrin	125	%
1405025-01	Wipple	13C12-p,p-DDE	79	%	SPIKE (LCS)	1409019	13C12-p,p-DDE	88	%
1405025-01	Wipple	13C12-p,p-DDD	113	%	SPIKE (LCS)	1409019	13C12-p,p-DDD	111	%
1405025-01	Wipple	13C12-p,p-DDT	104	%	SPIKE (LCS)	1409019	13C12-p,p-DDT	115	%
1405025-01	Wipple	13C12-Dieldrin	92	%	SPIKE (LCS)	1409019	13C12-Dieldrin	102	%
1405025-02	Wipple	13C12-p,p-DDE	82	%	1409020-01	Wipple	13C12-p,p-DDE	122	%
1405025-02	Wipple	13C12-p,p-DDD	114	%	1409020-01	Wipple	13C12-p,p-DDD	144	%
1405025-02	Wipple	13C12-p,p-DDT	111	%	1409020-01	Wipple	13C12-p,p-DDT	133	%
1405025-02	Wipple	13C12-Dieldrin	90	%	1409020-01	Wipple	13C12-Dieldrin	135	%
1405025-04	Cherry	13C12-p,p-DDE	72	%	1409020-02	Cherry	13C12-p,p-DDE	109	%
1405025-04	Cherry	13C12-p,p-DDD	105	%	1409020-02	Cherry	13C12-p,p-DDD	149	%
1405025-04	Cherry	13C12-p,p-DDT	107	%	1409020-02	Cherry	13C12-p,p-DDT	131	%
1405025-04	Cherry	13C12-Dieldrin	104	%	1409020-02	Cherry	13C12-Dieldrin	137	%
BLANK	1405025	13C12-p,p-DDE	65	%	BLANK	1409020	13C12-p,p-DDE	104	%
BLANK	1405025	13C12-p,p-DDD	101	%	BLANK	1409020	13C12-p,p-DDD	129	%
BLANK	1405025	13C12-p,p-DDT	89	%	BLANK	1409020	13C12-p,p-DDT	127	%
BLANK	1405025	13C12-Dieldrin	106	%	BLANK	1409020	13C12-Dieldrin	126	%
SPIKE (LCS)	1405025	13C12-p,p-DDE	68	%	SPIKE (LCS)	1409020	13C12-p,p-DDE	106	%
SPIKE (LCS)	1405025	13C12-p,p-DDD	91	%	SPIKE (LCS)	1409020	13C12-p,p-DDD	135	%
SPIKE (LCS)	1405025	13C12-p,p-DDT	87	%	SPIKE (LCS)	1409020	13C12-p,p-DDT	143	%
SPIKE (LCS)	1405025	13C12-Dieldrin	97	%	SPIKE (LCS)	1409020	13C12-Dieldrin	117	%
1405026-01	Wipple	13C12-p,p-DDE	81	%	1409021-01	Wipple	13C12-p,p-DDE	71	%
1405026-01	Wipple	13C12-p,p-DDD	88	%	1409021-01	Wipple	13C12-p,p-DDD	101	%
1405026-01	Wipple	13C12-p,p-DDT	76	%	1409021-01	Wipple	13C12-p,p-DDT	74	%
1405026-01	Wipple	13C12-Dieldrin	109	%	1409021-01	Wipple	13C12-Dieldrin	47	%
1405026-02	Cherry	13C12-p,p-DDE	85	%	1409021-02	Wipple	13C12-p,p-DDE	69	%
1405026-02	Cherry	13C12-p,p-DDD	90	%	1409021-02	Wipple	13C12-p,p-DDD	96	%
1405026-02	Cherry	13C12-p,p-DDT	82	%	1409021-02	Wipple	13C12-p,p-DDT	78	%

MEL ID	Site	Parameter	Result	Unit
1405026-02	Cherry	13C12-Dieldrin	108	%
BLANK	1405026	13C12-p,p-DDE	82	%
BLANK	1405026	13C12-p,p-DDD	89	%
BLANK	1405026	13C12-p,p-DDT	73	%
BLANK	1405026	13C12-Dieldrin	105	%
SPIKE (LCS)	1405026	13C12-p,p-DDE	70	%
SPIKE (LCS)	1405026	13C12-p,p-DDD	8	%
SPIKE (LCS)	1405026	13C12-p,p-DDT	44	%
SPIKE (LCS)	1405026	13C12-Dieldrin	103	%
1406019-01	Wipple	13C12-p,p-DDE	78	%
1406019-01	Wipple	13C12-p,p-DDD	74	%
1406019-01	Wipple	13C12-p,p-DDT	56	%
1406019-01	Wipple	13C12-Dieldrin	111	%
1406019-02	Cherry	13C12-p,p-DDE	85	%
1406019-02	Cherry	13C12-p,p-DDD	74	%
1406019-02	Cherry	13C12-p,p-DDT	62	%
1406019-02	Cherry	13C12-Dieldrin	109	%
BLANK	1406019	13C12-p,p-DDE	73	%
BLANK	1406019	13C12-p,p-DDD	78	%
BLANK	1406019	13C12-p,p-DDT	58	%
BLANK	1406019	13C12-Dieldrin	94	%
SPIKE (LCS)	1406019	13C12-p,p-DDE	76	%
SPIKE (LCS)	1406019	13C12-p,p-DDD	85	%
SPIKE (LCS)	1406019	13C12-p,p-DDT	71	%
SPIKE (LCS)	1406019	13C12-Dieldrin	108	%
1406020-01	Wipple	13C12-p,p-DDE	65	%
1406020-01	Wipple	13C12-p,p-DDD	95	%
1406020-01	Wipple	13C12-p,p-DDT	74	%
1406020-01	Wipple	13C12-Dieldrin	100	%
1406020-02	Cherry	13C12-p,p-DDE	126	%
1406020-02	Cherry	13C12-p,p-DDD	118	%
1406020-02	Cherry	13C12-p,p-DDT	105	%
1406020-02	Cherry	13C12-Dieldrin	111	%
BLANK	1406020	13C12-p,p-DDE	88	%
BLANK	1406020	13C12-p,p-DDD	86	%
BLANK	1406020	13C12-p,p-DDT	73	%
BLANK	1406020	13C12-Dieldrin	120	%
SPIKE (LCS)	1406020	13C12-p,p-DDE	74	%
SPIKE (LCS)	1406020	13C12-p,p-DDD	80	%
SPIKE (LCS)	1406020	13C12-p,p-DDT	68	%
SPIKE (LCS)	1406020	13C12-Dieldrin	108	%
1407022-01	Wipple	13C12-p,p-DDE	85	%

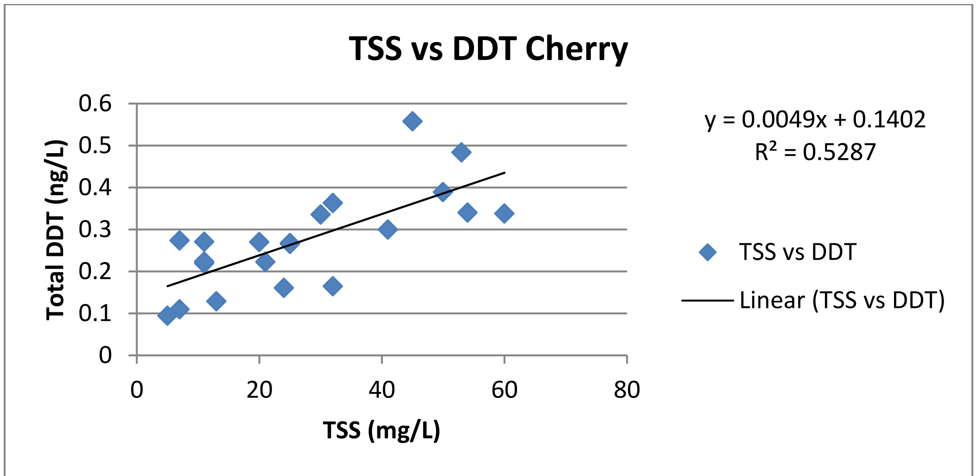
MEL ID	Site	Parameter	Result	Unit
1409021-02	Wipple	13C12-Dieldrin	48	%
1409021-03	Cherry	13C12-p,p-DDE	74	%
1409021-03	Cherry	13C12-p,p-DDD	98	%
1409021-03	Cherry	13C12-p,p-DDT	81	%
1409021-03	Cherry	13C12-Dieldrin	48	%
BLANK	1409021	13C12-p,p-DDE	80	%
BLANK	1409021	13C12-p,p-DDD	116	%
BLANK	1409021	13C12-p,p-DDT	83	%
BLANK	1409021	13C12-Dieldrin	47	%
SPIKE (LCS)	1409021	13C12-p,p-DDE	69	%
SPIKE (LCS)	1409021	13C12-p,p-DDD	97	%
SPIKE (LCS)	1409021	13C12-p,p-DDT	78	%
SPIKE (LCS)	1409021	13C12-Dieldrin	48	%
1410009-01	Wipple	13C12-p,p-DDE	64	%
1410009-01	Wipple	13C12-p,p-DDD	87	%
1410009-01	Wipple	13C12-p,p-DDT	79	%
1410009-01	Wipple	13C12-Dieldrin	61	%
1410009-02	Wipple	13C12-p,p-DDE	65	%
1410009-02	Wipple	13C12-p,p-DDD	80	%
1410009-02	Wipple	13C12-p,p-DDT	60	%
1410009-02	Wipple	13C12-Dieldrin	45	%
1410009-03	Cherry	13C12-p,p-DDE	75	%
1410009-03	Cherry	13C12-p,p-DDD	94	%
1410009-03	Cherry	13C12-p,p-DDT	82	%
1410009-03	Cherry	13C12-Dieldrin	77	%
BLANK	1410009	13C12-p,p-DDE	58	%
BLANK	1410009	13C12-p,p-DDD	77	%
BLANK	1410009	13C12-p,p-DDT	66	%
BLANK	1410009	13C12-Dieldrin	72	%
SPIKE (LCS)	1410009	13C12-p,p-DDE	56	%
SPIKE (LCS)	1410009	13C12-p,p-DDD	76	%
SPIKE (LCS)	1410009	13C12-p,p-DDT	74	%
SPIKE (LCS)	1410009	13C12-Dieldrin	72	%
1410010-01	Wipple	13C12-p,p-DDE	82	%
1410010-01	Wipple	13C12-p,p-DDD	95	%
1410010-01	Wipple	13C12-p,p-DDT	88	%
1410010-01	Wipple	13C12-Dieldrin	70	%
1410010-02	Cherry	13C12-p,p-DDE	69	%
1410010-02	Cherry	13C12-p,p-DDD	86	%
1410010-02	Cherry	13C12-p,p-DDT	70	%
1410010-02	Cherry	13C12-Dieldrin	86	%
BLANK	1410010	13C12-p,p-DDE	73	%

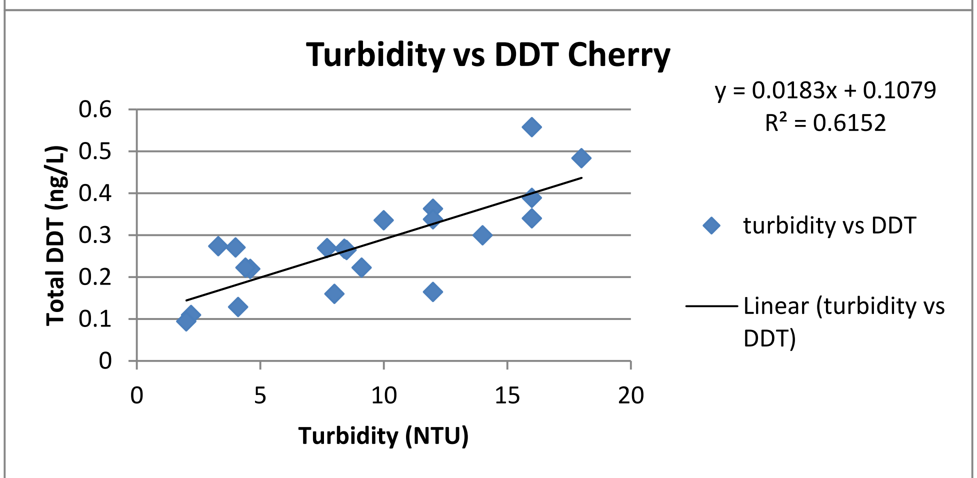
MEL ID	Site	Parameter	Result	Unit	MEL ID	Site	Parameter	Result	Unit
1407022-01	Wipple	13C12-p,p-DDD	106	%	BLANK	1410010	13C12-p,p-DDD	90	%
1407022-01	Wipple	13C12-p,p-DDT	107	%	BLANK	1410010	13C12-p,p-DDT	64	%
1407022-01	Wipple	13C12-Dieldrin	95	%	BLANK	1410010	13C12-Dieldrin	64	%
1407022-02	Cherry	13C12-p,p-DDE	73	%	SPIKE (LCS)	1410010	13C12-p,p-DDE	59	%
1407022-02	Cherry	13C12-p,p-DDD	96	%	SPIKE (LCS)	1410010	13C12-p,p-DDD	80	%
1407022-02	Cherry	13C12-p,p-DDT	93	%	SPIKE (LCS)	1410010	13C12-p,p-DDT	75	%
1407022-02	Cherry	13C12-Dieldrin	94	%	SPIKE (LCS)	1410010	13C12-Dieldrin	66	%
1407022-03	Cherry	13C12-p,p-DDE	84	%	1411010-01	Wipple	13C12-p,p-DDE	81	%
1407022-03	Cherry	13C12-p,p-DDD	101	%	1411010-01	Wipple	13C12-p,p-DDD	109	%
1407022-03	Cherry	13C12-p,p-DDT	110	%	1411010-01	Wipple	13C12-p,p-DDT	120	%
1407022-03	Cherry	13C12-Dieldrin	99	%	1411010-01	Wipple	13C12-Dieldrin	90	%
BLANK	1407022	13C12-p,p-DDE	99	%	1411010-02	Cherry	13C12-p,p-DDE	65	%
BLANK	1407022	13C12-p,p-DDD	116	%	1411010-02	Cherry	13C12-p,p-DDD	88	%
BLANK	1407022	13C12-p,p-DDT	120	%	1411010-02	Cherry	13C12-p,p-DDT	96	%
BLANK	1407022	13C12-Dieldrin	119	%	1411010-02	Cherry	13C12-Dieldrin	88	%
SPIKE (LCS)	1407022	13C12-p,p-DDE	84	%	BLANK	1411010	13C12-p,p-DDE	72	%
SPIKE (LCS)	1407022	13C12-p,p-DDD	100	%	BLANK	1411010	13C12-p,p-DDD	97	%
SPIKE (LCS)	1407022	13C12-p,p-DDT	107	%	BLANK	1411010	13C12-p,p-DDT	112	%
SPIKE (LCS)	1407022	13C12-Dieldrin	102	%	BLANK	1411010	13C12-Dieldrin	85	%
1407023-01	Wipple	13C12-p,p-DDE	102	%	SPIKE (LCS)	1411010	13C12-p,p-DDE	60	%
1407023-01	Wipple	13C12-p,p-DDD	107	%	SPIKE (LCS)	1411010	13C12-p,p-DDD	76	%
1407023-01	Wipple	13C12-p,p-DDT	76	%	SPIKE (LCS)	1411010	13C12-p,p-DDT	87	%
1407023-01	Wipple	13C12-Dieldrin	124	%	SPIKE (LCS)	1411010	13C12-Dieldrin	77	%
1407023-02	Cherry	13C12-p,p-DDE	90	%	1411011-01	Wipple	13C12-p,p-DDE	59	%
1407023-02	Cherry	13C12-p,p-DDD	98	%	1411011-01	Wipple	13C12-p,p-DDD	79	%
1407023-02	Cherry	13C12-p,p-DDT	75	%	1411011-01	Wipple	13C12-p,p-DDT	84	%
1407023-02	Cherry	13C12-Dieldrin	120	%	1411011-01	Wipple	13C12-Dieldrin	79	%
BLANK	1407023	13C12-p,p-DDE	97	%	1411011-02	Cherry	13C12-p,p-DDE	62	%
BLANK	1407023	13C12-p,p-DDD	97	%	1411011-02	Cherry	13C12-p,p-DDD	82	%
BLANK	1407023	13C12-p,p-DDT	72	%	1411011-02	Cherry	13C12-p,p-DDT	94	%
BLANK	1407023	13C12-Dieldrin	114	%	1411011-02	Cherry	13C12-Dieldrin	69	%
SPIKE (LCS)	1407023	13C12-p,p-DDE	79	%	BLANK	1411011	13C12-p,p-DDE	77	%
SPIKE (LCS)	1407023	13C12-p,p-DDD	83	%	BLANK	1411011	13C12-p,p-DDD	109	%
SPIKE (LCS)	1407023	13C12-p,p-DDT	65	%	BLANK	1411011	13C12-p,p-DDT	129	%
SPIKE (LCS)	1407023	13C12-Dieldrin	109	%	BLANK	1411011	13C12-Dieldrin	75	%
SPIKE (LCS)	1411011	13C12-p,p-DDT	96	%	SPIKE (LCS)	1411011	13C12-p,p-DDE	69	%
SPIKE (LCS)	1411011	13C12-Dieldrin	63	%	SPIKE (LCS)	1411011	13C12-p,p-DDD	88	%

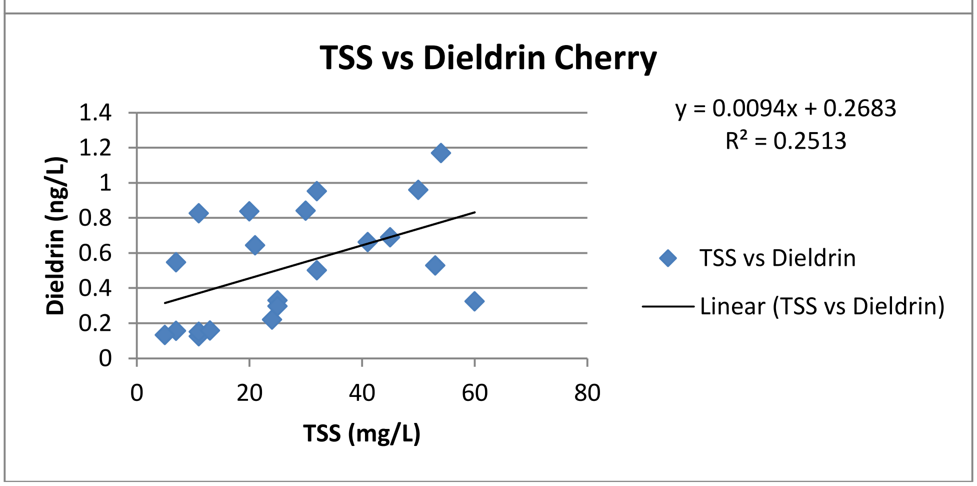
Table C-4. Discharge, Average Velocity, Average Depth, TSS, and Turbidity.

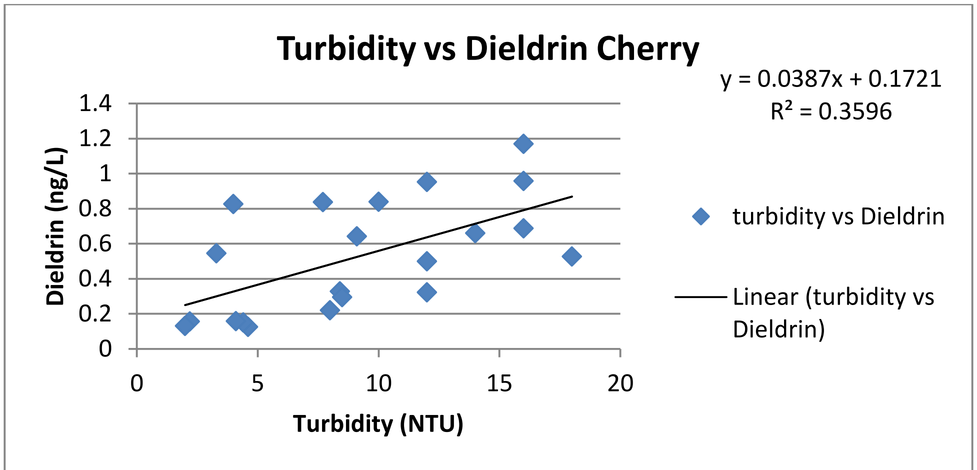
Station and Date, 2014	Discharge (cfs)	Average Velocity (ft/sec)	Average Depth (feet)	TSS (mg/L)	Turbidity (NTU)	Sample Number
Wipple 3.25	19.70	0.73	1.39	3	0.9	1402017-05
Cherry 3.25	42.81	1.72	0.89	11	4.6	1402017-03
Wipple 4.14	31.99	1.01	1.60	80	28	1404041-01
Cherry 4.14	31.62	1.68	0.70	21	9.1	1404041-02
Wipple 4.30	75.96	1.64	2.21	26	8.8	1404042-01
Cherry 4.30	102.13	2.17	1.50	54	16	1404042-02
Wipple 5.12	92.18	1.82	1.38	31	12	1405025-01
Cherry 5.12	151.92	2.48	1.58	41	14	1405025-04
Wipple 5.27	138.66	6.30	1.84	78	24	1405026-01
Cherry 5.27	149.14	2.85	2.83	45	16	1405026-02
Wipple 6.10	107.44	12.98	1.59	60	20	1406019-01
Cherry 6.10	146.84	19.60	1.00	53	18	1406019-02
Wipple 6.25	164.75	6.63	2.07	38	11	1406020-01
Cherry 6.25	102.47	1.68	0.70	32	12	1406020-02
Wipple 7.7	81.69	1.70	1.27	36	13	1407022-01
Cherry 7.7	119.76	2.34	2.69	32	12	1407022-02
Wipple 7.22	104.23	5.33	1.55	25	7.9	1407023-01
Cherry 7.22	89.84	1.91	2.48	11	4	1407023-02
Wipple 8.4	127.78	5.69	1.87	24	8.9	1408022-01
Cherry 8.4	134.53	2.41	2.97	20	7.7	1408022-04
Wipple 8.19	179.35	6.87	2.16	26	8.3	1408023-01
Cherry 8.19	197.37	3.10	3.43	25	8.4	1408023-03
Wipple 9.3	242.73	6.97	1.75	17	6	1409019-01
Cherry 9.3	155.38	2.78	2.93	24	8† U	1409019-02
Wipple 9.15	155.38	2.78	2.93	13	4.4	1409020-01
Cherry 9.15	96.95	2.05	2.49	7	3.3	1409020-02
Wipple 9.30	213.39	6.88	2.58	15	5.6	1409021-01
Cherry 9.30	134.40	2.39	2.74	50	16	1409021-03
Wipple 10.15	269.33	7.20	3.07	45	17	1410009-01
Cherry 10.15	138.63	2.55	2.89	60	12	1410009-03
Wipple 10.27	33.85	1.01	1.68	3	1.6	1410010-01
Cherry 10.27	59.39	1.88	1.12	13	4.1	1410010-02
Wipple 11.12	29.49	0.93	1.60	4	2.2	1411010-01
Cherry 11.12	44.03	1.67	1.00	7	2.2	1411010-02
Wipple 11.24	30.05	0.97	1.55	4	1.3	1411011-01
Cherry 11.24	48.69	1.85	0.96	5	2	1411011-02

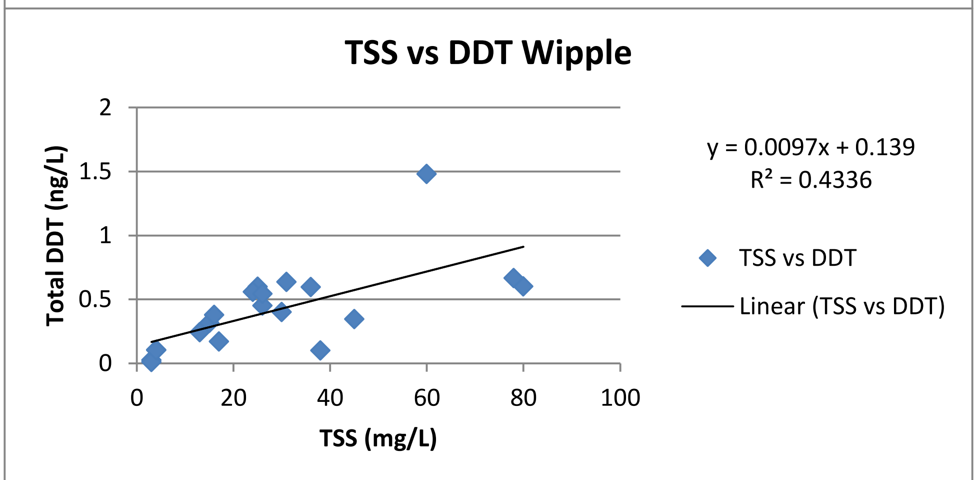
Appendix D. Scatterplots and Slope Equations

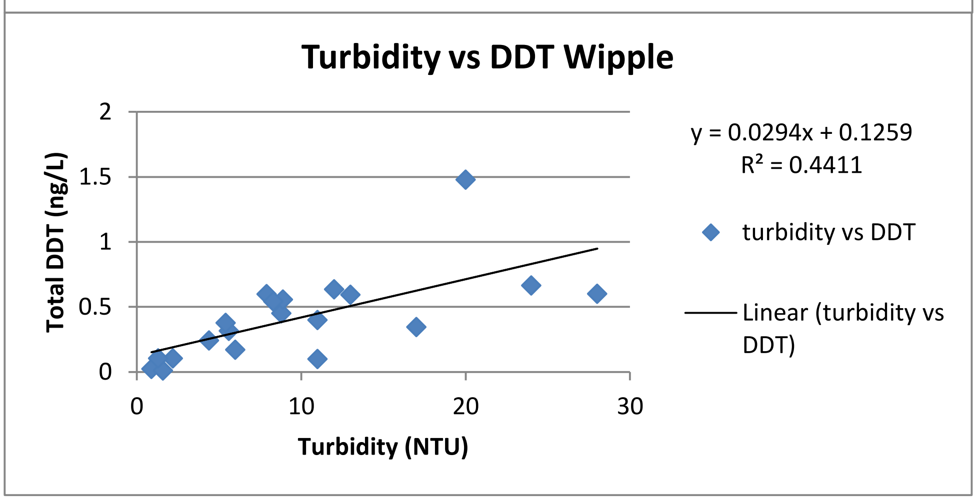


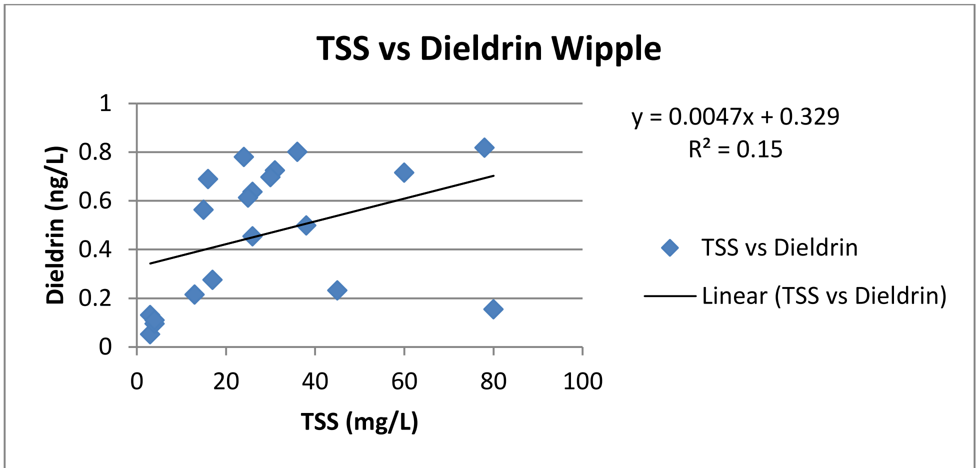


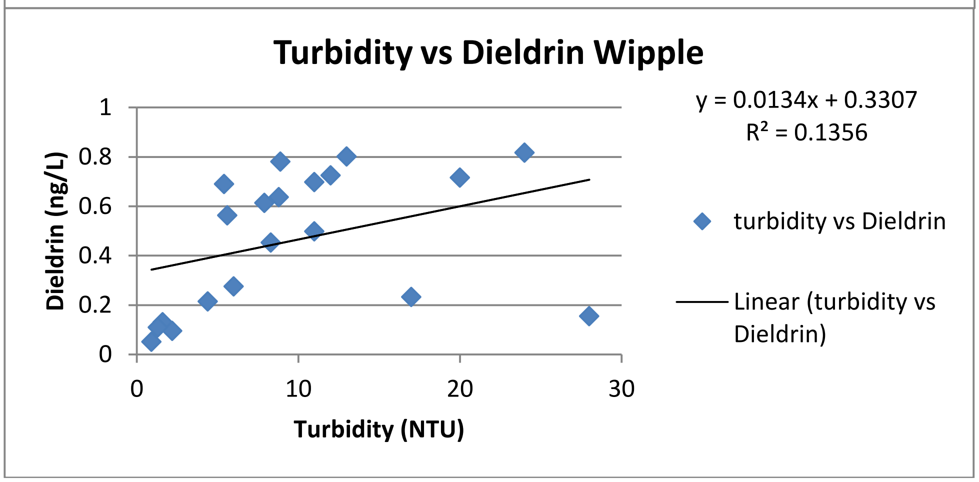



Turbidity vs Dieldrin Cherry
y = 0.0387x + 0.1721
R² = 0.3596
turbidity vs Dieldrin
Linear (turbidity vs Dieldrin)
Dieldrin (ng/L)
Turbidity (NTU)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
5
10
15
20


TSS vs DDT Wipple
y = 0.0097x + 0.139
R² = 0.4336
TSS vs DDT
Linear (TSS vs DDT)
Total DDT (ng/L)
TSS (mg/L)
2
1.5
1
0.5
0
0
20
40
60
80
100


Turbidity vs DDT Wipple
y = 0.0294x + 0.1259
R² = 0.4411
turbidity vs DDT
Linear (turbidity vs DDT)
Total DDT (ng/L)
Turbidity (NTU)
2
1.5
1
0.5
0
0
10
20
30


TSS vs Dieldrin Wipple
y = 0.0047x + 0.329
R² = 0.15
TSS vs Dieldrin
Linear (TSS vs Dieldrin)
Dieldrin (ng/L)
TSS (mg/L)
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100


Turbidity vs Dieldrin Wipple
y = 0.0134x + 0.3307
R² = 0.1356
turbidity vs Dieldrin
Linear (turbidity vs Dieldrin)
Dieldrin (ng/L)
Turbidity (NTU)
1
0.8
0.6
0.4
0.2
0
0
10
20
30

Appendix E. Glossary, Acronyms, and Abbreviations

Glossary

303(d) list: Section 303(d) of the federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality-limited estuaries, lakes, and streams that fall short of state surface water quality standards and are not expected to improve within the next two years.

Analytes: The chemical substances being analyzed by analytical methods.

Boxplot: A graphical depiction of a data set showing the 25th percentile, 50th percentile or median, the 75th percentile, range of data, and outliers.

Category 5: A waterbody or section of a waterbody that is on the 303(d) list.

Correlation: A statistical technique that evaluates the strength of the relationship of variables.

DDT: A insecticide Banned in the United States in 1972. The breakdown products, or metabolites of DDT are DDD and DDE.

Dieldrin: An insecticide and a by-product of the insecticide Aldrin. No longer produced in the United States, most uses of dieldrin were banned in 1987.

Isomer: A molecule or compound with the same chemical formula but a different structure.

Organochlorine: Chlorinated hydrocarbons, especially pesticides such as DDT or dieldrin.

Quantitation Limit: The lowest concentration of an analyte in a sample that can be identified with acceptable precision and accuracy.

Reporting Limit: The lowest concentration at which an analyte can be detected in a sample.

Stormwater: The portion of precipitation that does not naturally percolate into the ground or evaporate but instead runs off roads, pavement, and roofs during rainfall or snow melt. Stormwater can also come from hard or saturated grass surfaces such as lawns, pastures, playfields, and from gravel roads and parking lots.

Streamflow: Discharge of water in a surface stream (river or creek).

Surface waters of the state: Lakes, rivers, ponds, streams, inland waters, salt waters, wetlands and all other surface waters and water courses within the jurisdiction of Washington State.

Thalweg: The line of lowest elevation in a waterway or valley.

Total Maximum Daily Load (TMDL): Water cleanup plan. A distribution of a substance in a waterbody designed to protect it from not meeting (exceeding) water quality standards. A TMDL is equal to the sum of all of the following: (1) individual wasteload allocations for point sources, (2) the load allocations for nonpoint sources, (3) the contribution of natural sources, and (4) a Margin of Safety to allow for uncertainty in the wasteload determination. A reserve for future growth is also generally provided.

Total suspended solids (TSS): Portion of solids retained by a filter.

Turbidity: A measure of water clarity. High levels of turbidity can have a negative impact on aquatic life.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

Acronyms and Abbreviations

CRO	Central Regional Office
CLP	Contract Laboratory Program
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EAP	Environmental Assessment Program
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
EPA	U.S. Environmental Protection Agency
EQL	xx
et al.	And others
HRGC/HRMS	High Resolution Gas Chromatography/ High Resolution Mass Spectrometry
HUC	Hydrologic unit code
MEL	Manchester Environmental Laboratory
MQO	Measurement quality objective
NTU	Nephelometric Turbidity Unit
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
SOP	Standard operating procedures
t-DDT	Total DDT
TMDL	(See Glossary above)
TOC	Total organic carbon
TSS	(See Glossary above)
TSU	Toxics Studies Unit
USGS	U.S. Geological Survey
WRIA	Water Resource Inventory Area

Units of Measurement

g	gram, a unit of mass
mg	milligram
mg/L	milligrams per liter (parts per million)
mL	milliliter
ng/g	nanograms per gram (parts per billion)
ng/Kg	nanograms per kilogram (parts per trillion)
ng/L	nanograms per liter (parts per trillion)

NTU	nephelometric turbidity unit
ug/L	micrograms per liter (parts per billion)
°C	degrees Celsius