Quality Assurance Project Plan

Dieldrin and PCB Monitoring of Wastewater Treatment Plants in the Palouse River Watershed

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August 2007

303(d) Listings Addressed in this Study

Palouse River (WRIA 34)

- PCB-1260
- Dieldrin

Waterbody Numbers:
Palouse River (WA-34-1010)
South Fork Palouse River (WA-34-1020)

Project Code: 08-026

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Dieldrin and PCB Monitoring of Wastewater Treatment Plants in the Palouse River Watershed

Approvals

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Abstract

A Quality Assurance Project Plan is provided for monitoring the chlorinated pesticide, dieldrin, and polychlorinated biphenyls (PCBs) in influent and effluent wastewater from the Pullman, Albion, and Colfax wastewater treatment plants.

The purpose of this effort is to (1) determine whether these discharges currently exceed Washington State human health water quality criteria, and (2) assess the extent to which the contamination is internal or external to each facility. An additional sample will be taken from the landfill seepage and sediments above SYG Nursery to assess the relative importance of this source of dieldrin and PCBs.

This work is being conducted as a result of wasteload allocations recently established through a Total Maximum Daily Load for the Palouse River.

Background

TMDL

A recent Total Maximum Daily Load (TMDL) for the Palouse River (Johnson et al., 2007) established wasteload allocations for dieldrin and polychlorinated biphenyls (PCBs) in final effluents from the Albion, Colfax, and Pullman wastewater treatment plants (WWTPs). The Albion and Pullman WWTPs discharge to the South Fork Palouse River, and the Colfax WWTP discharges to the Palouse River.

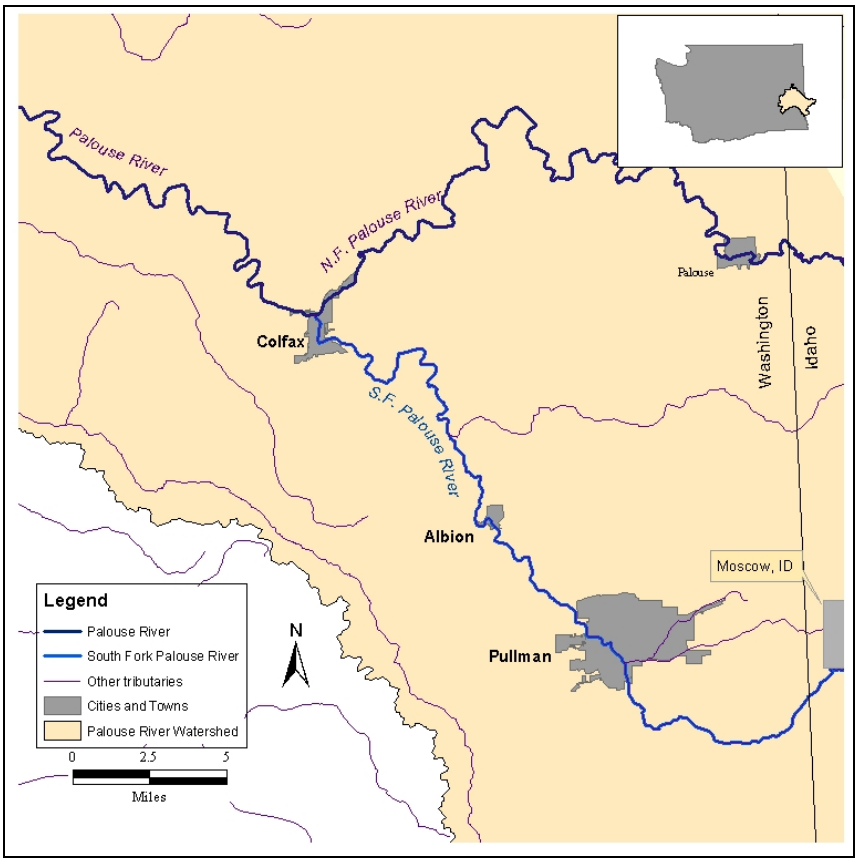

Figure 1. Location of Pullman, Albion, and Colfax and the Palouse River.

The river segment between the Washington-Idaho state line and the town of Colfax is locally referred to as the North Fork. The North Fork and South Fork merge at Colfax to form the mainstem of the Palouse River.

The lower Palouse River (near Hooper and Winona, Washington) has been on the 303(d) list for non-attainment of the human health criteria for 4,4'-DDE[1], heptachlor epoxide, alpha-BHC[2], dieldrin, and PCB-1260 in edible fish tissue. Placement on the list was based on samples collected by the Washington State Department of Ecology (Ecology) in 1984 and 1994. These chlorinated pesticides and PCBs are no longer used in the United States, having been banned in the 1970s and 1980s for ecological concerns. They are now classed as probable human carcinogens by the U.S. Environmental Protection Agency (EPA).

The data available to determine if WWTP discharges were causing or contributing to exceedances of human health criteria for dieldrin or PCBs in the Palouse River were extremely limited. The main sources of dieldrin and PCBs are suspected to be from nonpoint (diffuse) sources. These contaminants are widespread in the environment and likely present in the WWTP effluents. Other water quality assessments of WWTPs have found dieldrin and PCBs in wastewater effluent (Golding, 2002; Serdar, 2003; Johnson et al., 2004).

Therefore wasteload allocations were assigned for the three WWTPs in Washington that discharge to parts of the river where loading capacity is exceeded, as required by the federal Clean Water Act. Because the receiving waters already exceed loading capacity, the wasteload allocations were set to meet the Washington State human health criterion at the end of pipe for each facility's design flow (Table 1). These are interim wasteload allocations that will be revised as more knowledge is gained about the levels being discharged.

Table 1. PCB and Dieldrin Interim Wasteload Allocations for Palouse River Wastewater Treatment Plants.

WWTP	Chemical	Design Flow (mgd)	Human Health Criteria (ng/L)	Interim WLA* (grams/day)
Pullman	Total PCBs	3.4	0.17	0.0022
	Dieldrin	3.4	0.14	0.0018
Albion	Total PCBs	0.12	0.17	0.0001
	Dieldrin	0.12	0.14	0.0001
Colfax	Total PCBs	0.60	0.17	0.0004
	Dieldrin	0.60	0.14	0.0003

WLA = wasteload allocations
* = mgd x criteria/1000 x 3.79
From Johnson et al., 2007.

[1] DDE = 1,1-Dichloro-2,2-bis(p-chlorophenyl) ethylene
2 Alpha-BHC synonyms: (1a,2a,3b,4a,5b,6b)-1,2,3,4,5,6-hexachlorocylohexane, alpha-1,2,3,4,5,6-hexachlorocylohexane

The TMDL proposed that natural attenuation, monitoring, and best management practices (BMPs) be relied on to bring the Palouse River into compliance with water quality standards for dieldrin and PCBs. However, there is very little information about the WWTPs as sources of dieldrin and PCBs, or sources to the collection systems for each WWTP.

The TMDL called for additional monitoring from the following sources:

- Evaluate wastewater treatment facilities (including the collection systems) as potential dieldrin and PCB sources.
- Identify and clean up sources of dieldrin and PCBs to the Pullman storm drain system.
- Identify and clean up abandoned landfills and old dumps vulnerable to high water events or surface runoff during storms.

Other Study Results

The Whitman County Health Department collected water samples from an abandoned landfill that was uncovered during high water events in 1996-97, about two miles downstream of Colfax on the mainstem Palouse River. An oxbow was fortified at the upstream end with automobile bodies. The channel was then used as a disposal site until the early 1970s when it was covered with soil. Refuse was visible for miles downstream after the flood waters receded.

Whatever toxics were associated with this site appear to have been flushed out over the years. Refuse that did not wash away was covered in place. Two samples were analyzed: one from an eroded channel that cut through the fill, and another from a seep of discolored water on the river side of the fill. No chlorinated pesticides or PCBs were detected at or above 1.0 ug/L (unpublished data collected by John Skyles, Whitman County Health Department, Colfax).

Marti and Chern (1991) assessed groundwater and surface water contamination at the Washington State University chemical waste landfill in Pullman. The landfill was located on 16 acres at the eastern edge of the campus on a south facing slope bordered by Airport Creek, a tributary to Paradise Creek. Marti and Chern concluded that “in general, contaminant concentrations were low, confirming previous groundwater sample results.” Low concentrations (<1.0 ug/L) of chlorinated pesticides were detected in only 1 of the 16 wells sampled. The detections included DDT compounds and heptachlor epoxide, but not dieldrin or alpha-BHC. No chlorinated pesticides were detected in the Airport Creek water sample collected downstream of the site. PCBs were not detected in any groundwater or surface water samples.

As part of the National Water Quality Assessment (NAWQA) Program, the U.S. Geological Survey (USGS) collected water and sediment samples for analysis of pesticides from the Palouse watershed as part of the much larger Central Columbia Plateau - Yakima River basin study effort. In 1994, two samples were collected in the vicinity of Pullman (Table 2).

Table 2: USGS NAWQA Pesticide Concentrations from Sample Sites near Pullman

Location	Parameter	Measured Value	Units
Water Sample			
Mouth of Paradise Creek[1]	Dieldrin	<0.001	µg/L, ppb
	alpha BHC	<0.002	µg/L, ppb
	gamma BHC	0.045	µg/L, ppb
	Triallate	0.06	µg/L, ppb
	Diazinon	0.021	µg/L, ppb
Sediment Sample			
South Fork Palouse River at Armstrong Road[2]	Aldrin[a]	<1	µg/kg, ppb
	o,p'-DDD[a]	1	µg/kg, ppb
	p,p'-DDD[a]	<1	µg/kg, ppb
	o,p'-DDE[a]	<1	µg/kg, ppb
	p,p'-DDE[a]	8	µg/kg, ppb
	o,p'-DDT[a]	<2	µg/kg, ppb
	p,p'-DDT[a]	<2	µg/kg, ppb
	Dieldrin[a]	<1	µg/kg, ppb
	alpha-BHC[a]	<1	µg/kg, ppb
	Heptachlor epoxide[a]	<1	µg/kg, ppb
	PCBs[a]	160	µg/kg, ppb

[1]Wagner and Roberts, 1998.
[2]USGS NAWQA website.
[a]Bed sediment smaller than 2 millimeters, dry weight basis.

NAWQA found a PCB concentration of 160 µg/kg from one stream sediment sample taken from the South Fork Palouse River at Armstrong Road, approximately five miles downstream of the city limits, (U.S. Geological Survey, accessed 2005). This site (464539117133000) was sampled on July 12, 1994.

Project Description

As the existing National Pollutant Discharge Elimination System (NPDES) permits for the cities of Pullman, Colfax, and Albion's WWTPs expire, they will be revised and reissued. The revised NPDES permit conditions will include effluent limitations for dieldrin and PCBs based on the wasteload allocations established in the TMDL study findings. Because the current level of dieldrin and PCBs in their influent wastewater is unknown, this study was initiated to characterize the influent and effluent concentrations. Old municipal landfills located on or near the Palouse River are also potential sources of chlorinated pesticides and PCBs. This study will help determine the need for additional actions, revisions to the interim wasteload allocations, and a schedule for WWTP monitoring. The NPDES permits will include requirements for monitoring dieldrin and PCBs following Ecology's initial study.

Ecology's Environmental Assessment Program will monitor dieldrin and PCBs in influent and effluent from the Pullman, Albion, and Colfax WWTPs. Three pairs of composite samples will be collected from each facility between August 2007 and March 2008. The samples will be analyzed for dieldrin and PCB congeners[3] using low-level detection methods.

The City of Pullman used several small landfill locations along the South Fork just west of town. As a first step toward identifying dieldrin and PCB sources within the Pullman service area, an effort will be made to assess the relative importance of the landfills on the South Fork Palouse River. A closed landfill located above the SYG Nursery has a year round seepage that will be sampled by this study. Two other small landfills are located about ½ mile downstream; one is an old incinerator site used for burning municipal garbage. Ash, bricks, and other residues from this facility are still evident on the river bank. Two sediment samples will be collected from the seepage sediments at the landfill above the SYG Nursery and from the incinerator site just downstream on the north bank. These samples will be analyzed for dieldrin and PCB Aroclors.

If the WWTP influents have elevated concentrations of dieldrin and PCBs, Ecology will work with the affected city to develop a compliance schedule to meet their wasteload allocations. The compliance schedule will outline a plan for locating and removing sources to the collection system.

If elevated levels of dieldrin and PCBs are found in Pullman's wastewater influent, the city should work closely with Washington State University to ensure a source is not located on campus.

3 In the United States, PCBs were primarily manufactured and sold under the trade name Aroclor. PCBs are typically analyzed as equivalent concentrations of commercial Aroclor mixtures (e.g., PCB-1254) or as individual compounds, referred to as PCB congeners. A congener analysis affords much lower detection limits than an Aroclor analysis.

Organization and Schedule

Organization

Table 3: Project Organization.

Name	Organization	Phone Number	Role
Brandi Lubliner	Directed Studies Unit, Western Operations Section, EAP	360-407-7140	Project Lead QAPP and Report Preparation
Kristin Kinney	Directed Studies Unit, Eastern Operations Section, EAP	509-454-4243	Field Assistance
Brenda Nipp	Directed Studies Unit, Eastern Operations Section, EAP	509-329-3420	Field Assistance
George Onwumere	Directed Studies Unit, Western Operations Section, EAP	360-407-6730	Unit Supervisor, QAPP Approval
Elaine Snouwaert	TMDL Lead, Water Quality Program, Eastern Regional Office	509-329-3503	Client, QAPP Approval
Stuart Magoon	Manchester Laboratory	360-871-8801	Laboratory Director, QA and QAPP Approval
Bill Kammin	EAP	360-407-6964	Ecology QA Officer, QAPP Approval

EAP – Environmental Assessment Program; QAPP – Quality Assurance Project Plan

Schedule

Table 4: Anticipated Schedule.

Project Schedule	
Field Work	August 2007 to May 2008
Laboratory Analyses Completed	June 2008
Environmental Information System (EIM) Data Set	
Data Engineer	Brandi Lubliner
EIM User Study ID	BRWA0003
EIM Study Name	Dieldrin and PCB Monitoring of WWTPs in the Palouse River Watershed
EIM Completion Due	December 2008
Final Report	
Author Lead	Brandi Lubliner
Schedule	
Draft to Supervisor	July 2008
Draft to Client/Peer	August 2008
External Draft	September 2008
Report Final Due (original)	December 2008

Sampling Process Design (Experimental Design)

Composite influent and effluent samples will be collected on three occasions at each facility when the WWTPs discharge directly to receiving waters: once each during August 2007, March 2008, and May 2008. The exception to the schedule is that Albion does not discharge effluent during the summer. The composite samples will be taken over a two-day period. Effluent data obtained by the Environmental Assessment Program for other WWTPs have shown only minor variations in PCB concentrations sampled on two consecutive days (Golding, 2002). Specific locations of influent, effluent, and landfill samples will be determined in consultation with the treatment plant operators and the Ecology Eastern Regional Office staff.

Each composite will consist of four grab samples: two in the morning and two in the afternoon. The grabs will be hand collected to avoid contamination that could occur with an auto-sampler. A composited grab sample from the landfill leachate at SYG Nursery will be collected in an identical manner, however only once during the project.

Sediment samples from the two landfill locations will be collected only once during the project. The location of the sediment grabs will be in the sediments along the landfill leachate on the SYG Nursery property and just downstream at an old incinerator landfill site on the western bank of the South Fork Palouse River. A background sediment sample will be collected above the city of Pullman from the soft sediments along the South Fork Palouse River.

Sampling Procedures

Composited water samples will consist of two grabs per day (morning and afternoon) for two days. The grabs will be taken by hand using glass jars cleaned to EPA quality assurance/quality control (QA/QC) specifications (EPA, 1990). Each grab will be used to fill a jar for each parameter in 1/4 increments. The composites will be maintained on ice and in the dark during the two-day collection process. Influent and effluent flow data will be obtained from WWTP records.

Sediment/soil samples will be obtained with stainless steel scoops. Five or more grabs will be composited for each sample. The sub-samples will be homogenized to uniform color and consistency by stirring in stainless steel bowls with stainless steel spoons. Sub-samples of the homogenate will be placed in 8-oz. glass jars with teflon lid liners, cleaned to EPA QA/QC specifications (EPA, 1990).

Stainless steel scoops and bowls used to manipulate the sediments will be cleaned by washing with Liquinox detergent, followed by sequential rinses with tap water, dilute nitric acid, deionized water, and pesticide-grade acetone. The equipment will then be air-dried and wrapped in aluminum foil. Separate scoops and bowls will be used for the two sites.

Sample containers, preservation, and holding times are shown in Table 5.

Table 5. Containers, Preservation, and Holding Times for Samples.

Parameter	Matrix	Container*	Preservation	Holding Time
Dieldrin	Water	1 gal glass with Teflon lid	Cool to 4°C	7 days
	Sediment	4 oz glass with Teflon lid	Cool to 4°C	14 days
PCBs	Water	1 L glass with Teflon lid	Cool to 4°C	1year
	Sediment	4 oz glass with Teflon lid	Cool to 4°C	1 year
Total Suspended Solids	Water	1 L poly bottle	Cool to 4°C	7 days

*Sample containers obtained from Manchester Environmental Laboratory or their contractors.

If scoops cannot be used to grab a background sediment sample along the river, then a petite Ponar grab will be used where flow is not too fast and a depositional area with softer material can be found. A Ponar grab will be considered acceptable if not over-filled with sediment, overlying water is present and not excessively turbid, the sediment surface is relatively flat, and desired depth penetration has been achieved. After siphoning off overlying water, the top 10 cm of sediment from each grab will be removed with stainless steel scoops, placed in a stainless steel bowl, and homogenized by stirring. Material touching the side walls of the grab will not be taken.

Field personnel will wear nitrile gloves at all times during sample collection and will follow standard health and safety procedures. The sediment samples will be placed polyethylene bags and stored on ice. All water and sediment samples will be held in a secure cooler for transport to Ecology's Manchester Environmental Laboratory by a state vehicle or sent by Fed-Ex. Chain of custody will be maintained. The latitude and longitude of the sampling sites will be recorded from a Global Positioning System (GPS) unit.

Measurement Procedures

Methods were chosen that give reporting limits equal to or less than the lowest concentrations of interest. Reporting limits vary with congener and Aroclor. Other methods may be used by Ecology's Manchester Environmental Laboratory (MEL) or their contractors after consulting with the project lead. All water samples will be analyzed for dieldrin, PCBs, and total suspended solids (TSS). TSS is included as routine wastewater parameter and will be analyzed by MEL. PCB congeners in water samples will have low detection limits achieved by using a high-resolution gas chromatography/mass spectrometry (HRGC/MS) analysis for individual congeners. PCB congeners analyses will be contracted out to specialized laboratories.

Water samples for dieldrin will be measured during the first round of sampling from the wastewater samples at MEL using a solid phase extraction (SPE) technique. The dieldrin levels in the wastewater are unknown. If the concentrations cannot be detected after this first round, then a contracted laboratory will be sought to pursue a high resolution mass spectrometry (HRMS) method to detect the low levels of contaminants.

MEL will analyze the sediment samples for dieldrin and PCB Aroclors. Dieldrin and PCB Aroclors will be quantified by gas chromatography methods (GC/ECD) using the EPA Methods 8081 and 8082, respectively.

The lowest concentrations of interest shown in Table 6 are those practically attainable within budget constraints of this project. Table 6 shows the numbers of samples to be analyzed, expected range of results, required reporting limits, and sample preparation and analysis methods.

Table 6. Laboratory Procedures for Monitoring at Palouse River Basin WWTPs.

Analysis	Matrix	Field Samples	Expected Range of Results	Reporting Limit	Sample Prep Method	Analytical Method
Dieldrin	Water/ Wastewater	24[a]	0.001 – 10 ng/L or <0.005-10 ng/L	2-10 ng/L or 0.035 ng/L	EPA 3535M(SPE) or Other[b]	SPE or HRMS EPA Method 8081M
	Sediment	1	Unknown	1 ug/Kg	EPA SW846 Method 3541	EPA SW846 Method 8081
PCB Congeners	Water/ Wastewater	24[a]	0.1 - 100 ng/L	10 pg/L	EPA Method 1668A	EPA Method 1668A
PCB Aroclors	Sediment	1	Unknown	1-5 ug/Kg	EPA SW846 Method 8082	EPA SW846 Method 8082
Total Suspended Solids	Water/ Wastewater	21	5-200 mg/L	1 mg/L	NA	EPA Method 160.3 or SM 2540

[a] including field duplicates and field blanks.
[b] sample prep method for potential contract work to be decided later.
NA = not applicable.

Quality Objectives

Quality objectives for this project are to obtain high quality data so that uncertainties are minimized and results are comparable to data from previous monitoring. These objectives will be achieved through careful attention to the sampling, measurement, and quality control (QC) procedures described in this plan.

Ecology's Manchester Environmental Laboratory and their contractors are expected to meet all QC requirements of the analytical methods being used for this project. Measurement quality objectives are shown in Table 7.

Table 7. Measurement Quality Objectives for Monitoring at Palouse River Basin WWTPs.

Analysis	Matrix	Laboratory Control Samples (% recov.)	RPD[a] in Duplicate Samples	Surrogate Standards
Dieldrin	water	25 - 150	± 50	50-150% surrogate recovery
	sediment	50 - 150	± 50	50-150% surrogate recovery
PCB congeners	water	50 - 150	± 50	25-150% labeled congeners
	sediment	50 - 150	± 50	25-150% labeled congeners
Total Suspended Solids	water	80-120	< 20	NA

NA – Not applicable.
[a]RPD – Relative percent difference (range as a percent of the mean).
[b]Recovery in a standard solution of 27 congeners.

Laboratory control samples contain known amounts of analytes and indicate bias due to sample preparation and calibration. Results of duplicate (split) samples provide estimates of analytical precision, through the process of comparing the relative percent difference (RPD) in the sample values.

The PCB congener analysis for this study uses an isotopic dilution method with labeled congeners. The 12 PCBs designated as toxic by the World Health Organization (also known as dioxin-like PCBs) and the earliest and latest eluted congener at each level of chlorination are determined by isotope dilution quantitation. The remaining congeners are determined by an internal standard quantitation technique.

Quality Control Procedures

The field and laboratory quality control (QC) samples to be analyzed for this project are shown in Tables 8 and 9, respectively.

Field

QC samples for influent and effluent will consist of the transfer blanks and duplicate samples. The transfer blank is intended to detect contamination arising from sample containers or sample handling. The blank will be prepared using a sample bottle filled with organic-free water by the analyzing laboratory. The bottle will be opened in the field and a portion of its contents transferred to a new bottle each time a corresponding grab is taken at that site, in essence mimicking the grab sampling procedure.

Table 8. Field QC Samples for Monitoring Palouse River Basin WWTPs.

Parameter	Blanks Water Samples	Duplicate Water Samples	Matrix Spike Pair[a (water)]	Duplicate Sediment Sample
Dieldrin[b]	1/project	2/project	1/project	1/project
PCBs[b]	1/project	2/project	1/project	1/project
TSS	NA	2/project	NA	NA

[a]Matrix spike and matrix spike duplicate is a pair of samples.
[b]To be analyzed by a contract laboratory.
TSS – total suspended solids.
NA – not analyzed for.

Duplicates will provide estimates of analytical variability. The duplicates will be prepared by filling two sample bottles, side by side in an identical manner. Two effluent samples will be duplicated, one at Pullman and one at Colfax.

Laboratory

The QC procedures routinely followed by MEL or required of its contractors will be satisfactory for purposes of this project.

Table 9. Laboratory QC Samples for Monitoring for Palouse River Basin WWTPs.

Parameter	Check Standard/ Laboratory Control Sample	Method Blanks	OPR[b] Standards/ Labeled Compounds	Lab Duplicate
Dieldrin[b]	1/batch	1/batch	NA	none
PCBs[b]	1/batch	1/batch	all samples	none
Total Suspended Solids	1/batch	1/batch	NA	1/batch

[a]Ongoing precision and recovery.
[b]To be analyzed by a contract laboratory.

The laboratory cost associated with this project is estimated to be $34,008 (Table 10). The cost estimate includes MEL's 25% surcharge for contract laboratory analyses and the 50% discount for samples analyzed at MEL.

Table 10. Laboratory Cost Estimate for Monitoring for Palouse River Basin WWTPs.

Location	Number of Samples				Cost Per Sample			Totals
	Influent	Effluent	Field Blank[a]	Field Dups	Dieldrin	PCBs	TSS	
Pullman	6	3	1	1	$ 425	$ 659	$ 12	$ 12,056
Colfax	3	3	0	1	$ 425	$ 659	$ 12	$ 7,672
Albion	3	2	0	0	$ 425	$ 659	$ 12	$ 5,480
Landfill (seepage)	0	1	0	0	$ 425	$ 659	$ 12	$ 1,096
Sediment	0	3	0	1	$ 200	$ 100	NA	$ 1,200
							Total[b]	$ 34,008

[a]PCBs and Dieldrin only.
[b]25%markup on contract work.
Dups – duplicates
TSS – total suspended solids

This cost estimate may change if the prices from the contracting laboratories are different in February 2008 than they are at the time of writing this Quality Assurance Project Plan. This cost estimate includes the prices for contracting out the wastewater dieldrin analysis for all three sampling rounds.

Data Management Procedures

Field data and observations will be recorded in a bound notebook of waterproof paper. The data package from MEL will include a case narrative discussing any problems with the analyses, corrective actions taken, changes to the referenced method, and an explanation of data qualifiers. The data package will also include all associated QC results. This information is needed to evaluate the accuracy of the data and to determine whether the measurement quality objectives have been met. This will include results for all laboratory control samples, method blanks, standards/labeled compounds, and laboratory duplicates included in the sample batch.

All project data will be entered into Excel spreadsheets. All entries will be independently verified for accuracy by another individual on the project team.

All project data will be entered into Ecology's Environmental Information Management System (EIM). Data entered into EIM follow a formal Data Validation Review Procedure where data are reviewed by the project manager of the study, the person entering the data, and an independent reviewer.

Audits and Reports

MEL participates in performance and system audits of their routine procedures. Results of these audits are available on request.

The PCB congener analyses will be contracted out to a laboratory accredited by Ecology for Method 1668A. Ecology's Environmental Laboratory Accreditation Program evaluates a laboratory's quality system, staff, facilities and equipment, test methods, records, and reports. The Accreditation Program then establishes whether the laboratory has the capability to provide accurate, defensible data. Results of on-site assessments and proficiency testing studies are available from Ecology on request.

The following reports will be prepared for this project:

1. The data from each round of sampling will be provided to the city contacts as soon as practical after review by MEL and the project lead.
2. A draft technical report will be prepared by Ecology's Environmental Assessment Program staff on or before September 2008. The responsible staff member is Brandi Lubliner.
3. A final technical report is anticipated in December 2008. The responsible staff member is Brandi Lubliner.
4. The project data will be entered into Ecology's EIM System on or before December 2008.

Data Verification and Review

Data Verification

The contract laboratory will conduct a review of all laboratory data and case narratives. The contractor will verify that (1) methods and protocols specified in this Quality Assurance Project Plan were followed, (2) all calibrations, checks on quality control, and intermediate calculations were performed for all samples, and (3) the data are consistent, correct, and complete, with no errors or omissions. Evaluation criteria will include the acceptability of holding times, instrument calibration, procedural blanks, spike sample analyses, precision data, laboratory control sample analyses, and appropriateness of data qualifiers assigned. A case summary will meet the requirements for a data verification report.

Further Review

To determine if project measurement quality objectives have been met, results for check standards/laboratory control samples, duplicate samples, and labeled compounds will be compared to QC limits. The field and method blanks' results will be examined to verify there was no significant contamination of the samples. To evaluate whether the targets for reporting limits have been met, the results will be examined for *non-detects* and to determine if any values exceed the lowest concentration of interest.

MEL and the project lead will review the laboratory data packages, verify the report, and assess the usability of the data. Based on these assessments, the data will be either accepted, accepted with appropriate qualifications, or rejected and re-analysis considered.

As noted previously, MEL is being requested to carefully review the data for each sample set and provide it to the project lead within two months from the time of sample collection.

Data Quality (Usability) Assessment

Once the data have been verified and validated, the project lead will determine if the data can be used to make the calculations, determinations, and decisions for which the project was conducted. If the results are satisfactory, data analysis will proceed.

Data analysis will include, but not necessarily be limited to, compiling summary statistics and constructing plots to (1) examine the distribution of the dieldrin and PCB concentrations detected in the samples, and (2) compare PCB levels in the influent versus effluent. The PCB concentration/human health criterion ratio will be calculated for each effluent sample and displayed in dot density plots to illustrate the extent to which criteria are or are not exceeded. The dieldrin and PCB concentrations measured in the landfill discharge will be compared with other instream measurements within the watershed to rank it as a source of contamination.

References

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