# Post-Remediation Sediment Sampling On the Raisin River Near Monroe, Michigan Final Results from 2001-2002 Survey: PCB Chemistry, Caged Fished and Bioaccumulation Results

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## EXECUTIVE SUMMARY

In 2001 and 2002 the Great Lakes National Program Office (GLNPO), in conjunction with the U.S. Army Corps of Engineers - Detroit District and the Michigan Department of Environmental Quality conducted an extensive survey of sediment quality conditions within the Raisin River Area of Concern (AOC). The focus of the survey was to evaluate the levels of polychlorinated bi-phenyls (PCB) contamination remaining in the area of the Ford-Monroe sediment removal project completed in 1997. The survey also collected data to evaluate the quality of sediments in the AOC outside the removal area. The assessment focused on PCBs, the primary contaminant of concern within the AOC, but also include analysis of other chemical constituents.

The sediment investigation included the collection of sediment cores and ponar samples for sediment chemistry analysis, whole sediment toxicity testing, benthic community analysis, and whole sediment bioaccumulation testing. Additionally, the agencies conducted caged fish testing at three locations within the AOC. This report summarizes the results of the sediment chemistry, whole sediment bioaccumulation testing, and the caged fish studies. Results of the whole sediment toxicity and benthic community analysis will be provided in a separate report. This report details sampling locations and methods and presents the results of the sediment assessment.

The results of the survey indicate that PCBs are still a significant problem within the AOC, from the sediment removal project, downstream to the mouth of the river. Additionally, the whole sediment bioaccumulation tests and caged fish testing indicate the potential for contaminant uptake into the food web, and suggest that PCBs remaining in the sediment removal area and in downstream areas may continue to present a human health and ecological risk.

A summary of the key findings include:

1. Elevated PCB concentrations remain in the "Sediment Removal Area" (SRA). Maximum surficial PCB concentrations in SRA are >200 mg/kg (total Aroclors). Maximum total PCB concentration at depth in the SRA is 550 mg/kg (average of RFS and field duplicate);

2. PCB contamination does not appear to be a problem upstream of the SRA. Surficial PCB concentrations in sediments are all <1 mg/kg based on total aroclor analysis. Maximum PCB concentrations in the deep sediments are all <1.3 mg/kg.

3. PCB contamination in the sediments is a problem downstream of the SRA where surficial sediment concentrations are found up to 85 mg/kg (total of aroclors), and the deep sediments contain PCB concentrations up to 90 mg/kg.

4. Heavy metal and PAH contamination are only a minor concern within the study area. Most levels are present below the TEC and PEC sediment screening levels guidelines suggested by *MacDonald et al*. (2002);

5. Caged fish results indicate that there is the potential for significant uptake of PCBs into the food web in the areas adjacent to and down-steam of the SRA;

6. PCB concentrations in caged fish are similar to those measured by MDEQ in 1991 and 1998 caged fish studies, and significantly below the results from a 1988 caged fish study *(MDEQ 2001*, Figure 72);

7. Whole sediment bioaccumulation testing results indicate that there is the potential for significant uptake of PCBs into the food-chain in the areas adjacent to and downstream of the SRA;

8. Bioaccumulation in caged-fish and whole sediment bioaccumulation testing is highest in sediment samples collected within the SRA;

9. PCB uptake in caged-fish and whole sediment bioaccumulation testing does not appear to be a significant problem upstream of the SRA;

10. There is not sufficient data to determine the source of PCB contamination remaining in the SRA. It is recommended that on-going sources, sloughing of contaminated sediments from the adjacent navigational channel, and residual contamination from the completed dredging project should all be investigated as potential sources of the PCB contamination in the SRA.

Preliminary estimates of the volume and PCB concentration of sediments remaining in the SRA indicate that approximately 2,600 cubic yards of sediments remain in the SRA with an average surfical concentration of 35 mg/kg, and an average total concentration of 58 mg/kg.

The results of this investigation indicate that there is the potential for significant human health and ecological risk from PCBs within the Raisin River AOC from the SRA downstream. Additional ecological and human health risk assessment is necessary to quantify this risk. State, local, and federal stakeholders need to coordinate in order to formulate a plan to address the remaining PCB contamination in the Raisin River AOC.

# 1. BACKGROUND

## 1.1 SITE DESCRIPTION

The Raisin River flows southeast through the southeast corner of Michigan's Lower Peninsula, discharging into Lake Erie at Monroe Harbor near the city of Monroe, Michigan. The Area of Concern (AOC) is defined as "the lower 2.6 miles of the River Raisin, downstream from Dam Number 6 at Winchester Bridge in the city of Monroe, extending [downstream] one-half mile into Lake Erie, and including Plum Creek which discharges into Lake Erie through a canal." (*USEPA*, 1994)

Once forested with mature hardwood stands, the AOC now consists of mostly cleared land that is urban, suburban, and industrial in nature. Industries within the AOC include automotive, steel and paper manufacturers. Several landfills also border the river within the AOC. Contaminants of concern in the AOC include: polychlorinated bi-phenols (PCBs), chromium, copper, zinc, and oil and grease. (*USEPA*, 1994).

In 1997 the Ford-Monroe facility, located on the banks of the Raisin River, completed an emergency sediment removal project at the Ford Monroe contaminated sediment site under an administrative order by the U.S. Environmental Protection Agency (USEPA) Region 5 Superfund program. The cleanup resulted in the remediation of approximately 27,000 cubic yards of PCB-contaminated sediments (maximum concentration 49,000 ppm) by the Ford Motor Company from a large depositional area near an old 48-inch outfall from the Ford Monroe Stamping Plant. Remedial work also included the removal of contaminated in-plant sewer material to eliminate the potential for on-going releases. The remedial work at the site was completed in October 1997. (*USEPA*, 1998).

In 2001 the U.S. Environmental Protection Agency's Great Lakes National Program Office (GLNPO), in conjunction with the U.S. Army Corps of Engineers Detroit District and the Michigan Department of Environmental Quality Surface Water Quality Division, initiated a post-remediation investigation to evaluate: (1) the levels of residual contamination left behind after completion of the Ford-Monroe sediment removal project, (2) the recovery of the aquatic system after dredging, and (3) the level of sediment contamination present in the AOC outside the removal area. The post-remediation assessment focused on polychlorinated bi-phenyls (PCBs), the primary contaminant of concern at the site, but also included analysis of other chemical constituents.

The post-remediation investigation included the collection of sediment cores and ponar samples for sediment chemistry analysis, whole sediment toxicity testing, benthic community analysis, and whole sediment bioaccumulation testing. Additionally, the agencies conducted caged fish testing at three locations within the AOC. This report summarizes sampling locations and methods and presents the results of the post-remediation assessment.

## 1.2. SUMMARY OF SAMPLING SURVEY

The primary objective of this survey was to collect sufficient data to ascertain the current state of the sediment environment in the vicinity of the Raisin River, Ford Outfall, Sediment Removal Project. A secondary objective of the survey was to collect adequate sediment data (chemistry, toxicity, tissue

chemistry, etc.) to provide an overall summary of sediment quality conditions within the Raisin River AOC.

The project study area and sampling locations are shown in Figure 1. This post-remediation assessment included the following types of sampling and analysis:

1. Sediment depth survey (12 locations within the Sediment Removal Area),
2. Sediment Chemistry (18 sediment cores and 8 surficial ponar grabs from locations upstream, downstream , and within the SRA) ,
3. Sediment Bioaccumulation Testing with *Lumbriculus variegatus* (8 ponar grabs upstream, downstream , and within the SRA),
4. Caged Fish Testing (3 cage locations upstream, adjacent, and downstream of the SRA),
5. Whole Sediment Toxicity Testing using *Hyalella azteca* & *Chironomus tentans* (8 ponar grabs upstream, downstream , and within the SRA), and
6. Benthic Community Analysis specific to the family taxonomic (8 ponar grabs upstream, downstream , and within the SRA)

This report focuses on the results of the Sediment Chemistry, Sediment Bioaccumulation, and Caged Fish, and Sediment Depth sampling and analysis. Results of the Whole Sediment Toxicity Testing and Benthic Community Analysis will be presented in a separate report. Methods and results for each type of testing are summarized in Sections 3 through 6, and a summary of the conclusions and recommendations for further evaluations and potential remedial action are provided in Section 7.

## 2. QAPP DEVELOPMENT

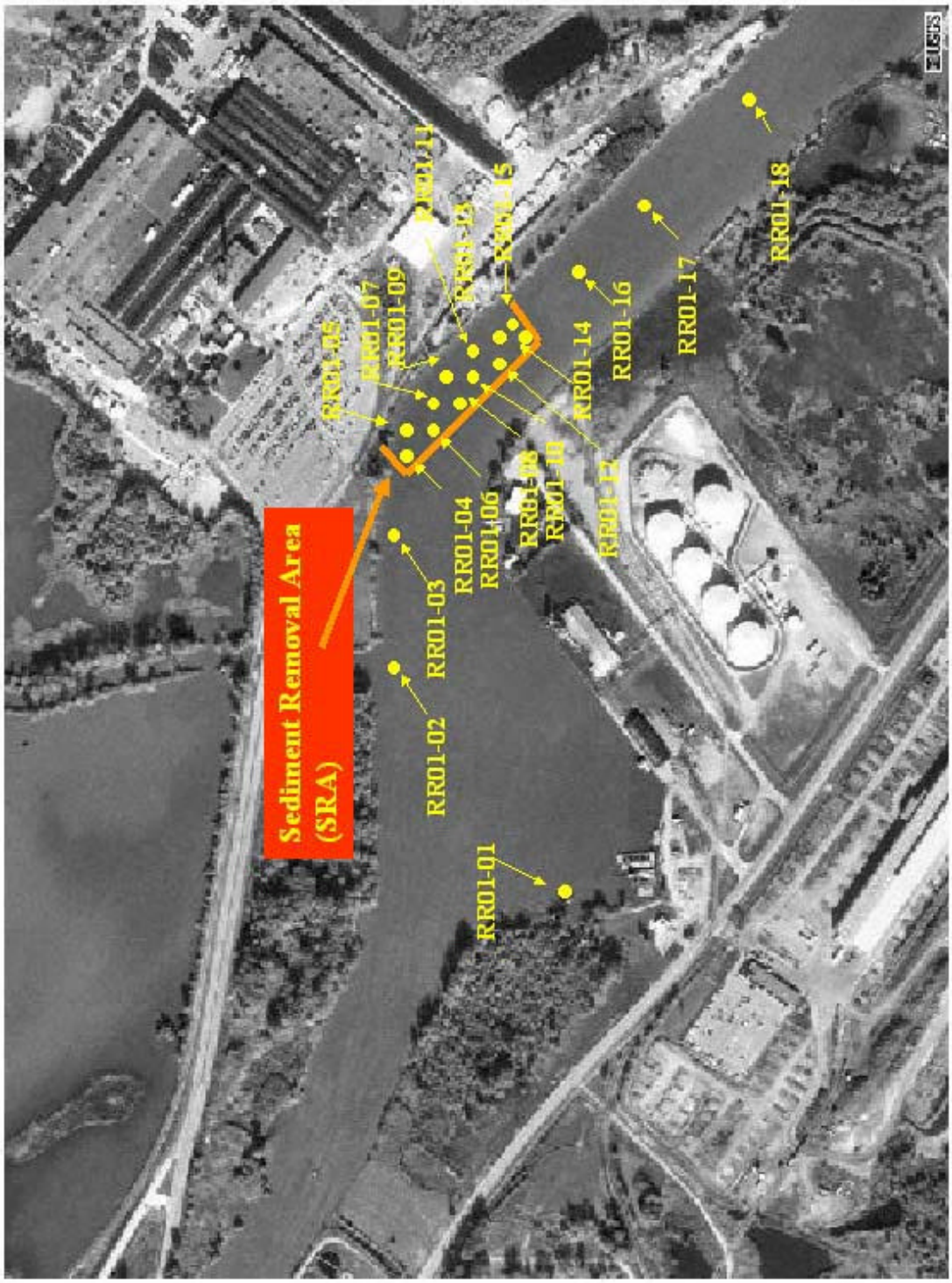
Prior to initiating sampling for this survey, GLNPO, in conjunction with the U.S. Army Corps of Engineers (Corps) and the Michigan Department of Environmental Quality (MDEQ), prepared a Quality Assurance Project Plan (QAPP) [*USEPA, 2001*], which was reviewed and signed by all major participants in the collection and analysis of samples. The QAPP contains detailed descriptions and standard operating procedures (SOPs) for all sampling and analysis methods. These methods are briefly described in the following subsections.

## 3. SEDIMENT CHEMISTRY

Both sediment cores and surficial ponar grab samples were collected for chemical analysis. PCB concentrations were the focus of the sediment chemistry survey, but some additional parameters were collected for use in evaluating the results of the whole sediment toxicity testing, which is discussed later. Sampling methods and locations and analysis methods and results are provided below.

Sediment sampling locations are shown in Figure 1.

**Figure 1**. Sediment Sampler Locations



## 3.1 SEDIMENT CHEMISTRY SAMPLING AND ANALYSIS METHODS

### 3.1.1 SEDIMENT CORE SAMPLING

Sediment cores were collected utilizing a Rossfelder Vibro-corer equipped with a polycarbonate plastic core tube outfitted with a plastic nose cone. After measuring water depth and sediment depth the vibro-corer and core tube assembly was driven into the sediments until refusal, or until reaching a sediment depth of 10-feet. The vibro-corer assembly was then retrieved to the deck of the vessel and the core tube was detached from the vibro-corer. The core tube was then laid on its side and sectioned into intervals of 0"-6", 6"-18", 18"-54", and 54"-90" utilizing a battery-powered circular saw. Sediment cores <90" in length were cut into fewer sections utilizing the same intervals (e.g. a 42" core would be sectioned into 0"-6", 6"-18", and 18"-42" intervals). Where coring was unsuccessful due to lack of sediment depth, a ponar grab sampler was used to collect a surficial sediment sample. Sediment from each interval was then transferred into stainless steel bowls, homogenized, and placed into appropriate sample jars. Sediment cores were analyzed for the parameters shown in Table 1.

**Table 1**. List of Analytical Parameters of Sediment Core Chemistry

| ***Analyte*** | ***Analysis Method*** |
|---|---|
| Moisture Content (Total Solids) | ASTM D2937 |
| TOC | 9060/Lloyd-Kahn |
| PCBs (Aroclors & Congeners[(1)]) | EPA 8082B |
| Oil and Grease | EPA 9071A |

*[(1)]The following 19 PCB congeners, listed by their International Union of Pure and Applied Chemistry Number (IUPAC #), were analyzed and reported for sediment chemistry: 1, 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, 206.*

The field team attempted to collect sediment cores at 20 sampling locations. Sediment coring was successful at 13 of these locations. Ponar grab sampling was successful at an additional five (5) proposed coring locations. One sampling location, RR01-20 was inaccessible due to low water levels, and no sediments were present at sampling location RR01-09. Therefore, sediment samples were collected at a total of 18 sediment coring locations.

### 3.1.2 SURFICIAL SEDIMENT SAMPLING (PONAR DREDGE SAMPLER)

Surficial sediment samples were collected using a ponar dredge sampler capable of collecting approximately 2-gallons of sediment. The ponar sampler was lowered into the sediments and automatically activated, samples were retrieved to the deck of the vessel, transferred into stainless steel bowls, homogenized, and placed into appropriate sample jars. Sediment ponar samples were analyzed for the wider range of chemical parameters than the sediment core samples. Analytical parameters for the ponar samples are summarized in Table 2.

**Table 2**. List of Analytical Parameters of Sediment Ponar Chemistry

| *Analyte* | *Analysis Method* |
|---|---|
| Moisture Content (Total Solids) | ASTM D2937 |
| Grain Size without hydrometer | ASTM-D422 |
| *28-day H. azteca*, and 10-day *C. tentans* Whole Sediment Toxicity Tests | EPA/600/R-99/064, Methods 100.4 (Survival & Length) and 100.2 (Survival & Weight) |
| *28-day L.variegatys* Bioaccumulation Test for Sediments | EPA/600/R-99/064, Methods 100.3 |
| TOC | 9060/Lloyd-Kahn |
| Ammonia-Nitrogen | E350.1 |
| TKN | E 351.2 |
| Total Phosphorus | E 365.2M |
| Metals Kit | EPA 6020, 6010A (As & Cd analyzed using 6010B ICAP Trace procedures), 7471A |
| PCBs (Sediments, *L. variegatus* tissue) Aroclors & Congeners[(1)] | EPA 8082B |
| PAHs | EPA 8270C |
| Acid Volatile Sulfide (AVS) [(2)] | EPA-121-R91-100 |
| Simultaneously Extracted (SEM) Metals [(2)] | EPA 6020M 6010A |

[(1)]The following 19 PCB congeners, listed by their International Union of Pure and Applied Chemistry Number (IUPAC #), will be analyzed and reported for sediment chemistry: 1, 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, 206.

[(2)] AVS-SEM Analysis Method can be found in the "Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment", EPA#: 821/R-91-100 YEAR: 1991, NTIS#:PB93-155901, ERIC#: D-121

The field team collected surficial ponar dredge samples at all eight (8) of the sites targeted for surficial sampling. Locations of the ponar samples overlap the sediment core locations and are shown in Figure 1.

## 3.2 SEDIMENT CHEMISTRY RESULTS

Appendix A contains the analytical results for the sediment cores and the surficial ponar samples. The totals of the PCB congener data should be used only as a qualitative evaluation tool, since the PCB congener data represents only a subset of the full list of PCB congeners. Additionally, several field duplicate and field replicate samples were collected for QA/QC purposes. A comparison of the routine field samples (RFS) and the duplicates and replicates are also provided in Appendix A for both the sediment cores and the ponar samples.

Visual summaries of the analytical results for total PCB Aroclors are provided in Figures 2 (surficial concentrations) and Figure 3 (max PCB concentration at depth).

It is noted that the results for PCB levels in sample RR-01-02B represent data from a second round of analysis. This sample was identified as an outlier data point due to the peculiar initial results (high PCB concentrations in the 6"-18" interval, surrounded by extremely low PCB concentrations in both the ponar sample and the 18"-54" interval). GLNPO asked the laboratories to perform a second set of analyses on this sample using excess sample material that was originally sent to Trace Laboratories for metals analysis. The second round of analysis was performed several weeks after the initial rounds of analyses were completed. Only PCB aroclor analysis was performed on this second sample. Therefore, no PCB congener data is reported for sample RR01-02B. PCB concentrations in sample RR01-02B were much lower than the original results and were in-line with the adjacent samples.

Also, the RR01-02A sample intended for semi-volatile and PCB analysis broke in transit to the laboratory. Therefore, no chemistry data for these parameters is provided for this sample. Important items observed in the sediment chemistry data include:

1. Elevated PCB concentrations remain in the "Sediment Removal Area". Maximum surficial PCB concentrations in SRA are >200 mg/kg (total Aroclors). Maximum total PCB concentration at depth in the SRA is 550 mg/kg (average of RFS and field duplicate);

2. PCB contamination does not appear to be a problem upstream of the SRA. Surficial PCB concentrations in sediments are all <1 mg/kg based on total aroclor analysis. Maximum PCB concentrations in the deep sediments are all <1.3 mg/kg.

3. PCB contamination in the sediments is a problem downstream of the SRA where surficial sediment concentrations are found up to 85 mg/kg (total of aroclors), and the deep sediments contain PCB concentrations up to 90 mg/kg.

4. Heavy metal and PAH contamination are only a minor concern within the study area. Most levels are present below the TEC and PEC sediment screening levels guidelines suggested by *MacDonald et al*. (2002);

5. All SEM minus AVS (SEM-AVS) values in the ponar samples are less than zero, indicating that metals contamination are not likely to contribute to toxicity to benthic organisms (cite reference).

6. PCB congener data are highly correlated to PCB aroclor data and serve as a good, qualitative indication of the accuracy of the PCB aroclor data;

7. There is not sufficient data to determine the source of PCB contamination remaining in the SRA. On-going sources, sloughing of contaminated sediments from the adjacent navigational channel, and residual contamination from the completed dredging project should all be investigated as potential sources of the PCB contamination in the SRA.

8. Results of field duplicate and field replicate analysis indicate a moderate level of variability with some RPD calculations >50%. However, the field duplicates and replicates indicate that this PCB

data is accurate to a factor of <3 (i.e., PCB concentrations provide in the results table are expected to be within a factor of 3 of the true total PCB concentration present in each sample). Therefore, this data is considered to be of sufficient quality to be used to make management decisions at this site.

**Figure 2.** Surficial PCB Concentrations (total PCB Aroclors)

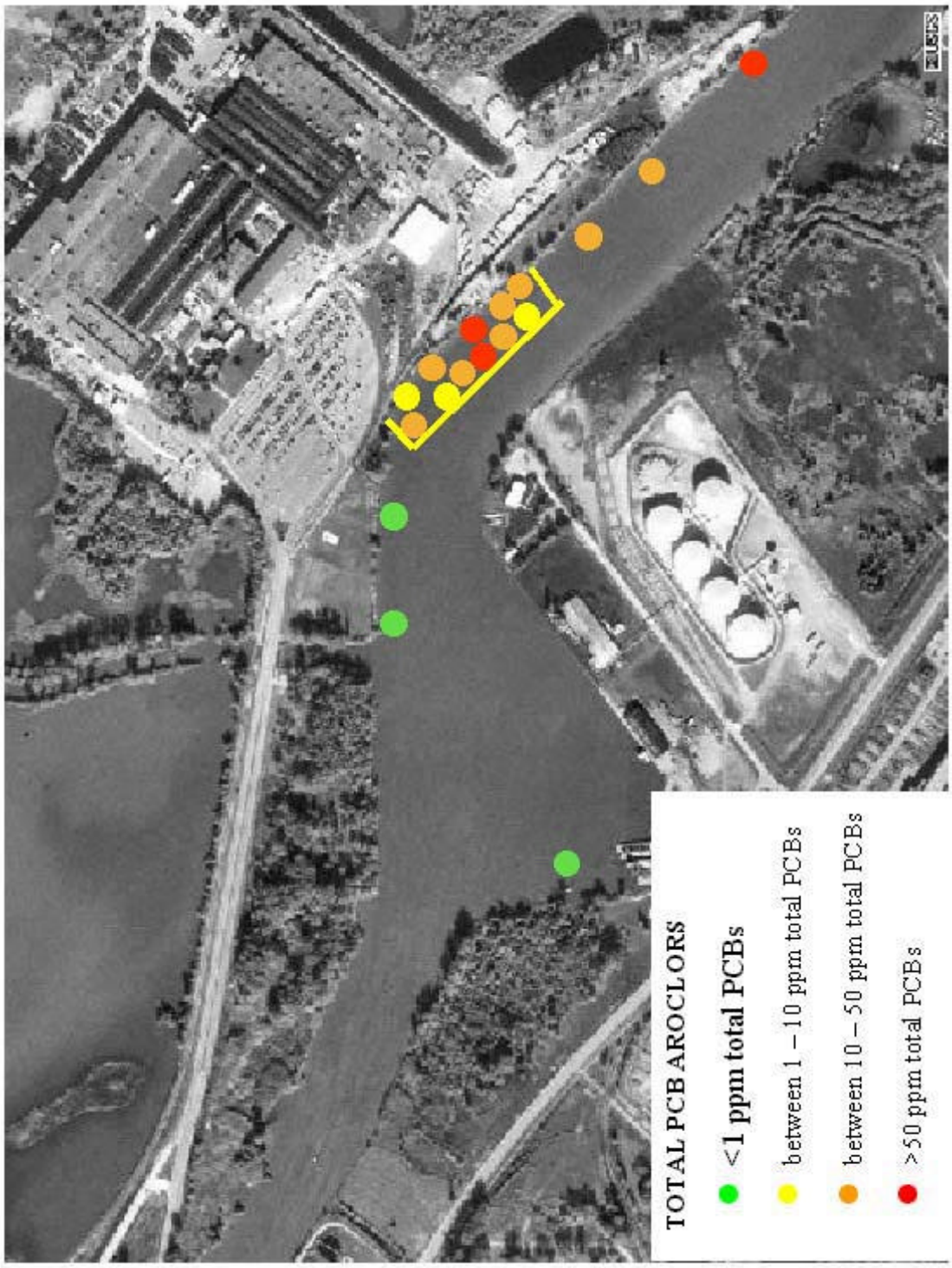
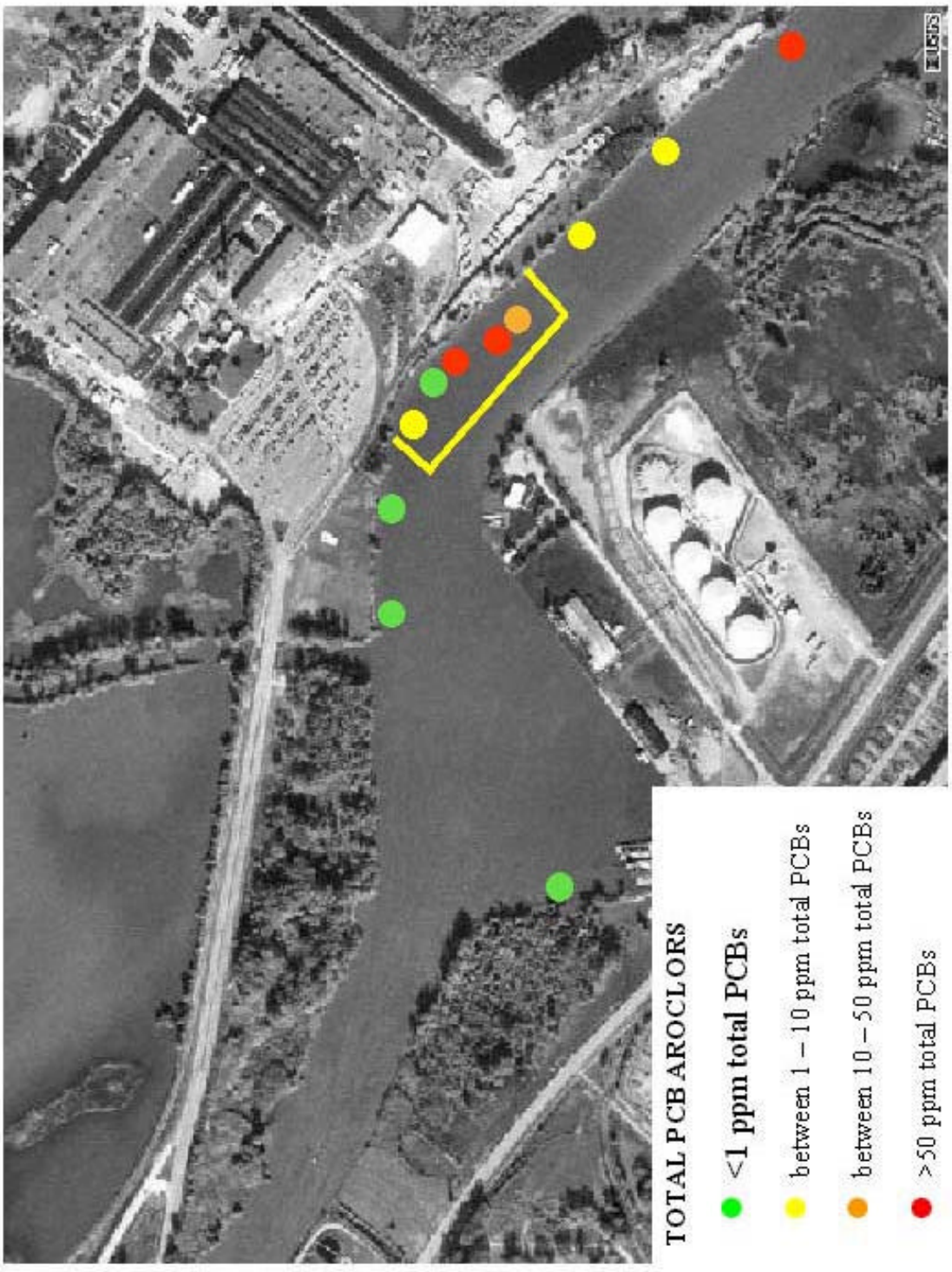


**Figure 3.** PCB Concentrations at Depth (total PCB Aroclors)



# 4. CAGED FISH SAMPLING

## 4.1 CAGED FISH SAMPLING AND ANALYSIS METHODS

Caged fish sampling and processing was performed according to MDEQ GLEAS Procedures #31 and #62 (Procedure #31 is available at: http://www.deq.state.mi.us/documents/deq-swq-gleas-proc31.pdf, procedure #62 is available upon request). A total of 32 young-of-the-year catfish were placed into each of 4 fish cages (3 routine field samples and one duplicate cage). Fish cages were left in place for a total of 28-days, and then harvested. Surviving organisms were divided into 4 replicates of approximately equal weight, frozen, and submitted to the laboratory for whole fish processing. Sediment samples were collected at each of the cage fish sites prior to setting each cage, and after collection of each cage. Water samples were collected at each site prior to setting of the cages. Caged fish sampling locations are shown in Figure 4.

The fish, water, and sediment samples were analyzed for the parameters listed in Table 3.

**Table 3**. List of Analytical Parameters of Caged Fish Testing

| *Analyte* | *Analysis Method* |
|---|---|
| Moisture Content/Total Solids (Sediments) | ASTM D2937 |
| TOC (Water and Sediments) | 9060/Lloyd-Kahn |
| Metals Kit (Water and Sediments) | EPA 6020, 6010A (As & Cd analyzed using 6010B ICAP Trace procedures), 7471A |
| PCBs Aroclors & Congeners[(1)] (Sediments, Water, Fish Tissue) | EPA 8082B |

[(1)]The following 19 PCB congeners, listed by their International Union of Pure and Applied Chemistry Number (IUPAC #), will be analyzed and reported for sediment chemistry: 1, 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, 206.

## 4.2. CAGED FISH SAMPLING RESULTS

The results of the caged fish tissue analysis are summarized visually in Figure 5. Details of the analytical results of the caged fish sampling are provided in Appendix B for the fish tissue, sediment, and water chemistry. Table 5 summarizes the number of surviving fish in each cage at the end of the 28-day sampling event.

**Figure 4.** Caged Fish Sampling Locations

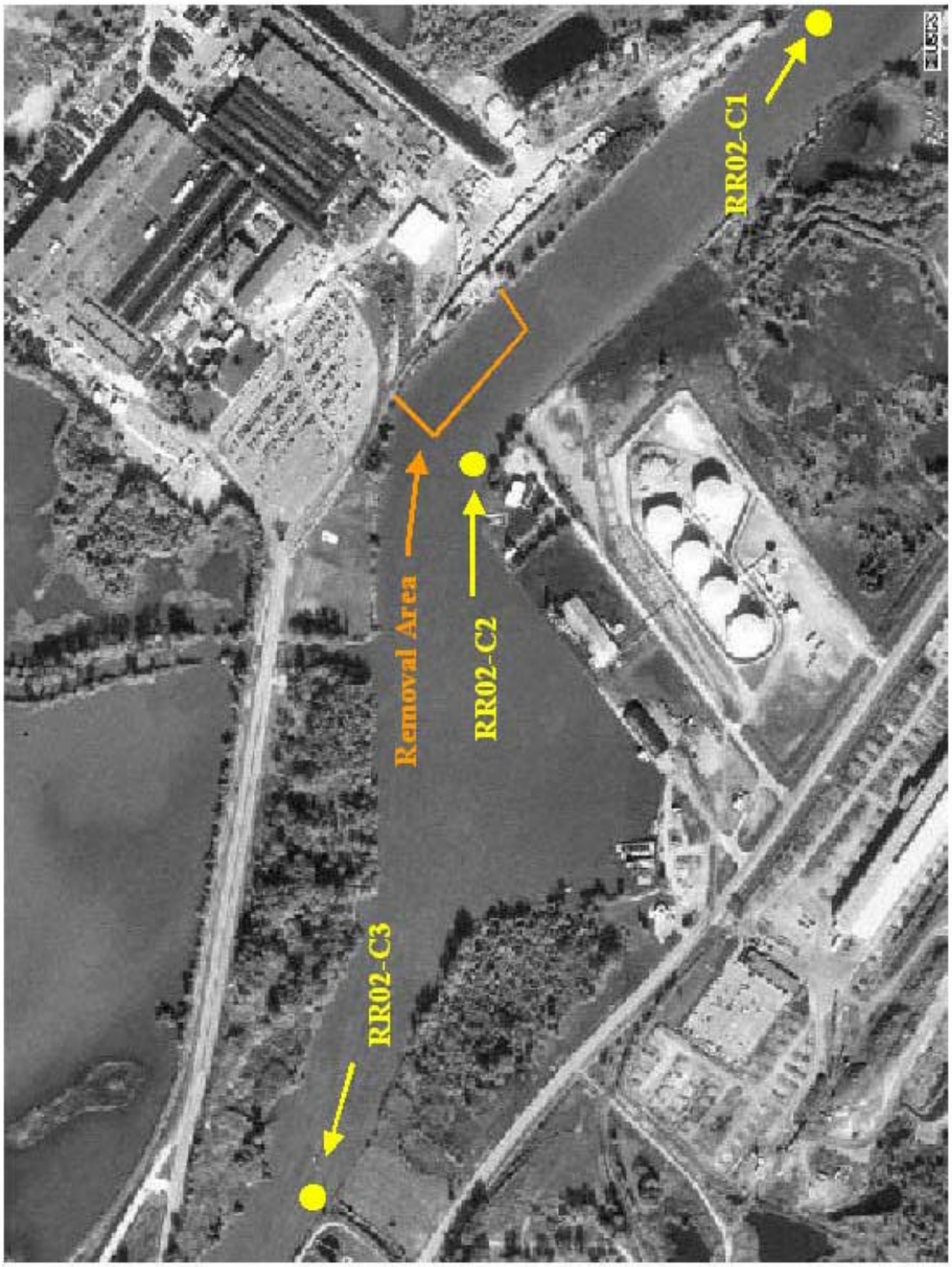


**Figure 5**. Summary of PCB Levels in Caged Fish Tissue

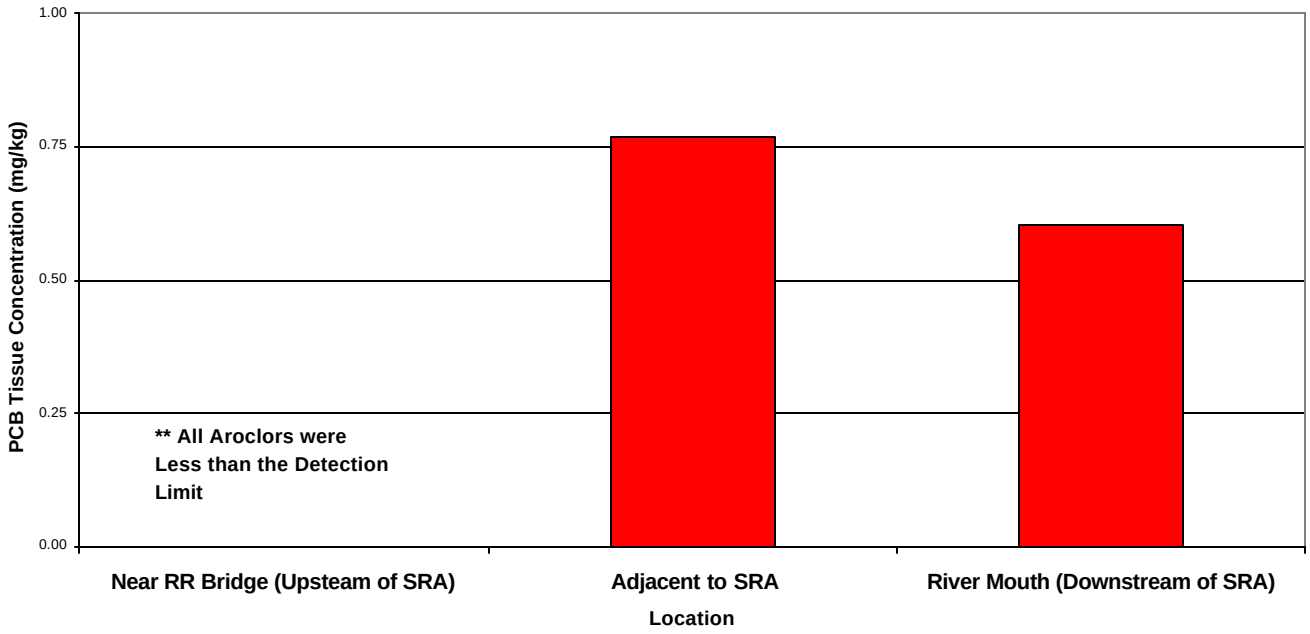



**Table 5**. Number of Surviving Fish from Caged Fish Sampling

| *Location* | *Number of Surviving Fish* |
|---|---|
| **C-1** | 29 |
| **C-2** | 18 |
| **C-2 DUP** | 31 |
| **C-3** | 15 |

Important items to observe in the data include:

1. As shown in Figure 5, the caged fish results indicate that there is the potential for significant uptake of PCBs into the food web in the areas adjacent to and down-steam of the SRA;

2. PCB uptake into caged fish are highest adjacent to the SRA;

3. PCB concentrations in caged fish are similar to those measured by MDEQ in 1991 and 1998 caged fish studies, and significantly below the results from a 1988 caged fish study *(MDEQ 2001*, Figure 72);

4. PCB uptake into the caged fish does not appear to be a significant problem upstream of the turning basin; and

5. The RPDs between the field replicate and the routine field sample for location C-2 are shown in Table 4 and are 12% and 0%, for total aroclors and total congeners, respectively. This indicates a high degree of precision and representativeness in the caged fish samples. Therefore, we conclude that the caged fish data is of sufficient quality for making screening level management decisions at the site.

It should be noted that caged fish testing is not a direct indicator of bioaccumulation in wild fish, but only an indication of the potential for uptake into the food web. Additional human health and ecological risk work is required to estimate the risk from PCBs at this site.

# 5. WHOLE SEDIMENT BIOACCUMULATIVE SAMPLING

## 5.1 BIOACCUMULATION SAMPLING AND ANALYSIS METHODS

Sediment ponar samples were collected at seven (7) locations, the eight (8) ponar sampling sites shown in Figure 1 excluding location RR01-06P. A total of four liters of sample was collected from each of these eight (8) locations to be utilized for performing whole sediment bioaccumulation testing. Bioaccumulation testing was performed by AScI Corporation with *Lumbriculus variegatus* as specified in Test Method 100.3 in *USEPA* (2000). Tissue chemistry analysis was performed by Lancaster Laboratories. One duplicate sample and one replicate sample were collected for QA/QC purposes. L. variegatus tissue was analyzed for the parameters listed in Table 4.

## 5.2 BIOACCUMULATION SAMPLING RESULTS

The results of the whole sediment bioaccumulation testing are summarized visually in Figure 6. Details of the analytical results of the bioaccumulation testing and the QA/QC comparisons of RPD are provided in Appendix C. Sampling locations are shown in Figure 1.

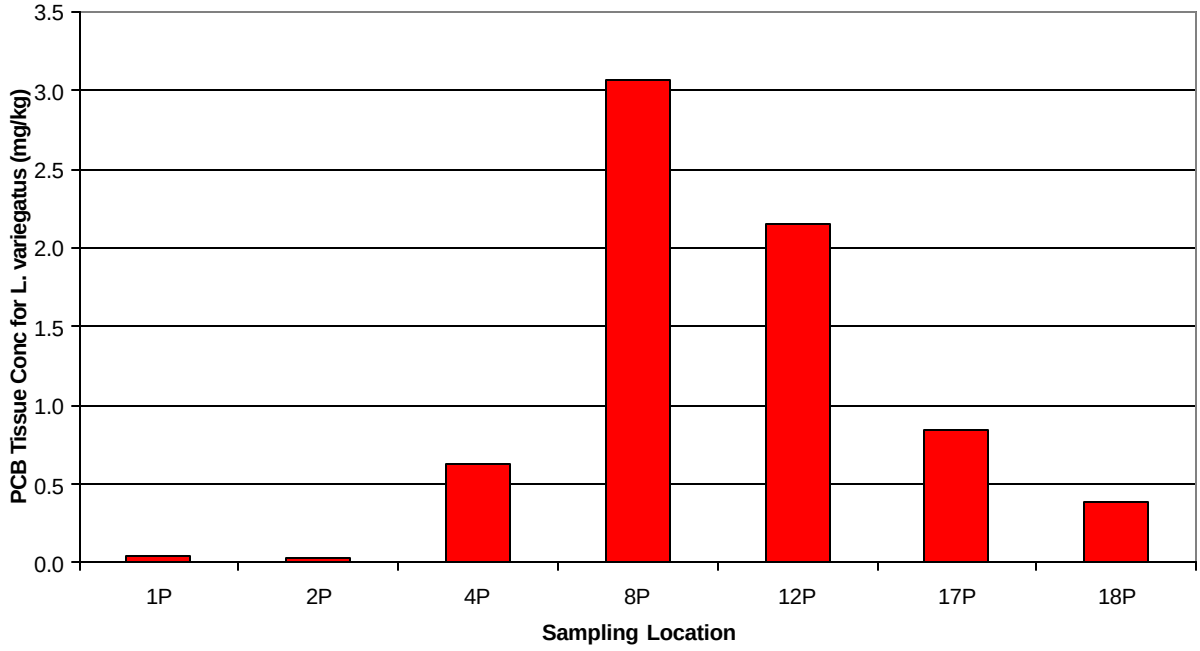



**Figure 6**. Summary of PCB Levels in Whole Sediment Bioaccumulation Testing (Station Locations are shown in Figure 1)

Important items to observe in the data include:

1. As shown in Figure 6, the whole sediment bioaccumulation testing results indicate that there is the potential for significant uptake of PCBs into the food-chain in the areas adjacent to and downstream of the SRA;

2. Bioaccumulation is highest in sediment samples collected within the SRA;

3. PCB uptake does not appear to be a significant problem upstream of the SRA;

4. The RPDs between the field replicates and the routine field sample for location 4P and 17P were 3% and 5%, respectively. This indicates a high degree of precision and representativeness in the whole sediment bioaccumulation sampling and testing process. Therefore, we can conclude that the whole sediment bioaccumulation data is of sufficient quality for making management decisions at the site.

Table 6 summarizes the results of the sediment chemistry and tissue chemistry analysis for the seven RFS ponar samples. Due to the presence of large amounts of gravel and shells, no bioaccumulation sample was collected at location RR01-06P As can be seen in Table 6, tissue bioaccumulation concentrations of PCBs are highly correlated to sediment chemistry results. In fact there is an almost perfect correlation between the data sets. The calculated correlation coefficient for the two data sets is 0.988 where 1.00 would be perfect correlation.

**Table 6**. Comparison of PCB Concentrations in Bioaccumulation Tests and Sediments

| Location | Sediment PCB Conc. (mg/kg) | Tissue PCB Conc. (mg/kg) |
|---|---|---|
| **1P** | 0.2 | 0.0 |
| **2P** | 0.2 | 0.0 |
| **4P** | 3.9 | 0.6 |
| **8P** | 18.0 | 3.1 |
| **12P** | 10.0 | 2.2 |
| **17P** | 5.4 | 0.8 |
| **18P** | 1.4 | 0.4 |

Once again it is noted that caged fish testing is not a direct indicator of bioaccumulation in wild fish, but only an indication of the potential for uptake into the food web. Additional human health and ecological risk work is required to estimate the risk from PCBs at this site.

## 6. WATER DEPTH AND SEDIMENT DEPTH SURVEY

### 6.1 WATER DEPTH SURVEY METHODS AND RESULTS

Water Depth Measurement Method: After arriving and triple-point anchoring at each sampling location. The field team used a weighted tape measure to estimate water depth to the nearest 1-inch. At locations where wave action caused variability in the depth measurement, the field team members estimated water depth by averaging between the high and low water marks on the tape measure. Water depth was recorded on a field data log sheet.

Water depth data was collected at each sampling location and the results are provided in Appendix D. Water surface elevation data, referenced to low water datum (LWD) are also provided in Appendix D for each day of sampling. Given the proximity of sampling locations to open water Lake Erie, Lake Erie water elevations are provided. Water data was collected for purposes of future data reference, and no additional evaluation of this data was performed.

### 6.2 SEDIMENT DEPTH SURVEY METHODS AND RESULTS

Sediment Depth Survey Method: Sediment depth data were collected at each of the sediment core locations within the SRA. Sampling locations are shown in Figure 1 and results are detailed in Appendix D. This data was collected in order to provide a rough estimate of volume and average PCB concentration of sediments remaining in the SRA.

The sediment depth survey was conducted as follows:

> After measuring water depth and recording sampling location from the differentially corrected GPS, the field team assembled a set of 2-inch diameter, aluminum rods to use as a sediment probing devices. Each rod is 6-feet long and the six rods can be connected in series to reach a maximum depth of 36-feet. Each rod is marked in 1-foot increments to allow for fairly accurate depth measurement. After assembling the rods, the field team members lowered the rod to the sediment-water interface, noted the depth measurement, and then pushed the rod into the sediments until refusal. The total depth of penetration by the rods represents the estimated sediment depth. Sediment depth was then recorded on a field data log sheet to the nearest 0.25 feet.

Using the sediment depth data provided in Appendix D and the PCB chemistry data provided in Section 3, we can obtain a rough estimate of the volume and PCB concentration of the contaminated sediments remaining in the SRA. Appendix E contains the details of the calculations used to make the estimate. The method described in Appendix E provides only a crude estimate of the volume and PCB concentration of contaminated sediments remaining in the SRA. However, the accuracy of this measurement is sufficient for providing a screening level evaluation of the conditions within the SRA.

| | |
|---|---|
| **Estimated Volume of Contaminated Sediments Remaining in SRA** | **= 2,600 cubic yards** |
| **Average Depth of Sediment in the SRA** | **= 1.1 feet** |
| **Est. Avg. Surficial PCB Concentrations in SRA Sediments** | **= 35 mg/kg** |
| **Est. Avg. PCB Concentration in all SRA Sediments** | **= 58 mg/kg** |

# 7. CONCLUSIONS AND RECOMMENDATIONS

## 7.1 CONCLUSIONS

The results from the caged fish, whole sediment bioaccumulation, and sediment chemistry testing and analysis all present a similar picture and indicate that PCBs are still a potential ecological and human health risk within the Raisin River AOC. The following are the major conclusions based on the results of the sampling performed by GLNPO, MDEQ, and the Corps of Engineers.

1. Significant levels of PCBs (> 500 ppm) in the sediments continue to impact the AOC downstream of the turning basin including significantly elevated concentrations (> 200 ppm) within the SRA;

2. PCB contamination is present in both surficial sediments (top 6-inches) and deeper sediments in the SRA and downstream areas;

3. Caged fish and whole sediment bioaccumulation testing indicate the potential for significant bioaccumulation of PCBs in areas within and downstream of the SRA;

4. PCB contamination is not a significant problem upstream of the SRA; and

5. PAHs, heavy metals, and oil & grease are only present at moderate levels and should probably not be considered primary contaminants of concern at this site.

## 7.2 RECOMMENDATIONS

Additional work is needed to evaluate the current state of the sediments within the Raisin River AOC and to support decision-making at the site. Although, it may not be necessary to collect additional sediment data at the site, it is necessary to evaluate all available data available for the AOC. The authors have the following specific recommendations for further evaluation and analysis:

1. USEPA and MDEQ should undertake an extensive review of existing data to investigate the potential source of PCB contamination remaining in the SRA. On-going sources, sloughing of PCB-contaminated sediments from the adjacent navigational channel, and residual contamination from the dredging project should all be investigated as potential causes of the PCB contamination in the sediments currently in the SRA. This analysis should be performed prior to taking additional remedial actions at the site in order to obtain the benefit of any insights this analysis may provide.

2. USEPA and MDEQ should coordinate with other state, local, and federal stakeholders to complete a screening level risk assessment for the sediments in the Raisin River AOC.

3. USEPA and MDEQ should coordinate with other state, local, and federal stakeholders to devise a method of addressing the PCB contamination remaining in the Raisin River AOC. These

efforts should focus on the area downstream of the turning basin and determining the next steps for action in the AOC.

## 8. REFERENCES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# Appendix A

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-01A | RR01-01B | RR01-02A | RR01-02B | RR01-02C | RR01-03A | RR01-03B | RR01-03C | RR01-04A | RR01-04B | RR01-04C |
| **Date Collected** | | mm/dd/yy | 10/15/01 | 10/15/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 |
| **Time Collected** | | hhhh | 1405 | 1405 | 1545 | 1545 | 1545 | 1444 | 1444 | 1444 | 1408 | 1408 | 1408 |
| **Latitude** | GPS | dd mm.mmm | 41 53.969 | 41 53.969 | 41 54.076 | 41 54.076 | 41 54.076 | 41 54.070 | 41 54.070 | 41 54.070 | 41 54.069 | 41 54.069 | 41 54.069 |
| **Longitude** | GPS | dd mm.mmm | -83 21.637 | -83 21.637 | -83 21.483 | -83 21.483 | -83 21.483 | -83 21.352 | -83 21.352 | -83 21.352 | -83 21.272 | -83 21.272 | -83 21.272 |
| **Slice Start Depth** | | inches | 0 | 6 | 0 | 6 | 18 | 0 | 6 | 18 | 0 | 6 | 18 |
| **Slice End Depth** | | inches | 6 | 17 | 6 | 18 | 62 | 6 | 18 | 44 | 6 | 18 | 46 |
| TOC | Walkley-Black | mg/kg | 29,000 | 32,000 | 34,000 | 39,000 | 84,000 | 37,000 | 34,000 | 36,000 | 28,000 | 85,000 | 41,000 |
| % Moisture (Trace) | D2974 | % | 58.4 | 53.2 | 54.2 | 53.6 | 55.6 | 56.4 | 49.7 | 48.2 | 50.1 | 54.8 | 39.8 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 58.2 | 53.2 | n/r | 51.1 | 54.4 | 55.5 | 48.4 | 48.4 | 46.8 | 53.9 | 43.9 |
| Oil and Grease | 9071 | mg/kg | < 600 | < 530 | < 540 | < 540 | < 560 | < 570 | < 500 | < 480 | 560 | 1,500 | 830 |
| **Metals** | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 7.7 | 9.7 | 8.1 | 5.9 | 8.3 | 10 | 9.8 | 8.3 | 7.8 | 10 | 9.3 |
| Total Barium | 6020 | mg/kg | 100 | 150 | 110 | 110 | 300 | 120 | 150 * | 130 * | 120 | 560 | 460 |
| Total Cadmium | 6020 | mg/kg | 0.67 | 0.86 | 0.8 | 0.81 | 3.4 | 0.78 | 0.86 | 0.89 | 0.6 | 4.1 | 2.8 |
| Total Chromium | 6020 | mg/kg | 25 | 42 | 32 | 34 | 77 | 38 | 44 | 50 | 32 | 71 | 47 |
| Total Copper | 6020 | mg/kg | 33 | 44 | 38 | 47 | 120 | 43 | 45 | 58 | 34 | 100 | 81 |
| Total Iron | 6010 | mg/kg | 20,000 | 27,000 | 20,000 | 20,000 | 18,000 | 22,000 | 26,000 | 24,000 | 17,000 | 21,000 | 17,000 |
| Total Lead | 6020 | mg/kg | 28 | 43 | 34 | 41 | 290 | 38 | 36 | 53 | 27 | 270 | 200 |
| Total Manganese | 6010 | mg/kg | 520 | 720 | 470 | 520 | 440 | 590 | 650 | 580 | 400 | 340 | 260 |
| Total Mercury | 7471 | mg/kg | < 0.10 | 0.13 | 0.14 | 0.19 | 1.4 | 0.15 | 0.21 | 0.23 | 0.12 | 1.3 | 0.88 |
| Total Nickel | 6020 | mg/kg | 28 | 40 | 30 | 34 | 37 | 34 | 37 | 42 | 25 | 50 | 31 |
| Total Selenium | 6020 | mg/kg | 1.2 | 1.7 | < 0.36 | 1.7 | < 0.36 | 1.5 | 1.7 | 0.48 | 1.2 | 1.5 | 1.2 |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 | < 0.50 | < 0.50 | 2.2 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | 1.7 | 1.3 |
| Total Zinc | 6020 | mg/kg | 100 | 260 | 120 | 140 | 530 | 120 | 140 | 170 * | 89 | 670 | 600 |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.0079 | < 0.0071 | n/r | <0.0066 | < 0.0072 | < 0.037 | < 0.032 | < 0.032 | < 3.1 | < 0.036 | < 0.0059 |
| Aroclor-1221 | 8082 | mg/kg | < 0.011 | < 0.0094 | n/r | <0.0088 | < 0.0096 | < 0.049 | < 0.043 | < 0.043 | < 4.1 | < 0.048 | < 0.0078 |
| Aroclor-1232 | 8082 | mg/kg | < 0.0079 | < 0.0071 | n/r | <0.0066 | < 0.0072 | < 0.037 | < 0.032 | < 0.032 | < 3.1 | < 0.036 | < 0.0059 |
| Aroclor-1242 | 8082 | mg/kg | 0.12 | 0.21 | n/r | <0.0066 | 0.43 | 0.52 | 0.32 | 1.3 | 20 | 1.2 | 0.26 |
| Aroclor-1248 | 8082 | mg/kg | < 0.0086 | < 0.0077 | n/r | 0.49 | < 0.0072 | < 0.040 | < 0.035 | < 0.035 | < 3.4 | < 0.039 | < 0.0064 |
| Aroclor-1254 | 8082 | mg/kg | < 0.0079 | < 0.0071 | n/r | <0.0066 | < 0.0072 | < 0.037 | < 0.032 | < 0.032 | < 3.1 | < 0.036 | < 0.0059 |
| Aroclor-1260 | 8082 | mg/kg | 0.039 J | 0.044 | n/r | 0.043 | 0.28 | 0.049 J | 0.063 J | 0.12 J | < 3.1 | 0.21 | 0.071 |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | < 0.0017 | 0.0089 J | n/r | < 0.72 | < 0.0077 | < 0.0079 | < 0.0068 | 0.035 J | 2.5 J | 0.10 | 0.0091 J |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.00048 | < 0.0021 | n/r | < 0.20 | < 0.0022 | < 0.0022 | < 0.0019 | < 0.0039 | < 0.19 | < 0.00043 | < 0.0018 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.011 | 0.016 | n/r | 1.6 | 0.015 | 0.033 | < 0.0019 | 0.140 | 3.0 | < 0.00043 | < 0.0018 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 0.017 | 0.029 | n/r | 0.58 J | < 0.0022 | 0.041 | 0.024 | 0.090 | 0.48 J | 0.016 | 0.0031 J |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.010 | 0.017 | n/r | 0.55 J | 0.017 | 0.029 | 0.019 | 0.053 | 0.27 J | 0.013 | < 0.0018 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.013 | 0.024 | n/r | 1.0 | 0.025 | 0.042 | 0.025 | 0.071 | 0.80 | 0.024 | 0.0035 J |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.0089 | 0.015 | n/r | 0.50 J | 0.017 | 0.022 | 0.018 | 0.049 | < 0.19 | 0.0088 | < 0.0018 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 0.0017 | 0.0033 J | n/r | < 0.20 | 0.0070 J | 0.0052 J | 0.0030 J | 0.0063 J | < 0.19 | 0.0026 | < 0.0018 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.0030 | 0.0060 J | n/r | < 0.20 | 0.020 | 0.014 | 0.0076 | 0.019 | < 0.19 | 0.011 | 0.0073 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.0058 | 0.0099 | n/r | < 0.20 | 0.017 | 0.017 | 0.011 | 0.027 | < 0.19 | 0.0076 | 0.0028 J |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.0024 | 0.0047 J | n/r | < 0.20 | 0.013 | 0.012 | 0.0046 J | 0.0079 J | < 0.19 | 0.010 | 0.0064 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | < 0.00048 | < 0.0021 | n/r | < 0.20 | 0.0062 J | < 0.0022 | < 0.0019 | < 0.0039 | < 0.19 | 0.0034 | 0.0030 J |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | 0.00086 J | < 0.0021 | n/r | < 0.20 | 0.0057 J | 0.0045 J | < 0.0019 | < 0.0039 | < 0.19 | 0.0037 | 0.0022 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.0027 | 0.0033 J | n/r | < 0.20 | 0.014 | 0.011 | 0.0044 J | 0.0095 J | < 0.19 | 0.0087 | 0.0045 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 0.0011 J | < 0.0021 | n/r | < 0.20 | 0.0061 J | 0.0053 J | < 0.0019 | < 0.0039 | < 0.19 | 0.0066 | 0.0033 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.0015 J | 0.0025 J | n/r | < 0.20 | 0.014 | 0.0062 J | 0.0029 J | 0.0056 J | < 0.19 | 0.014 | 0.0082 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.00048 | < 0.0021 | n/r | < 0.20 | 0.0044 J | < 0.0022 | < 0.0019 | < 0.0039 | < 0.19 | 0.0039 | 0.0021 J |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.0013 J | 0.0022 J | n/r | < 0.20 | 0.010 | 0.0041 J | 0.0021 J | 0.0041 J | < 0.19 | 0.0093 | 0.0056 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.00048 | < 0.0021 | n/r | < 0.20 | 0.013 | < 0.0022 | < 0.0019 | < 0.0039 | < 0.19 | 0.014 | 0.0086 |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 0.08 | 0.11 | - | 2.60 | 0.18 | 0.22 | 0.10 | 0.45 | 3.80 | 0.26 | 0.03 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 0.12 | 0.25 | - | 0.53 | 0.71 | 0.52 | 0.32 | 1.30 | 20.00 | 1.41 | 0.33 |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-05A | RR01-06A | RR01-06B | RR01-07A | RR01-08A | RR01-08B | RR01-08C | RR01-09A | RR01-10A | RR01-10B | RR01-11A |
| **Date Collected** | | mm/dd/yy | 10/18/01 | 10/19/01 | 10/19/01 | 10/18/01 | 10/19/01 | 10/19/01 | 10/19/01 | 10/18/01 | 10/19/01 | 10/19/01 | 10/18/01 |
| **Time Collected** | | hhhh | 1034 | 0924 | 0924 | 1010 | 0953 | 0953 | 0953 | 0942 | 1034 | 1034 | 0907 |
| **Latitude** | GPS | dd mm.mmm | 41 54.065 | 41 54.052 | 41 54.052 | 41 54.054 | 41 54.039 | 41 54.039 | 41 54.039 | 41 54.036 | 41 54.028 | 41 54.028 | 41 54.052 |
| **Longitude** | GPS | dd mm.mmm | -83 21.275 | -83 21.250 | -83 21.250 | -83 21.238 | -83 21.236 | -83 21.236 | -83 21.236 | -83 21.220 | -83 21.215 | -83 21.215 | -83 21.202 |
| **Slice Start Depth** | | inches | 0 | 0 | 6 | ponar | 0 | 6 | 18 | No Sample | 0 | 6 | ponar |
| **Slice End Depth** | | inches | 4 | 6 | 17 | ponar | 6 | 18 | 30 | No Sample | 6 | 16 | ponar |
| TOC | Walkley-Black | mg/kg | 22,000 | 19,000 | 30,000 | 12,000 | 27,000 | 26,000 | 40,000 | No Sample | 23,000 | 32,000 | 23,000 |
| % Moisture (Trace) | D2974 | % | 34.5 | 44.0 | 53.0 | 36.5 | 57.4 | 51.0 | 49.0 | No Sample | 48.0 | 51.8 | 46.4 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 31.1 | 42.2 | 52.0 | 29.8 | 57.4 | 50.7 | 48.9 | No Sample | 48.1 | 53.1 | 25.5 |
| Oil and Grease | 9071 | mg/kg | < 380 | < 450 | < 530 | 520 | < 590 | < 510 | < 490 | No Sample | < 480 | 700 | 1,200 |
| **Metals** | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 4.7 | 7.0 | 7.9 | 6.3 | 7.0 | 8.3 | 8.5 | No Sample | 7.2 | 7.8 | 7.4 |
| Total Barium | 6020 | mg/kg | 74 | 78 | 120 | 52 | 91 | 130 | 160 | No Sample | 77 | 100 | 70 |
| Total Cadmium | 6020 | mg/kg | 0.26 | 0.43 | 0.74 | 0.85 | 0.56 | 2.0 | 1.1 | No Sample | 0.52 | 0.71 | 0.59 |
| Total Chromium | 6020 | mg/kg | 9.3 | 23 | 39 | 15 | 27 | 40 | 54 | No Sample | 22 | 34 | 23 |
| Total Copper | 6020 | mg/kg | 12 | 29 | 44 | 30 | 32 | 51 | 66 | No Sample | 33 | 45 | 35 |
| Total Iron | 6010 | mg/kg | 12,000 | 16,000 | 23,000 | 12,000 | 18,000 | 24,000 | 23,000 * | No Sample | 17,000 | 20,000 | 12,000 |
| Total Lead | 6020 | mg/kg | 8.6 | 21 | 33 | 15 | 22 | 220 | 54 | No Sample | 20 | 32 | 32 |
| Total Manganese | 6010 | mg/kg | 360 | 390 | 490 | 300 | 460 | 590 | 510 | No Sample | 440 | 490 | 310 |
| Total Mercury | 7471 | mg/kg | < 0.10 | 2.0 | 0.26 | < 0.10 | 0.17 | 0.33 | 0.43 | No Sample | < 0.10 | 0.23 | 0.14 |
| Total Nickel | 6020 | mg/kg | 18 | 25 | 36 | 19 | 28 | 40 | 42 | No Sample | 26 | 34 | 22 |
| Total Selenium | 6020 | mg/kg | < 0.29 | < 0.29 | < 0.41 | 0.95 | < 0.38 | 1.8 | < 0.34 | No Sample | 1.4 | < 0.28 | 1.0 |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | No Sample | < 0.50 | < 0.50 | 1.1 |
| Total Zinc | 6020 | mg/kg | 36 | 90 | 140 | 77 | 110 | 150 | 190 | No Sample | 100 | 130 | 76 |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.024 | < 1.1 | < 0.034 | < 0.94 | < 0.39 | < 3.3 | < 6.5 | No Sample | < 6.4 | < 7.0 | < 11 |
| Aroclor-1221 | 8082 | mg/kg | < 0.032 | < 1.5 | < 0.046 | < 1.3 | < 0.52 | < 4.5 | < 8.6 | No Sample | < 8.5 | < 9.4 | < 15 |
| Aroclor-1232 | 8082 | mg/kg | < 0.024 | < 1.1 | < 0.034 | < 0.94 | < 0.39 | < 3.3 | < 6.5 | No Sample | < 6.4 | < 7.0 | < 11 |
| Aroclor-1242 | 8082 | mg/kg | 0.40 | 8.7 | 0.67 | 27 | 7.9 | 46 | 300 | No Sample | 190 | 150 | 93 |
| Aroclor-1248 | 8082 | mg/kg | < 0.026 | < 1.2 | < 0.038 | < 1.0 | < 0.42 | < 3.7 | < 7.0 | No Sample | < 6.9 | < 7.7 | < 12 |
| Aroclor-1254 | 8082 | mg/kg | < 0.024 | < 1.1 | < 0.034 | < 0.94 | < 0.39 | < 3.3 | < 6.5 | No Sample | < 6.4 | < 7.0 | < 11 |
| Aroclor-1260 | 8082 | mg/kg | < 0.024 | < 1.1 | 0.065 J | 1.6 J | 0.68 | < 3.3 | 24 J | No Sample | 17 | 10 | < 11 |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 0.028 | 0.52 J | < 0.0073 | 1.5 | 0.11 J | 1.7 | 75 | No Sample | 25 | 20 | 4.9 J |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.00029 | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | < 0.041 | < 0.39 | No Sample | < 0.39 | < 0.43 | < 0.67 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.024 | 1.1 | 0.018 | 2.6 | 0.38 | 3.1 | 42 | No Sample | 15 | 18 | 12 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 0.0037 | 0.39 | 0.033 | 0.63 | 0.46 | 1.0 | 23 | No Sample | 11 | 4.2 | 8.8 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.0026 | 0.34 | 0.023 | 0.55 | 0.34 | 0.6 | 5.1 | No Sample | 9.1 | 6.6 | 4.6 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.0047 | 0.54 | 0.029 | 0.93 | 0.47 | 1.2 | 11 | No Sample | 10 | 14 | 7.1 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.0017 | 0.31 | 0.025 | 0.58 | 0.46 | 0.75 | 7.8 | No Sample | 16 | 6.1 | 4.5 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.069 | 0.0040 J | < 0.057 | 0.057 J | 0.095 J | 1.6 | No Sample | 3.3 | 1.3 J | < 0.67 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.00097 J | 0.12 J | 0.0083 | 0.21 | 0.12 | 0.23 | 3.9 | No Sample | 5.6 | 2.6 | 1.9 J |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.0012 | 0.17 J | 0.012 | 0.27 | 0.15 | 0.27 | 4.3 | No Sample | 6.7 | 3.4 | 2.4 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.00043 J | < 0.069 | 0.0038 J | 0.094 J | 0.041 J | 0.082 J | 2.0 | No Sample | 2.5 | 1.2 J | < 0.67 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00030 J | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | < 0.041 | 0.45 J | No Sample | 0.50 J | < 0.43 | < 0.67 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | 0.00032 J | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | < 0.041 | 0.53 J | No Sample | < 0.39 | < 0.43 | < 0.67 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00067 J | < 0.069 | 0.0037 J | 0.094 J | 0.041 J | 0.088 J | 1.8 | No Sample | 2.3 | 1.1 J | < 0.67 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | 0.045 J | 1.0 J | No Sample | 0.91 J | 0.55 J | < 0.67 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.00058 J | < 0.069 | 0.0023 J | 0.075 J | 0.030 J | 0.075 J | 1.8 | No Sample | 1.6 | 1.0 J | < 0.67 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | < 0.041 | < 0.39 | No Sample | < 0.39 | < 0.43 | < 0.67 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.00044 J | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | 0.044 J | 0.94 J | No Sample | 0.85 J | 0.55 J | < 0.67 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.069 | < 0.0021 | < 0.057 | < 0.023 | < 0.041 | < 0.39 | No Sample | < 0.39 | < 0.43 | < 0.67 |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 0.07 | 2.68 | 0.15 | 7.27 | 2.38 | 8.85 | 179.30 | | 108.10 | 74.90 | 39.40 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 0.40 | 8.70 | 0.67 | 27.00 | 8.58 | 46.00 | 300.00 | | 207.00 | 160.00 | 93.00 |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | RR01-12A | RR01-12B | RR01-13A | RR01-14A | RR01-15A | RR01-16A | RR01-16B | RR01-16C | RR01-17A | RR01-17B | RR01-17C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | | | | | | | | | | | |
| **Date Collected** | | mm/dd/yy | 10/19/01 | 10/19/01 | 10/18/01 | 10/19/01 | 10/16/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/19/01 | 10/19/01 | 10/19/01 |
| **Time Collected** | | hhhh | 1359 | 1359 | 0826 | 1500 | 0820 | 1654 | 1654 | 1654 | 0827 | 0827 | 0827 |
| **Latitude** | GPS | dd mm.mmm | 41 54.010 | 41 54.010 | 41 54.011 | 41 53.995 | 41 53.999 | 41 53.957 | 41 53.957 | 41 53.957 | 41 53.315 | 41 53.315 | 41 53.315 |
| **Longitude** | GPS | dd mm.mmm | -83 21.194 | -83 21.194 | -83 21.178 | -83 21.176 | -83 21.168 | -83 21.122 | -83 21.122 | -83 21.122 | -83 21.060 | -83 21.060 | -83 21.060 |
| **Slice Start Depth** | | inches | 0 | 6 | ponar | ponar | ponar | 0 | 6 | 18 | 0 | 6 | 18 |
| **Slice End Depth** | | inches | 6 | 11 | ponar | ponar | ponar | 6 | 18 | 36 | 6 | 18 | 51 |
| TOC | Walkley-Black | mg/kg | 27,000 | 26,000 | 7,700 | 32,000 | 6,000 | 22,000 | 36,000 | 51,000 | 26,000 | 35,000 | 61,000 |
| % Moisture (Trace) | D2974 | % | 55.0 | 44.3 | 19.9 | 62.0 | 17.5 | 50.7 | 48.5 | 46.5 | 52.6 | 45.8 | 45.4 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 54.8 | 48.1 | 18.7 | 61.2 | 13.3 | 49.3 | 45.3 | 45.9 | 52.7 | 43.9 | 43.1 |
| Oil and Grease | 9071 | mg/kg | < 550 | 450 | 800 | 700 | 770 | < 510 | < 480 | < 470 | < 530 | < 460 | 630 |
| **Metals** | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 6.7 | 8.1 | 4.6 | 6.6 | 7.3 | 6.3 | 7.6 | 10 | 7.8 | 7.0 | 6.3 |
| Total Barium | 6020 | mg/kg | 110 | 110 | 29 | 92 | 29 | 100 | 130 | 300 | 110 | 150 | 240 |
| Total Cadmium | 6020 | mg/kg | 0.75 | 0.75 | 0.13 | 0.69 | 0.15 | 0.68 | 0.92 | 1.9 | 0.78 | 2.6 | 3.6 |
| Total Chromium | 6020 | mg/kg | 30 | 35 | 12 | 26 | 14 | 37 | 40 | 48 | 34 | 46 | 54 |
| Total Copper | 6020 | mg/kg | 45 | 54 | 22 | 45 | 44 | 45 | 60 | 81 | 44 | 48 | 73 |
| Total Iron | 6010 | mg/kg | 19,000 | 20,000 | 8,200 | 20,000 | 15,000 | 19,000 | 22,000 | 25,000 | 22,000 | 20,000 | 23,000 |
| Total Lead | 6020 | mg/kg | 31 | 36 | 15 | 29 | 17 | 38 | 53 | 120 | 31 | 62 | 120 |
| Total Manganese | 6010 | mg/kg | 510 | 460 | 250 | 500 | 320 | 440 | 520 | 450 | 520 | 410 | 430 |
| Total Mercury | 7471 | mg/kg | 0.10 | 0.16 | < 0.10 | < 0.10 | < 0.10 | 0.12 | 0.19 | 0.82 | 0.24 | 0.43 | 0.72 |
| Total Nickel | 6020 | mg/kg | 35 | 36 | 13 | 31 | 22 | 46 | 51 | 42 | 40 | 39 | 45 |
| Total Selenium | 6020 | mg/kg | 1.6 | 0.84 | < 0.20 | < 0.33 | 0.56 | < 0.30 | 1.6 | 0.63 | < 0.33 | 0.44 | 0.80 |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | 0.65 | < 0.50 | < 0.50 | 0.65 |
| Total Zinc | 6020 | mg/kg | 130 | 140 | 32 | 120 | 47 | 130 | 170 | 330 | 140 | 180 | 290 |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.37 | < 0.64 | < 1.6 | < 0.17 | < 1.5 | < 0.65 | < 0.60 | < 0.030 | < 1.4 | < 0.29 | < 0.0058 |
| Aroclor-1221 | 8082 | mg/kg | < 0.49 | < 0.85 | < 2.2 | < 0.23 | < 2.0 | < 0.87 | < 0.80 | < 0.041 | < 1.9 | < 0.39 | < 0.0077 |
| Aroclor-1232 | 8082 | mg/kg | < 0.37 | < 0.64 | < 1.6 | < 0.17 | < 1.5 | < 0.65 | < 0.60 | < 0.030 | < 1.4 | < 0.29 | < 0.0058 |
| Aroclor-1242 | 8082 | mg/kg | 12 | 9.4 | 20 | 6.6 | 27 | 4.8 | 5.5 | 0.42 | 14 | 3.0 | 0.28 |
| Aroclor-1248 | 8082 | mg/kg | < 0.40 | < 0.69 | < 1.8 | < 0.19 | < 1.7 | < 0.71 | < 0.66 | < 0.033 | < 1.5 | < 0.32 | < 0.0063 |
| Aroclor-1254 | 8082 | mg/kg | < 0.37 | < 0.64 | < 1.6 | < 0.17 | < 1.5 | < 0.65 | < 0.60 | < 0.030 | < 1.4 | < 0.29 | < 0.0058 |
| Aroclor-1260 | 8082 | mg/kg | 0.88 J | 5.1 | 2.0 J | 0.85 J | 2.1 | < 0.65 | < 0.60 | 0.067 J | < 1.4 | < 0.29 | < 0.0058 |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 0.26 J | 12 | 1.2 J | 0.16 J | 1.1 J | 0.20 J | < 0.13 | < 0.026 | 0.33 J | 0.081 J | < 0.0012 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.022 | < 0.039 | < 0.098 | < 0.021 | < 0.092 | < 0.039 | < 0.037 | < 0.0074 | < 0.085 | < 0.018 | < 0.00035 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.76 | 4.4 | 2.3 | 0.37 | 2.1 | 0.36 | 0.27 | 0.026 | 2.2 | 0.27 | < 0.00035 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 0.75 | 1.2 | 0.54 | 0.54 | 1.1 | 0.38 | 0.36 | 0.026 | 0.62 | 0.14 | 0.0048 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.57 | 0.94 | 0.48 | 0.49 | 1.2 | 0.31 | 0.24 | < 0.0074 | 0.32 | 0.086 | < 0.00035 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.85 | 1.6 | 0.84 | 0.61 | 1.5 | 0.45 | 0.39 | 0.024 J | 0.97 | 0.16 | 0.0064 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.71 | 1.6 | 0.61 | 0.70 | 1.4 | 0.31 | 0.28 | 0.019 J | 0.42 | 0.083 | 0.0045 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 0.093 | 0.28 | < 0.098 | 0.11 | 0.13 J | 0.048 J | 0.046 J | < 0.0074 | < 0.085 | < 0.018 | 0.0014 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.24 | 0.55 | 0.22 J | 0.22 | 0.36 | 0.14 J | 0.19 | 0.013 J | 0.16 J | 0.035 J | 0.0052 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.27 | 0.72 | 0.25 J | 0.28 | 0.43 | 0.16 | 0.19 | 0.010 J | 0.15 J | 0.042 J | 0.0034 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.082 | 0.32 | < 0.098 | 0.11 | 0.16 J | 0.05 J | 0.070 J | < 0.0074 | < 0.085 | < 0.018 | 0.0038 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | < 0.022 | 0.064 J | < 0.098 | < 0.021 | < 0.092 | < 0.039 | < 0.037 | < 0.0074 | < 0.085 | < 0.018 | 0.0024 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | < 0.022 | < 0.039 | < 0.098 | < 0.021 | < 0.092 | < 0.039 | < 0.037 | < 0.0074 | < 0.085 | < 0.018 | 0.0015 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.091 | 0.27 | < 0.098 | 0.092 | 0.13 J | 0.058 J | 0.092 J | < 0.0074 | < 0.085 | < 0.018 | 0.0033 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 0.036 J | 0.19 | < 0.098 | 0.042 J | < 0.092 | < 0.039 | < 0.037 | < 0.0074 | < 0.085 | < 0.018 | 0.0024 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.066 J | 0.31 | < 0.098 | 0.071 J | 0.12 J | 0.044 J | 0.061 J | < 0.0074 | < 0.085 | < 0.018 | 0.0052 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.022 | 0.064 J | < 0.098 | < 0.021 | < 0.092 | < 0.039 | < 0.037 | < 0.0074 | < 0.085 | < 0.018 | 0.0021 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.039 J | 0.16 | < 0.098 | 0.043 J | < 0.092 | < 0.039 | 0.037 J | < 0.0074 | < 0.085 | < 0.018 | 0.0038 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.022 | 0.048 J | < 0.098 | < 0.021 | < 0.092 | < 0.039 | < 0.037 | 0.0084 J | < 0.085 | < 0.018 | 0.0067 |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 4.42 | 24.54 | 4.77 | 3.52 | 8.09 | 1.97 | 1.92 | 0.05 | 4.53 | 0.74 | 0.06 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 12.00 | 14.50 | 20.00 | 6.60 | 29.10 | 4.80 | 5.50 | 0.42 | 14.00 | 3.00 | 0.28 |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | | | | | Field Dup of RR01-13A | Field Rep of RR01-05A | Field Dup of RR01-03B | Field Rep of RR01-02A | Field Rep of RR01-02B | Field Rep of RR01-02C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-18A | RR01-18B | RR01-18C | RR01-19A | RR01-19B | RR01-21A | RR01-22A | RR01-23B | RR01-24A | RR01-24B | RR01-24C |
| **Date Collected** | | mm/dd/yy | 10/15/01 | 10/15/01 | 10/15/01 | 10/15/01 | 10/15/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 | 10/18/01 |
| **Time Collected** | | hhhh | 0955 | 0955 | 0955 | 1100 | 1100 | 0926 | 1058 | 1449 | 1602 | 1602 | 1602 |
| **Latitude** | GPS | dd mm.mmm | 41 53.847 | 41 53.847 | 41 53.847 | 41 53.665 | 41 53.665 | 41 54.011 | 41 54.065 | 41 54.070 | 41 54.076 | 41 54.076 | 41 54.076 |
| **Longitude** | GPS | dd mm.mmm | -83 21.065 | -83 21.065 | -83 21.065 | -83 20.684 | -83 20.684 | -83 21.178 | -83 21.257 | -83 21.352 | -83 21.483 | -83 21.483 | -83 21.483 |
| **Slice Start Depth** | | inches | 0 | 6 | 18 | 0 | 6 | ponar | 0 | 6 | 0 | 6 | 18 |
| **Slice End Depth** | | inches | 6 | 18 | 58 | 6 | 22 | ponar | 5 | 18 | 6 | 18 | 46 |
| TOC | Walkley-Black | mg/kg | 49,000 | 49,000 | 64,000 | 26,000 | 14,000 | 8,600 | 21,000 | 32,000 | 38,000 | 49,000 | 130,000 |
| % Moisture (Trace) | D2974 | % | 55.6 | 46.9 | 54.2 | 58.6 | 25.0 | 28.4 | 36.0 | 48.4 | 56.6 | 49.9 | 64.5 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 56.4 | 51.1 | 42.9 | 50.5 | 28.1 | 23.1 | 32.4 | 48.8 | 54.7 | 35.4 | 62.4 |
| Oil and Grease | 9071 | mg/kg | 840 | 480 | 1,400 | < 600 | 390 | 460 | < 390 | < 480 | < 570 | < 500 | 830 |
| **Metals** | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 9.2 | 6.5 | 13 | 9.9 | 9.6 | 5.0 | 5.6 | 5.9 | 6.9 | 8.9 | 10 |
| Total Barium | 6020 | mg/kg | 140 | 230 | 190 | 250 | 91 | 27 | 70 | 86 | 110 | 210 | 590 |
| Total Cadmium | 6020 | mg/kg | 1.6 | 2.9 | 2.7 | 1.4 | 0.50 | 0.12 | 0.19 | 0.65 | 0.79 | 2.7 | 5.6 |
| Total Chromium | 6020 | mg/kg | 730 | 64 | 220 | 37 | 33 | 6.9 | 13 | 26 | 35 | 59 | 100 |
| Total Copper | 6020 | mg/kg | 360 | 64 | 180 | 48 | 36 | 18 | 13 | 36 | 44 | 75 | 170 |
| Total Iron | 6010 | mg/kg | 16,000 | 20,000 | 23,000 | 23,000 | 20,000 | 7,600 | 12,000 | 18,000 | 20,000 | 20,000 | 21,000 |
| Total Lead | 6020 | mg/kg | 100 | 110 | 150 | 570 | 20 | 9.1 | 16 | 30 | 41 | 160 | 620 |
| Total Manganese | 6010 | mg/kg | 300 | 430 | 370 | 540 | 430 | 240 | 350 | 520 | 510 | 430 | 350 |
| Total Mercury | 7471 | mg/kg | 5.1 | 0.46 | 3.4 | 0.12 | < 0.10 | 0.40 | < 0.10 | 0.12 | 0.19 | 0.74 | 2.1 |
| Total Nickel | 6020 | mg/kg | 140 | 46 | 170 | 37 | 33 | 11 | 17 | 27 | 33 | 38 | 43 |
| Total Selenium | 6020 | mg/kg | 1.4 | 1.5 | 1.6 | 1.4 | 1.1 | < 0.26 | < 0.27 | 1.5 | 1.6 | 1.6 | 1.8 |
| Total Silver | 6010 | mg/kg | 0.83 | 1.5 | 3.0 | 0.71 | < 0.50 | 1.7 | 6.2 | < 0.50 | < 0.50 | 1.0 | 3.3 |
| Total Zinc | 6020 | mg/kg | 410 | 250 | 500 | 190 | 82 | 26 | 36 | 110 | 140 | 300 | 900 |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 3.0 | < 2.7 | < 0.0058 | < 0.067 | < 0.023 | < 1.7 | < 0.049 | < 0.0064 | < 0.0073 | < 0.0051 | < 0.0088 |
| Aroclor-1221 | 8082 | mg/kg | < 4.0 | < 3.6 | < 0.0077 | < 0.089 | < 0.031 | < 2.3 | < 0.065 | < 0.0086 | < 0.0097 | < 0.0068 | < 0.012 |
| Aroclor-1232 | 8082 | mg/kg | < 3.0 | < 2.7 | < 0.0058 | < 0.067 | < 0.023 | < 1.7 | < 0.049 | < 0.0064 | < 0.0073 | < 0.0051 | < 0.0088 |
| Aroclor-1242 | 8082 | mg/kg | 85 | 92 | 0.33 | 0.67 | 0.52 | 20 | 0.97 | 0.26 | 0.27 | 0.28 | 0.44 |
| Aroclor-1248 | 8082 | mg/kg | < 3.3 | < 2.9 | < 0.0063 | < 0.073 | < 0.025 | < 1.9 | < 0.053 | < 0.0070 | < 0.0079 | < 0.0056 | < 0.0096 |
| Aroclor-1254 | 8082 | mg/kg | < 3.0 | < 2.7 | < 0.0058 | < 0.067 | < 0.023 | < 1.7 | < 0.049 | < 0.0064 | < 0.0073 | < 0.0051 | < 0.0088 |
| Aroclor-1260 | 8082 | mg/kg | 3.2 J | 3.0 J | 0.11 | 0.098 J | 0.038 J | 1.9 J | 0.066 J | 0.036 | 0.042 | 0.093 | 0.30 |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 3.2 | 4.7 | 0.015 | < 0.014 | < 0.0097 | < 0.36 | 0.069 | < 0.0068 | < 0.0077 | < 0.0054 | < 0.0093 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | < 0.00035 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | < 0.0022 | < 0.0015 | < 0.0027 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 4.8 | 8.0 | 0.013 | 0.030 | 0.066 | 1.7 | 0.13 | 0.019 | 0.021 | 0.016 | 0.0086 J |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 2.5 | 2.6 | 0.0086 | 0.061 | < 0.0028 | 2.1 | 0.037 | 0.016 | 0.031 | 0.021 | 0.015 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 2.0 | 2.2 | 0.0078 | 0.039 | 0.033 | 1.6 | 0.030 | 0.012 | 0.026 | 0.016 | 0.012 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 4.8 | 5.2 | 0.018 | 0.046 | 0.052 | 2.1 | 0.049 | 0.017 | 0.035 | 0.023 | 0.018 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.50 J | < 0.16 | 0.0045 | 0.050 | 0.015 | 1.6 | 0.020 | 0.012 | 0.024 | 0.014 | 0.016 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0033 | 0.0060 J | < 0.0028 | 0.20 J | < 0.003 | 0.0022 J | 0.0055 J | 0.0039 J | 0.014 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.34 J | < 0.16 | 0.0098 | 0.014 J | 0.0054 J | 0.70 | 0.0084 J | 0.0057 J | 0.013 | 0.012 | 0.035 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.87 | 1.3 | 0.010 | 0.020 | 0.013 | 0.79 | 0.013 | 0.0072 | 0.017 | 0.012 | 0.024 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0078 | 0.0049 J | < 0.0028 | 0.15 J | < 0.003 | 0.0029 J | 0.0066 J | 0.009 | 0.028 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0050 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | < 0.0022 | 0.0034 J | 0.018 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0029 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | 0.0029 J | 0.0042 J | 0.012 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0067 | 0.0065 J | < 0.0028 | 0.18 J | 0.0035 J | 0.0027 J | 0.0071 J | 0.010 | 0.027 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0023 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | 0.0026 J | 0.0048 J | 0.014 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0071 | < 0.004 | < 0.0028 | 0.11 J | 0.0034 J | < 0.0020 | 0.0040 J | 0.010 | 0.035 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0039 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | < 0.0022 | 0.0030 J | 0.013 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0055 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | 0.0033 J | 0.0068 | 0.030 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.18 | < 0.16 | 0.0052 | < 0.004 | < 0.0028 | < 0.10 | < 0.003 | < 0.0020 | < 0.0022 | 0.0049 J | 0.031 |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 18.17 | 24.00 | 0.14 | 0.25 | 0.18 | 10.59 | 0.35 | 0.08 | 0.17 | 0.15 | 0.34 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 85.00 | 92.00 | 0.44 | 0.67 | 0.52 | 20.00 | 0.97 | 0.30 | 0.31 | 0.37 | 0.74 |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

# Appendix A

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | *Field Dup of RR01-08B* | *Field Dup of RR01-08C* |
|---|---|---|---|---|
| **Sample ID** | | | RR01-25B | RR01-25C |
| **Date Collected** | | mm/dd/yy | 10/19/01 | 10/19/01 |
| **Time Collected** | | hhhh | 1010 | 1010 |
| **Latitude** | GPS | dd mm.mmm | 41 54.039 | 41 54.039 |
| **Longitude** | GPS | dd mm.mmm | -83 21.236 | -83 21.236 |
| **Slice Start Depth** | | inches | 6 | 18 |
| **Slice End Depth** | | inches | 18 | 30 |
| | | | | |
| TOC | Walkley-Black | mg/kg | 25,000 | 37,000 |
| % Moisture (Trace) | D2974 | % | 50.2 | 50.3 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 52.1 | 48.9 |
| Oil and Grease | 9071 | mg/kg | < 500 | 4,600 |
| **Metals** | | | | |
| Total Arsenic | 6020 | mg/kg | 7.8 | 8.7 |
| Total Barium | 6020 | mg/kg | 120 | 140 |
| Total Cadmium | 6020 | mg/kg | 0.74 | 1.1 |
| Total Chromium | 6020 | mg/kg | 39 | 52 |
| Total Copper | 6020 | mg/kg | 45 | 69 |
| Total Iron | 6010 | mg/kg | 23,000 | 23,000 |
| Total Lead | 6020 | mg/kg | 32 | 59 |
| Total Manganese | 6010 | mg/kg | 590 * | 480 |
| Total Mercury | 7471 | mg/kg | 0.24 | 0.50 |
| Total Nickel | 6020 | mg/kg | 36 | 45 |
| Total Selenium | 6020 | mg/kg | 0.41 | 1.7 |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 |
| Total Zinc | 6020 | mg/kg | 130 * | 190 |
| **PCB Aroclors (Dry Weight)** | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.69 | < 32 |
| Aroclor-1221 | 8082 | mg/kg | < 0.92 | < 43 |
| Aroclor-1232 | 8082 | mg/kg | < 0.69 | < 32 |
| Aroclor-1242 | 8082 | mg/kg | 26 | 750 |
| Aroclor-1248 | 8082 | mg/kg | < 0.75 | < 35 |
| Aroclor-1254 | 8082 | mg/kg | < 0.69 | < 32 |
| Aroclor-1260 | 8082 | mg/kg | 1.6 J | < 32 |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 1.7 | 77 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.084 | < 0.39 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 4.0 | 48 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 1.9 | 28 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 1.6 | 5.8 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 2.4 | 13 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 2.3 | 9.0 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 0.36 | 1.8 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.64 | 4.3 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.79 | 4.8 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.23 J | 2.4 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | < 0.084 | 0.44 J |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | < 0.084 | 0.77 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.27 J | 1.9 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 0.098 J | 1.2 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.16 J | 2.0 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.084 | 0.40 J |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.090 J | 1.1 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.084 | < 0.39 |
| | | | | |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 15.69 | 198.00 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 26.00 | 750.00 |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

# Appendix A

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | *Field Dup* | *Field Rep* |
| | | | | | | | | | | | *of RR01-17P* | *of RR01-04P* |
| **Sample ID** | | | RR01-01P | RR01-02P | RR01-04P | RR01-06P | RR01-08P | RR01-12P | RR01-17P | RR01-18P | RR01-21P | RR01-22P |
| **Date Collected** | | mm/dd/yy | 10/17/01 | 10/19/01 | 10/20/01 | 10/20/01 | 10/20/01 | 10/19/01 | 10/19/01 | 10/19/01 | 10/19/01 | 10/20/01 |
| **Time Collected** | | hhhh | 0937 | 1729 | 0832 | 0916 | 0958 | 1359 | 1526 | 1614 | 1556 | 0859 |
| **Latitude** | GPS | dd mm.mmm | 41 53.963 | 41 54.074 | 41 54.068 | 41 54.053 | 41 54.038 | 41 54.010 | 41 33.914 | 41 53.857 | 41 33.914 | 41 54.068 |
| **Longitude** | GPS | dd mm.mmm | -83 21.663 | -83 21.487 | -83 21.274 | -83 21.250 | -83 21.231 | -83 21.194 | -83 21.064 | -83 20.984 | -83 21.064 | -83 21.274 |
| **Slice Start Depth** | | inches | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar |
| **Slice End Depth** | | inches | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar | ponar |
| TOC | Walkley-Black | mg/kg | 33,000 | 27,000 | 31,000 | 7,000 * | 19,000 * | 24,000 | 28,000 | 23,000 | 36,000 | 27,000 |
| Total Phosphorus | 6010 | mg/kg | 1,300 | 770 | 840 | 375 | 610 | 990 | 950 | 750 | 970 | 1,000 |
| TKN | 351.2 | mg/kg | 2,200 | 2,100 | 2,000 | 400 | 440 | 2,200 | 2,000 | 2,200 | 850 | 2,300 |
| Ammonia Nitrogen | 350.1 | mg/kg | 130 | 40 | 89 | 2.1 * | 6.7 * | 45 | 46 | 34 | 44 | 53 |
| % Moisture (Trace) | D2974 | % | 61.9 | 53.6 | 54.3 | 17.6 | 20.4 | 56.2 | 53.9 | 53.2 | 54.0 | 55.9 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 60.8 | 57.7 | 56.1 | 32.4 | 37.2 | 58.3 | 52.5 | 52.1 | 54.7 | 56.8 |
| Oil and Grease | 9071 | mg/kg | n/r | n/r | n/r | n/a | n/r | n/r | n/r | n/r | n/r | n/r |
| **Metals** | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 8.8 | 6.6 | 6.0 | 7.3 | 4.8 | 7.1 | 6.7 | 5.9 | 7.6 | 8.2 |
| Total Barium | 6020 | mg/kg | 140 | 94 | 86 | 51 | 46 | 110 | 100 | 79 | 110 | 130 |
| Total Cadmium | 6020 | mg/kg | 0.96 | 0.63 | 0.59 | 0.12 | 0.26 | 0.79 | 0.71 | 0.55 | 0.75 | 0.77 |
| Total Chromium | 6020 | mg/kg | 40 | 27 | 25 | 12 | 12 | 30 | 31 | 29 | 33 | 33 |
| Total Copper | 6020 | mg/kg | 51 | 34 | 32 | 14 | 27 | 45 | 46 | 37 | 41 | 42 |
| Total Iron | 6010 | mg/kg | 25000 | 16,000 | 17,000 | 10,000 | 10,000 | 22,000 | 20,000 | 15,000 | 22,000 | 22,000 |
| Total Lead | 6020 | mg/kg | 39 | 28 | 23 | 8.1 | 12 | 31 | 34 | 31 | 28 | 32 |
| Total Manganese | 6010 | mg/kg | 630 | 410 | 360 | 270 | 320 | 540 | 480 | 310 | 490 | 550 |
| Total Mercury | 7471 | mg/kg | 0.16 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Total Nickel | 6020 | mg/kg | 38 | 27 | 26 | 17 | 18 | 35 | 36 | 26 | 36 | 36 |
| Total Selenium | 6020 | mg/kg | 1.2 | 1.6 | 1.4 | < 0.2 | < 0.21 | 1.6 | < 0.38 | < 0.4 | < 0.29 | < 0.35 |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Total Zinc | 6020 | mg/kg | 150 | 110 | 95 | 43 | 51 * | 140 | 130 | 110 | 130 | 140 |
| **SEM-AVS** | | | | | | | | | | | | |
| Cadmium | 6010B | umoles/g | 0.0079 J | 0.0064 J | 0.0073 J | 0.0035 J | 0.0043 J | 0.0075 J | 0.0077 J | 0.0072 J | 0.0080 J | 0.0069 J |
| Copper | 6010B | umoles/g | 0.48 | 0.39 | 0.43 | 0.14 | 0.21 | 0.47 | 0.48 | 0.53 | 0.49 | 0.43 |
| Lead | 6010B | umoles/g | 0.12 | 0.11 | 0.11 | 0.032 | 0.040 | 0.10 | 0.12 | 0.13 | 0.11 | 0.10 |
| Nickel | 6010B | umoles/g | 0.30 | 0.24 | 0.27 | 0.14 J | 0.15 J | 0.28 | 0.33 | 0.30 | 0.35 | 0.27 |
| Silver | 6010B | umoles/g | < 0.00082 | < 0.00077 | < 0.00073 | < 0.00048 | < 0.00051 | < 0.00077 | < 0.00068 | < 0.00067 | < 0.00071 | < 0.00074 |
| Zinc | 6010B | umoles/g | 1.5 | 1.2 | 1.3 | 0.42 | 0.50 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 |
| Total SEM | | umoles/g | 2.4 | 1.9 | 2.1 | 0.6 | 0.8 | 2.3 | 2.3 | 2.4 | 2.4 | 2.1 |
| Acid Volatile Sulfide (AVS) | 821-R-91-100 | umoles/g | 6.1 | 5.5 | 6.3 | 0.6 U | 2.5 J | 5.2 | 6.3 | 8.0 | 6.2 | 5.3 |
| SEM-AVS | | | (3.7) | (3.6) | (4.2) | 0.0 | (1.8) | (3.0) | (4.0) | (5.6) | (3.9) | (3.2) |
| **PAHs** | | | | | | | | | | | | |
| Naphthalene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| 2-Methylnaphthalene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Acenaphthylene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Acenaphthene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Fluorene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Phenanthrene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Anthracene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Fluoranthene | 8270 | mg/kg | < 0.89 | 0.83 | < 0.74 | 0.38 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Pyrene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Benzo(a)anthracene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Chrysene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Benzo(b)fluoranthene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Benzo(k)fluoranthene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Benzo(a)pyrene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Indeno(1,2,3-cd)pyrene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Dibenzo(a,h)anthracene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| Benzo(g,h,i)perylene | 8270 | mg/kg | < 0.89 | < 0.73 | < 0.74 | < 0.33 | < 0.43 | < 0.78 | < 0.74 | < 0.73 | < 0.74 | < 0.77 |
| **Total of PAHs (< data not used)** | | mg/kg | 0.0 | 0.8 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

# Appendix A

| Parameters | Method | Units | | | | | | | | | Field Dup of RR01-17P | Field Rep of RR01-04P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-01P | RR01-02P | RR01-04P | RR01-06P | RR01-08P | RR01-12P | RR01-17P | RR01-18P | RR01-21P | RR01-22P |
| **Date Collected** | | mm/dd/yy | 10/17/01 | 10/19/01 | 10/20/01 | 10/20/01 | 10/20/01 | 10/19/01 | 10/19/01 | 10/19/01 | 10/19/01 | 10/20/01 |
| **Time Collected** | | hhhh | 0937 | 1729 | 0832 | 0916 | 0958 | 1359 | 1526 | 1614 | 1556 | 0859 |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.0084 | < 0.0078 | < 0.15 | < 0.098 | < 0.53 | < 0.79 | < 0.14 | < 0.069 | < 0.15 | < 0.38 |
| Aroclor-1221 | 8082 | mg/kg | < 0.011 | < 0.010 | < 0.20 | < 0.13 | < 0.70 | < 1.1 | < 0.19 | < .092 | < 0.19 | < 0.51 |
| Aroclor-1232 | 8082 | mg/kg | < 0.0084 | < 0.0078 | < 0.15 | < 0.098 | < 0.53 | < 0.79 | < 0.14 | < 0.069 | < 0.15 | < 0.38 |
| Aroclor-1242 | 8082 | mg/kg | 0.18 | 0.19 | 3.9 | 4.1 | 18 | 10 | 5.4 | 1.4 | 5.1 | 7.0 |
| Aroclor-1248 | 8082 | mg/kg | < 0.0092 | < 0.0085 | < 0.16 | < 0.11 | < 0.57 | < 0.86 | < 0.15 | < 0.075 | < 0.16 | < 0.42 |
| Aroclor-1254 | 8082 | mg/kg | < 0.0084 | < 0.0078 | < 0.15 | < 0.098 | < 0.53 | < 0.79 | < 0.14 | < 0.069 | < 0.15 | < 0.38 |
| Aroclor-1260 | 8082 | mg/kg | 0.041 J | 0.027 J | 0.61 J | 0.31 J | 0.95 J | < 0.79 | 0.30 J | 0.18 J | 0.38 J | 1.7 J |
| **PCB Congeners (Dry Weight)** | 8082 modified | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | < 0.0018 | 0.011 | 0.24 | 0.54 | 0.70 | < 0.17 | 0.16 J | 0.059 J | 0.16 | 0.31 J |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.00051 | < 0.00047 | < 0.0091 | < 0.015 | < 0.032 | < 0.048 | < 0.017 | < 0.0084 | < 0.0088 | < 0.023 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.014 | 0.012 | 0.66 | 1.0 | 1.1 | 0.66 | 0.84 | 0.16 | 0.72 | 0.85 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | < 0.00051 | 0.018 | 0.26 | 0.31 | 1.1 | 0.96 | 0.30 | 0.21 | 0.32 | 0.28 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.014 | 0.016 | 0.27 | 0.29 | 0.94 | 0.74 | 0.22 | 0.15 | 0.25 | 0.25 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.018 | 0.019 | 0.37 | 0.43 | 1.1 | 0.94 | 0.39 | 0.20 | 0.39 | 0.43 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.012 | 0.014 | 0.15 | 0.19 | 1.1 | 1.1 | 0.26 | 0.18 | 0.31 | 0.16 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 0.0023 | 0.0038 | 0.029 J | 0.023 J | 0.13 | 0.15 J | 0.034 J | 0.026 J | 0.045 | 0.028 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | < 0.00051 | 0.0065 | 0.075 | 0.092 | 0.32 | 0.35 | 0.084 | 0.060 | 0.11 | 0.099 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.0078 | 0.010 | 0.13 | 0.15 | 0.39 | 0.36 | 0.10 | 0.083 | 0.14 | 0.13 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.0033 | < 0.00047 | 0.044 | 0.035 J | 0.10 J | 0.12 J | 0.033 J | 0.028 J | 0.047 | 0.051 J |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00059 J | 0.0011 J | < 0.0091 | < 0.015 | < 0.032 | < 0.048 | < 0.017 | < 0.0084 | 0.011 J | < 0.023 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | 0.0011 J | 0.0012 J | 0.018 J | 0.015 J | < 0.032 | < 0.048 | < 0.017 | < 0.0084 | < 0.0088 | 0.034 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.0033 | 0.0038 | 0.048 | 0.047 J | 0.12 | 0.12 J | 0.045 J | 0.027 J | 0.044 | 0.068 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 0.00090 J | 0.0017 | 0.022 J | 0.017 J | 0.048 J | 0.051 J | 0.018 J | 0.012 J | 0.022 J | 0.033 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.0013 J | 0.0031 | 0.041 | 0.031 J | 0.065 J | 0.081 J | 0.029 J | 0.022 J | 0.037 | 0.047 J |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.00051 | 0.00073 J | < 0.0091 | < 0.015 | < 0.032 | < 0.048 | < 0.017 | < 0.0084 | < 0.0088 | < 0.023 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.0016 J | 0.0019 | 0.031 J | 0.023 J | 0.043 J | 0.049 J | 0.020 J | 0.014 J | 0.023 J | 0.041 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.00051 | < 0.00047 | < 0.0091 | < 0.015 | < 0.032 | < 0.048 | < 0.017 | < 0.0084 | < 0.0088 | < 0.023 |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 0.07 | 0.12 | 2.29 | 3.00 | 7.00 | 5.11 | 2.19 | 1.04 | 2.57 | 2.20 |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 0.18 | 0.19 | 3.90 | 4.10 | 18.00 | 10.00 | 5.40 | 1.40 | 5.10 | 7.00 |

* Results do not meet QC acceptance criteria, see narrative

n/r - not run

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

# Appendix A

**GRAIN SIZE DATA**

| Sample ID No. | % Gravel | | % Sand | % Fines | | Total |
|---|---|---|---|---|---|---|
| | CRS | Fine | | Silt | Clay | |
| RR01-01P | 0.0 | | 7.5 | 92.5 | | 100.0 |
| RR01-02P | 0.0 | | 26.5 | 73.5 | | 100.0 |
| RR01-04P | 0.0 | | 21.8 | 78.2 | | 100.0 |
| RR01-06P | 16.4 | | 62.9 | 20.7 | | 100.0 |
| RR01-08P | 1.4 | | 84.7 | 13.9 | | 100.0 |
| RR01-12P | 0.0 | | 8.2 | 91.8 | | 100.0 |
| RR01-17P | 0.0 | | 12.2 | 87.8 | | 100.0 |
| RR01-18P | 2.7 | | 64.1 | 33.2 | | 100.0 |
| RR01-21P | 0.0 | | 15.0 | 85.0 | | 100.0 |
| RR01-22P | 0.0 | | 19.1 | 80.9 | | 100.0 |

Test Method - ASTM D-422

NOTE: RR01-06P contained 2.9% zebra mussel shells
RR01-08P contained 0.9% zebra mussel shells
RR01-18P contained 18.21 g of shells

# Appendix A

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | *Field Rep of RR01-02A* | | | *Field Rep of RR01-02B* | | | *Field Rep of RR01-02C* | | | *Field Dup of RR01-03B* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-02A | RR01-24A | | RR01-02B | RR01-24B | | RR01-02C | RR01-24C | | RR01-03B | RR01-23B | |
| **Date Collected** | | mm/dd/yy | 10/18/01 | 10/18/01 | | 10/18/01 | 10/18/01 | | 10/18/01 | 10/18/01 | | 10/18/01 | 10/18/01 | |
| **Time Collected** | | hhhh | 1545 | 1602 | | 1545 | 1602 | | 1545 | 1602 | | 1444 | 1449 | |
| **Latitude** | GPS | dd mm.mmm | 41 54.076 | 41 54.076 | | 41 54.076 | 41 54.076 | | 41 54.076 | 41 54.076 | | 41 54.070 | 41 54.070 | |
| **Longitude** | GPS | dd mm.mmm | -83 21.483 | -83 21.483 | | -83 21.483 | -83 21.483 | | -83 21.483 | -83 21.483 | | -83 21.352 | -83 21.352 | |
| **Slice Start Depth** | | inches | 0 | 0 | | 6 | 6 | | 18 | 18 | | 6 | 6 | |
| **Slice End Depth** | | inches | 6 | 6 | | 18 | 18 | | 62 | 46 | | 18 | 18 | |
| TOC | Walkley-Black | mg/kg | 34,000 | 38,000 | 11% | 39,000 | 49,000 | 23% | 84,000 | 130,000 | 43% | 34,000 | 32,000 | 6% |
| % Moisture (Trace) | D2974 | % | 54.2 | 56.6 | 4% | 53.6 | 49.9 | 7% | 55.6 | 64.5 | 15% | 49.7 | 48.4 | 3% |
| % Moisture (Lancaster) | EPA 160.3 modified | % | n/r | 54.7 | | 51.1 | 35.4 | 36% | 54.4 | 62.4 | 14% | 48.4 | 48.8 | 1% |
| Oil and Grease | 9071 | mg/kg | < 540 | < 570 | 0% | < 540 | < 500 | 0% | < 560 | 830 | 39% | < 500 | < 480 | 0% |
| **Metals** | | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 8.1 | 6.9 | 16% | 5.9 | 8.9 | 41% | 8.3 | 10 | 19% | 9.8 | 5.9 | 50% |
| Total Barium | 6020 | mg/kg | 110 | 110 | 0% | 110 | 210 | 63% | 300 | 590 | 65% | 150 | 86 | 54% |
| Total Cadmium | 6020 | mg/kg | 0.8 | 0.79 | 1% | 0.81 | 2.7 | 108% | 3.4 | 5.6 | 49% | 0.86 | 0.65 | 28% |
| Total Chromium | 6020 | mg/kg | 32 | 35 | 9% | 34 | 59 | 54% | 77 | 100 | 26% | 44 | 26 | 51% |
| Total Copper | 6020 | mg/kg | 38 | 44 | 15% | 47 | 75 | 46% | 120 | 170 | 34% | 45 | 36 | 22% |
| Total Iron | 6010 | mg/kg | 20,000 | 20,000 | 0% | 20,000 | 20,000 | 0% | 18,000 | 21,000 | 15% | 26,000 | 18,000 | 36% |
| Total Lead | 6020 | mg/kg | 34 | 41 | 19% | 41 | 160 | 118% | 290 | 620 | 73% | 36 | 30 | 18% |
| Total Manganese | 6010 | mg/kg | 470 | 510 | 8% | 520 | 430 | 19% | 440 | 350 | 23% | 650 | 520 | 22% |
| Total Mercury | 7471 | mg/kg | 0.14 | 0.19 | 30% | 0.19 | 0.74 | 118% | 1.4 | 2.1 | 40% | 0.21 | 0.12 | 55% |
| Total Nickel | 6020 | mg/kg | 30 | 33 | 10% | 34 | 38 | 11% | 37 | 43 | 15% | 37 | 27 | 31% |
| Total Selenium | 6020 | mg/kg | < 0.36 | 1.6 | 127% | 1.7 | 1.6 | 6% | < 0.36 | 1.8 | 133% | 1.7 | 1.5 | 13% |
| Total Silver | 6010 | mg/kg | < 0.50 | < 0.50 | 0% | < 0.50 | 1.0 | 67% | 2.2 | 3.3 | 40% | < 0.50 | < 0.50 | 0% |
| Total Zinc | 6020 | mg/kg | 120 | 140 | 15% | 140 | 300 | 73% | 530 | 900 | 52% | 140 | 110 | 24% |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | n/r | < 0.0073 | | <0.009 | < 0.0051 | | < 0.0072 | < 0.0088 | | < 0.032 | < 0.0064 | |
| Aroclor-1221 | 8082 | mg/kg | n/r | < 0.0097 | | <0.012 | < 0.0068 | | < 0.0096 | < 0.012 | | < 0.043 | < 0.0086 | |
| Aroclor-1232 | 8082 | mg/kg | n/r | < 0.0073 | | <0.009 | < 0.0051 | | < 0.0072 | < 0.0088 | | < 0.032 | < 0.0064 | |
| Aroclor-1242 | 8082 | mg/kg | n/r | 0.27 | | 0.51 | 0.28 | | 0.43 | 0.44 | | 0.32 | 0.26 | |
| Aroclor-1248 | 8082 | mg/kg | n/r | < 0.0079 | | <0.009 | < 0.0056 | | < 0.0072 | < 0.0096 | | < 0.035 | < 0.0070 | |
| Aroclor-1254 | 8082 | mg/kg | n/r | < 0.0073 | | <0.009 | < 0.0051 | | < 0.0072 | < 0.0088 | | < 0.032 | < 0.0064 | |
| Aroclor-1260 | 8082 | mg/kg | n/r | 0.042 | | 0.12 | 0.093 | | 0.28 | 0.30 | | 0.063 J | 0.036 | |
| **PCB Congeners (Dry Weight)** | 8082 modified | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | n/r | < 0.0077 | | < 0.72 | < 0.0054 | | < 0.0077 | < 0.0093 | | < 0.0068 | < 0.0068 | |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | n/r | < 0.0022 | | < 0.20 | < 0.0015 | | < 0.0022 | < 0.0027 | | < 0.0019 | < 0.0020 | |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | n/r | 0.021 | | 1.6 | 0.016 | | 0.015 | 0.0086 J | | < 0.0019 | 0.019 | |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | n/r | 0.031 | | 0.58 J | 0.021 | | < 0.0022 | 0.015 | | 0.024 | 0.016 | |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.026 | | 0.55 J | 0.016 | | 0.017 | 0.012 | | 0.019 | 0.012 | |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.035 | | 1.0 | 0.023 | | 0.025 | 0.018 | | 0.025 | 0.017 | |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.024 | | 0.50 J | 0.014 | | 0.017 | 0.016 | | 0.018 | 0.012 | |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | n/r | 0.0055 J | | < 0.20 | 0.0039 J | | 0.0070 J | 0.014 | | 0.0030 J | 0.0022 J | |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | n/r | 0.013 | | < 0.20 | 0.012 | | 0.020 | 0.035 | | 0.0076 | 0.0057 J | |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | n/r | 0.017 | | < 0.20 | 0.012 | | 0.017 | 0.024 | | 0.011 | 0.0072 | |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0066 J | | < 0.20 | 0.009 | | 0.013 | 0.028 | | 0.0046 J | 0.0029 J | |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | n/r | < 0.0022 | | < 0.20 | 0.0034 J | | 0.0062 J | 0.018 | | < 0.0019 | < 0.0020 | |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0029 J | | < 0.20 | 0.0042 J | | 0.0057 J | 0.012 | | < 0.0019 | < 0.0020 | |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0071 J | | < 0.20 | 0.010 | | 0.014 | 0.027 | | 0.0044 J | 0.0027 J | |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0026 J | | < 0.20 | 0.0048 J | | 0.0061 J | 0.014 | | < 0.0019 | < 0.0020 | |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0040 J | | < 0.20 | 0.010 | | 0.014 | 0.035 | | 0.0029 J | < 0.0020 | |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | n/r | < 0.0022 | | < 0.20 | 0.0030 J | | 0.0044 J | 0.013 | | < 0.0019 | < 0.0020 | |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0033 J | | < 0.20 | 0.0068 | | 0.010 | 0.030 | | 0.0021 J | < 0.0020 | |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | n/r | < 0.0022 | | < 0.20 | 0.0049 J | | 0.013 | 0.031 | | < 0.0019 | < 0.0020 | |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | - | 0.17 | N/A | 2.60 | 0.15 | 178% | 0.18 | 0.34 | 65% | 0.10 | 0.08 | 23% |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | - | 0.31 | N/A | 0.63 | 0.37 | 51% | 0.71 | 0.74 | 4% | 0.32 | 0.30 | 8% |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

# Appendix A

## ANALYTICAL CHEMISTRY

| Parameters | Method | Units | | *Field Rep of RR01-05A* | | | *Field Dup of RR01-08B* | | | | *Field Dup of RR01-08C* | | | *Field Dup of RR01-13A* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-05A | RR01-22A | | RR01-08B | RR01-25B | | RR01-08C | RR01-25C | | RR01-13A | RR01-21A | |
| **Date Collected** | | mm/dd/yy | 10/18/01 | 10/18/01 | | 10/19/01 | 10/19/01 | | 10/19/01 | 10/19/01 | | 10/18/01 | 10/18/01 | |
| **Time Collected** | | hhhh | 1034 | 1058 | | 0953 | 1010 | | 0953 | 1010 | | 0826 | 0926 | |
| **Latitude** | GPS | dd mm.mmm | 41 54.065 | 41 54.065 | | 41 54.039 | 41 54.039 | | 41 54.039 | 41 54.039 | | 41 54.011 | 41 54.011 | |
| **Longitude** | GPS | dd mm.mmm | -83 21.275 | -83 21.257 | | -83 21.236 | -83 21.236 | | -83 21.236 | -83 21.236 | | -83 21.178 | -83 21.178 | |
| **Slice Start Depth** | | inches | 0 | 0 | | 6 | 6 | | 18 | 18 | | ponar | ponar | |
| **Slice End Depth** | | inches | 4 | 5 | | 18 | 18 | | 30 | 30 | | ponar | ponar | |
| TOC | Walkley-Black | mg/kg | 22,000 | 21,000 | 5% | 26,000 | 25,000 | 4% | 40,000 | 37,000 | 8% | 7,700 | 8,600 | 11% |
| % Moisture (Trace) | D2974 | % | 34.5 | 36.0 | 4% | 51.0 | 50.2 | 2% | 49.0 | 50.3 | 3% | 19.9 | 28.4 | 35% |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 31.1 | 32.4 | 4% | 50.7 | 52.1 | 3% | 48.9 | 48.9 | 0% | 18.7 | 23.1 | 21% |
| Oil and Grease | 9071 | mg/kg | < 380 | < 390 | 0% | < 510 | < 500 | 0% | < 490 | 4,600 | 0% | 800 | 460 | 0% |
| **Metals** | | | | | | | | | | | | | | |
| Total Arsenic | 6020 | mg/kg | 4.7 | 5.6 | 17% | 8.3 | 7.8 | 6% | 8.5 | 8.7 | 2% | 4.6 | 5.0 | 8% |
| Total Barium | 6020 | mg/kg | 74 | 70 | 6% | 130 | 120 | 8% | 160 | 140 | 13% | 29 | 27 | 7% |
| Total Cadmium | 6020 | mg/kg | 0.26 | 0.19 | 31% | 2.0 | 0.74 | 92% | 1.1 | 1.1 | 0% | 0.13 | 0.12 | 8% |
| Total Chromium | 6020 | mg/kg | 9.3 | 13 | 33% | 40 | 39 | 3% | 54 | 52 | 4% | 12 | 6.9 | 54% |
| Total Copper | 6020 | mg/kg | 12 | 13 | 8% | 51 | 45 | 13% | 66 | 69 | 4% | 22 | 18 | 20% |
| Total Iron | 6010 | mg/kg | 12,000 | 12,000 | 0% | 24,000 | 23,000 | 4% | 23,000 | 23,000 | 0% | 8,200 | 7,600 | 8% |
| Total Lead | 6020 | mg/kg | 8.6 | 16 | 60% | 220 | 32 | 149% | 54 | 59 | 9% | 15 | 9.1 | 49% |
| Total Manganese | 6010 | mg/kg | 360 | 350 | 3% | 590 | 590 | 0% | 510 | 480 | 6% | 250 | 240 | 4% |
| Total Mercury | 7471 | mg/kg | < 0.10 | < 0.10 | 0% | 0.33 | 0.24 | 32% | 0.43 | 0.50 | 15% | < 0.10 | 0.40 | 120% |
| Total Nickel | 6020 | mg/kg | 18 | 17 | 6% | 40 | 36 | 11% | 42 | 45 | 7% | 13 | 11 | 17% |
| Total Selenium | 6020 | mg/kg | < 0.29 | < 0.27 | 0% | 1.8 | 0.41 | 126% | < 0.34 | 1.7 | 133% | < 0.20 | < 0.26 | 0% |
| Total Silver | 6010 | mg/kg | < 0.50 | 6.2 | 170% | < 0.50 | < 0.50 | 0% | < 0.50 | < 0.50 | 0% | < 0.50 | 1.7 | 109% |
| Total Zinc | 6020 | mg/kg | 36 | 36 | 0% | 150 | 130 | 14% | 190 | 190 | 0% | 32 | 26 | 21% |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.024 | < 0.049 | | < 3.3 | < 0.69 | | < 6.5 | < 32 | | < 1.6 | < 1.7 | |
| Aroclor-1221 | 8082 | mg/kg | < 0.032 | < 0.065 | | < 4.5 | < 0.92 | | < 8.6 | < 43 | | < 2.2 | < 2.3 | |
| Aroclor-1232 | 8082 | mg/kg | < 0.024 | < 0.049 | | < 3.3 | < 0.69 | | < 6.5 | < 32 | | < 1.6 | < 1.7 | |
| Aroclor-1242 | 8082 | mg/kg | 0.40 | 0.97 | | 46 | 26 | | 300 | 750 | | 20 | 20 | |
| Aroclor-1248 | 8082 | mg/kg | < 0.026 | < 0.053 | | < 3.7 | < 0.75 | | < 7.0 | < 35 | | < 1.8 | < 1.9 | |
| Aroclor-1254 | 8082 | mg/kg | < 0.024 | < 0.049 | | < 3.3 | < 0.69 | | < 6.5 | < 32 | | < 1.6 | < 1.7 | |
| Aroclor-1260 | 8082 | mg/kg | < 0.024 | 0.066 J | | < 3.3 | 1.6 J | | 24 J | < 32 | | 2.0 J | 1.9 J | |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 0.028 | 0.069 | | 1.7 | 1.7 | | 75 | 77 | | 1.2 J | < 0.36 | |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.00029 | < 0.003 | | < 0.041 | < 0.084 | | < 0.39 | < 0.39 | | < 0.098 | < 0.10 | |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.024 | 0.13 | | 3.1 | 4.0 | | 42 | 48 | | 2.3 | 1.7 | |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 0.0037 | 0.037 | | 1.0 | 1.9 | | 23 | 28 | | 0.54 | 2.1 | |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.0026 | 0.030 | | 0.6 | 1.6 | | 5.1 | 5.8 | | 0.48 | 1.6 | |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.0047 | 0.049 | | 1.2 | 2.4 | | 11 | 13 | | 0.84 | 2.1 | |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.0017 | 0.020 | | 0.75 | 2.3 | | 7.8 | 9.0 | | 0.61 | 1.6 | |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.003 | | 0.095 J | 0.36 | | 1.6 | 1.8 | | < 0.098 | 0.20 J | |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.00097 J | 0.0084 J | | 0.23 | 0.64 | | 3.9 | 4.3 | | 0.22 J | 0.70 | |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.0012 | 0.013 | | 0.27 | 0.79 | | 4.3 | 4.8 | | 0.25 J | 0.79 | |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.00043 J | < 0.003 | | 0.082 J | 0.23 J | | 2.0 | 2.4 | | < 0.098 | 0.15 J | |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00030 J | < 0.003 | | < 0.041 | < 0.084 | | 0.45 J | 0.44 J | | < 0.098 | < 0.10 | |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | 0.00032 J | < 0.003 | | < 0.041 | < 0.084 | | 0.53 J | 0.77 J | | < 0.098 | < 0.10 | |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00067 J | 0.0035 J | | 0.088 J | 0.27 J | | 1.8 | 1.9 | | < 0.098 | 0.18 J | |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.003 | | 0.045 J | 0.098 J | | 1.0 J | 1.2 J | | < 0.098 | < 0.10 | |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.00058 J | 0.0034 J | | 0.075 J | 0.16 J | | 1.8 | 2.0 | | < 0.098 | 0.11 J | |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.003 | | < 0.041 | < 0.084 | | < 0.39 | 0.40 J | | < 0.098 | < 0.10 | |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.00044 J | < 0.003 | | 0.044 J | 0.090 J | | 0.94 J | 1.1 J | | < 0.098 | < 0.10 | |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.00029 | < 0.003 | | < 0.041 | < 0.084 | | < 0.39 | < 0.39 | | < 0.098 | < 0.10 | |
| **Total of 19 Congeners Analyzed (< detection limit assumed = 0)** | | | 0.07 | 0.35 | 136% | 8.85 | 15.69 | 56% | 179.30 | 198.00 | 10% | 4.77 | 10.59 | 76% |
| **Total of 7 Aroclors (< detection limit assumed = 0)** | | | 0.40 | 0.97 | 83% | 46.00 | 26.00 | 56% | 300.00 | 750.00 | 86% | 20.00 | 20.00 | 0% |

* Results do not meet QC acceptance criteria, see narrative

J - Estimated value. Result is above MDL, but below limit of quanitation

Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit.
Use RR01-02P analysis as a surrogate.

| Parameters | Method | Units | | *Field Rep of RR01-02A* | | | | *Field Rep of RR01-02B* | | | | *Field Rep of RR01-02C* | | | | *Field Dup of RR01-03B* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-02A | RR01-24A | | | RR01-02B | RR01-24B | | | RR01-02C | RR01-24C | | | RR01-03B | RR01-23B | | |
| **Date Collected** | | mm/dd/yy | 10/18/01 | 10/18/01 | | | 10/18/01 | 10/18/01 | | | 10/18/01 | 10/18/01 | | | 10/18/01 | 10/18/01 | | |
| **Time Collected** | | hhhh | 1545 | 1602 | | | 1545 | 1602 | | | 1545 | 1602 | | | 1444 | 1449 | | |
| **Latitude** | GPS | dd.ddddd | 41.90127 | 41.90127 | | | 41.90127 | 41.90127 | | | 41.90127 | 41.90127 | | | 41.90117 | 41.90117 | | |
| **Longitude** | GPS | dd.ddddd | -83.35805 | -83.35805 | | | -83.35805 | -83.35805 | | | -83.35805 | -83.35805 | | | -83.35587 | -83.35587 | | |
| **Slice Start Depth** | | inches | 0 | 0 | | | 6 | 6 | | | 18 | 18 | | | 6 | 6 | | |
| **Slice End Depth** | | inches | 6 | 6 | | | 18 | 18 | | | 62 | 46 | | | 18 | 18 | | |
| TOC | Walkley-Black | mg/kg | 34,000 | 38,000 | | 11% | 39,000 | 49,000 | | 23% | 84,000 | 130,000 | | 43% | 34,000 | 32,000 | | |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | n/r | 0.0073 | U | | <0.0066 | < 0.0090 | U | | < 0.0072 | < 0.0088 | U | | < 0.032 | < 0.0064 | U | |
| Aroclor-1221 | 8082 | mg/kg | n/r | 0.0097 | U | | < 0.0088 | < 0.0120 | U | | < 0.0096 | < 0.012 | U | | < 0.043 | < 0.0086 | U | |
| Aroclor-1232 | 8082 | mg/kg | n/r | 0.0073 | U | | <0.0066 | < 0.0090 | U | | < 0.0072 | < 0.0088 | U | | < 0.032 | < 0.0064 | U | |
| Aroclor-1242 | 8082 | mg/kg | n/r | 0.27 | | | <0.0066 | < 0.0090 | U | | 0.43 | 0.44 | | | 0.32 | 0.26 | | |
| Aroclor-1248 | 8082 | mg/kg | n/r | 0.0079 | U | | 0.49 | 0.51 | | | < 0.0072 | < 0.0096 | U | | < 0.035 | < 0.0070 | U | |
| Aroclor-1254 | 8082 | mg/kg | n/r | 0.0073 | U | | <0.0066 | < 0.0090 | U | | < 0.0072 | < 0.0088 | U | | < 0.032 | < 0.0064 | U | |
| Aroclor-1260 | 8082 | mg/kg | n/r | 0.042 | | | 0.043 | 0.12 | | | 0.28 | 0.30 | | | 0.063 | 0.036 | J | |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | n/r | 0.0077 | U | | < 0.72 | < 0.0054 | U | | < 0.0077 | < 0.0093 | U | | < 0.0068 | < 0.0068 | U | |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | n/r | 0.0022 | U | | < 0.20 | < 0.0015 | U | | < 0.0022 | < 0.0027 | U | | < 0.0019 | < 0.0020 | U | |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | n/r | 0.021 | | | 1.6 | 0.016 | | | 0.015 | 0.0086 | J | | < 0.0019 | 0.019 | U | |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | n/r | 0.031 | | | 0.58 | 0.021 | J | | < 0.0022 | 0.015 | U | | 0.024 | 0.016 | | |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.026 | | | 0.55 | 0.016 | J | | 0.017 | 0.012 | | | 0.019 | 0.012 | | |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.035 | | | 1.0 | 0.023 | | | 0.025 | 0.018 | | | 0.025 | 0.017 | | |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | n/r | 0.024 | | | 0.5 | 0.014 | J | | 0.017 | 0.016 | | | 0.018 | 0.012 | | |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | n/r | 0.0055 | J | | < 0.20 | 0.0039 | J | | 0.007 | 0.014 | | | 0.003 | 0.0022 | J | |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | n/r | 0.013 | | | < 0.20 | 0.012 | | | 0.020 | 0.035 | | | 0.0076 | 0.0057 | J | |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | n/r | 0.017 | | | < 0.20 | 0.012 | | | 0.017 | 0.024 | | | 0.011 | 0.0072 | | |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0066 | J | | < 0.20 | 0.009 | | | 0.013 | 0.028 | | | 0.0046 | 0.0029 | J | |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0022 | U | | < 0.20 | 0.0034 | J | | 0.0062 | 0.018 | | | < 0.0019 | < 0.0020 | U | |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0029 | J | | < 0.20 | 0.0042 | J | | 0.0057 | 0.012 | | | < 0.0019 | < 0.0020 | U | |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | n/r | 0.0071 | J | | < 0.20 | 0.010 | | | 0.014 | 0.027 | | | 0.0044 | 0.0027 | J | |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0026 | J | | < 0.20 | 0.0048 | J | | 0.0061 | 0.014 | | | < 0.0019 | < 0.0020 | U | |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | n/r | 0.004 | J | | < 0.20 | 0.010 | | | 0.014 | 0.035 | | | 0.0029 | < 0.0020 | U | |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0022 | U | | < 0.20 | 0.003 | J | | 0.0044 | 0.013 | | | < 0.0019 | < 0.0020 | U | |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | n/r | 0.0033 | J | | < 0.20 | 0.0068 | | | 0.010 | 0.030 | | | 0.0021 | < 0.0020 | U | |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | n/r | 0.0022 | U | | < 0.20 | 0.0049 | J | | 0.013 | 0.031 | | | < 0.0019 | < 0.0020 | U | |
| **Total of 19 Congeners Analyzed** | | | - | 0.22 | | | 4.23 | 0.17 | | | 0.20 | 0.35 | | | 0.12 | 0.10 | | |
| **Total of Aroclors** | | | - | 0.35 | | | 0.53 | 0.63 | | 17% | 0.71 | 0.74 | | 4% | 0.38 | 0.30 | | |
| | | | | | | | | | | 1 | | | | 1 | | | | |

* Results do not meet QC acceptance criteria, see narrative
n/r - not run
J - Estimated value. Result is above method detection limit, but below limit of quanitation
Sample RR01-02A was not analyzed by Lancaster since the sample broke in transit. Use RR01-02P analysis as a surrogate.

| Parameters | Method | Units | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Field Rep of RR01-04P* | | | | | | *Field Rep of RR01-05A* | | | | | | *Field Dup of RR01-08B* | | | | | |
| **Sample ID** | | | | RR01-04P | | RR01-22P | | | RR01-05A | | RR01-22A | | | RR01-08B | | RR01-25B | | | RR01-08C | | | | |
| **Date Collected** | | mm/dd/yy | | 10/20/01 | | 10/20/01 | | | 10/18/01 | | 10/18/01 | | | 10/19/01 | | 10/19/01 | | | 10/19/01 | | | | |
| **Time Collected** | | hhhh | | 0832 | | 0859 | | | 1034 | | 1058 | | | 0953 | | 1010 | | | 0953 | | | | |
| **Latitude** | GPS | dd.ddddd | | 41.90113 | | 41.90113 | | | 41.90109 | | 41.90109 | | | 41.90065 | | 41.90065 | | | 41.90065 | | | | |
| **Longitude** | GPS | dd.ddddd | | -83.35457 | | -83.35457 | | | -83.35429 | | -83.35429 | | | -83.35393 | | -83.35393 | | | -83.35393 | | | | |
| **Slice Start Depth** | | inches | | ponar | | ponar | | | 0 | | 0 | | | 6 | | 6 | | | 18 | | | | |
| **Slice End Depth** | | inches | | ponar | | ponar | | | 4 | | 5 | | | 18 | | 18 | | | 30 | | | | |
| TOC | Walkley-Black | mg/kg | -6% | 31,000 | | 27,000 | | -14% | 22,000 | | 21,000 | | -5% | 26,000 | | 25,000 | | -4% | 40,000 | | | | |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | | < 0.15 | U | < 0.38 | U | | < 0.024 | U | < 0.049 | U | | < 3.3 | U | < 0.69 | U | | < 6.5 | U | | | |
| Aroclor-1221 | 8082 | mg/kg | | < 0.20 | U | < 0.51 | U | | < 0.032 | U | < 0.065 | U | | < 4.5 | U | < 0.92 | U | | < 8.6 | U | | | |
| Aroclor-1232 | 8082 | mg/kg | | < 0.15 | U | < 0.38 | U | | < 0.024 | U | < 0.049 | U | | < 3.3 | U | < 0.69 | U | | < 6.5 | U | | | |
| Aroclor-1242 | 8082 | mg/kg | | 3.9 | | 7.0 | | | 0.40 | | 0.97 | | | 46 | | 26 | | | 300 | | | | |
| Aroclor-1248 | 8082 | mg/kg | | < 0.16 | U | < 0.42 | U | | < 0.026 | U | < 0.053 | U | | < 3.7 | U | < 0.75 | U | | < 7.0 | U | | | |
| Aroclor-1254 | 8082 | mg/kg | | < 0.15 | U | < 0.38 | U | | < 0.024 | U | < 0.049 | U | | < 3.3 | U | < 0.69 | U | | < 6.5 | U | | | |
| Aroclor-1260 | 8082 | mg/kg | | 0.61 | J | 1.7 | J | | < 0.024 | U | 0.066 | J | | < 3.3 | U | 1.6 | J | | 24 | | | | |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | | 0.24 | | 0.31 | J | | 0.028 | | 0.069 | | | 1.7 | | 1.7 | | | 75 | | | | |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | | < 0.0091 | U | < 0.023 | U | | < 0.00029 | U | < 0.003 | U | | < 0.041 | U | < 0.084 | U | | < 0.39 | U | | | |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | | 0.66 | | 0.85 | | | 0.024 | | 0.13 | | | 3.1 | | 4.0 | | | 42 | | | | |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | | 0.26 | | 0.28 | | | 0.0037 | | 0.037 | | | 1.0 | | 1.9 | | | 23 | | | | |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | | 0.27 | | 0.25 | | | 0.0026 | | 0.030 | | | 0.6 | | 1.6 | | | 5.1 | | | | |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | | 0.37 | | 0.43 | | | 0.0047 | | 0.049 | | | 1.2 | | 2.4 | | | 11 | | | | |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | | 0.15 | | 0.16 | | | 0.0017 | | 0.020 | | | 0.75 | | 2.3 | | | 7.8 | | | | |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | | 0.029 | J | 0.028 | J | | < 0.00029 | U | < 0.003 | U | | 0.095 | J | 0.36 | | | 1.6 | | | | |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | | 0.075 | | 0.099 | | | 0.00097 | J | 0.0084 | J | | 0.23 | | 0.64 | | | 3.9 | | | | |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | | 0.13 | | 0.13 | | | 0.0012 | | 0.013 | | | 0.27 | | 0.79 | | | 4.3 | | | | |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | | 0.044 | | 0.051 | J | | 0.00043 | J | < 0.003 | U | | 0.082 | J | 0.23 | J | | 2.0 | | | | |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | | < 0.0091 | U | < 0.023 | U | | 0.0003 | J | < 0.003 | U | | < 0.041 | U | < 0.084 | U | | 0.45 | | | | |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | | 0.018 | J | 0.034 | J | | 0.00032 | J | < 0.003 | U | | < 0.041 | U | < 0.084 | U | | 0.53 | | | | |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | | 0.048 | | 0.068 | J | | 0.00067 | J | 0.0035 | J | | 0.088 | J | 0.27 | J | | 1.8 | | | | |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | | 0.022 | J | 0.033 | J | | < 0.00029 | U | < 0.003 | U | | 0.045 | J | 0.098 | J | | 1 | | | | |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | | 0.041 | | 0.047 | J | | 0.00058 | J | 0.0034 | J | | 0.075 | J | 0.16 | J | | 1.8 | | | | |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | | < 0.0091 | U | < 0.023 | U | | < 0.00029 | U | < 0.003 | U | | < 0.041 | U | < 0.084 | U | | < 0.39 | U | | | |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | | 0.031 | J | 0.041 | J | | 0.00044 | J | < 0.003 | U | | 0.044 | J | 0.09 | J | | 0.94 | | | | |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | | < 0.0091 | U | < 0.023 | U | | < 0.00029 | U | < 0.003 | U | | < 0.041 | U | < 0.084 | U | | < 0.39 | U | | | |
| **Total of 19 Congeners Analyzed** | | | | 2.39 | | 2.81 | | | 0.07 | | 0.36 | | | 9.28 | | 16.54 | | | 182.22 | | | | |
| **Total of Aroclors** | | | -26% | 4.51 | | 8.70 | | 63% | 0.40 | | 1.04 | | 89% | 46.00 | | 27.60 | | -50% | 324.00 | | | | |
| | | | 1 | | | | | 0 | | | | | 0 | | | | | 1 | | | | | |

* Results do not meet QC acceptance criteria, see narrative
n/r - not run
J - Estimated value. Result is above method detection limit, but below limit of quar
Sample RR01-02A was not analyzed by Lancaster since the sample broke in transi

| Parameters | Method | Units | *Field Dup of RR01-08C* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | | RR01-25C | | | RR01-13A | | RR01-21A | | | RR01-17P | | RR01-21P | | |
| **Date Collected** | | mm/dd/yy | 10/19/01 | | | 10/18/01 | | 10/18/01 | | | 10/19/01 | | 10/19/01 | | |
| **Time Collected** | | hhhh | 1010 | | | 0826 | | 0926 | | | 1526 | | 1556 | | |
| **Latitude** | GPS | dd.ddddd | 41.90065 | | | 41.90020 | | 41.90020 | | | 41.89857 | | 41.89857 | | |
| **Longitude** | GPS | dd.ddddd | -83.35393 | | | -83.35297 | | -83.35297 | | | -83.35107 | | -83.35107 | | |
| **Slice Start Depth** | | inches | 18 | | | ponar | | ponar | | | ponar | | ponar | | |
| **Slice End Depth** | | inches | 30 | | | ponar | | ponar | | | ponar | | ponar | | |
| TOC | Walkley-Black | mg/kg | 37,000 | | -8% | 7,700 | | 8,600 | | 11% | 28,000 | | 36,000 | | 25% |
| **PCB Aroclors (Dry Weight)** | | | | | | | | | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 32 | U | | < 1.6 | U | < 1.7 | U | | < 0.14 | U | < 0.15 | U | |
| Aroclor-1221 | 8082 | mg/kg | < 43 | U | | < 2.2 | U | < 2.3 | U | | < 0.19 | U | < 0.19 | U | |
| Aroclor-1232 | 8082 | mg/kg | < 32 | U | | < 1.6 | U | < 1.7 | U | | < 0.14 | U | < 0.15 | U | |
| Aroclor-1242 | 8082 | mg/kg | 750 | | | 20 | | 20 | | | 5.4 | | 5.1 | | |
| Aroclor-1248 | 8082 | mg/kg | < 35 | U | | < 1.8 | U | < 1.9 | U | | < 0.15 | U | < 0.16 | U | |
| Aroclor-1254 | 8082 | mg/kg | < 32 | U | | < 1.6 | U | < 1.7 | U | | < 0.14 | U | < 0.15 | U | |
| Aroclor-1260 | 8082 | mg/kg | < 32 | U | | 2 | J | 1.9 | J | | 0.3 | J | 0.38 | J | |
| **PCB Congeners (Dry Weight)** 8082 modified | | | | | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 77 | | | 1.2 | J | < 0.36 | U | | 0.16 | J | 0.16 | | |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.39 | U | | < 0.098 | U | < 0.10 | U | | < 0.017 | U | < 0.0088 | U | |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 48 | | | 2.3 | | 1.7 | | | 0.84 | | 0.72 | | |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 28 | | | 0.54 | | 2.1 | | | 0.30 | | 0.32 | | |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 5.8 | | | 0.48 | | 1.6 | | | 0.22 | | 0.25 | | |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 13 | | | 0.84 | | 2.1 | | | 0.39 | | 0.39 | | |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 9.0 | | | 0.61 | | 1.6 | | | 0.26 | | 0.31 | | |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 1.8 | | | < 0.098 | U | 0.2 | J | | 0.034 | J | 0.045 | | |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 4.3 | | | 0.22 | J | 0.70 | | | 0.084 | | 0.11 | | |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 4.8 | | | 0.25 | J | 0.79 | | | 0.10 | | 0.14 | | |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 2.4 | | | < 0.098 | U | 0.15 | J | | 0.033 | | 0.047 | | |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | 0.44 | | | < 0.098 | U | < 0.10 | U | | < 0.017 | U | 0.011 | J | |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | 0.77 | | | < 0.098 | U | < 0.10 | U | | < 0.017 | U | < 0.0088 | U | |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 1.9 | | | < 0.098 | U | 0.18 | J | | 0.045 | J | 0.044 | | |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 1.2 | | | < 0.098 | U | < 0.10 | U | | 0.018 | J | 0.022 | J | |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 2.0 | | | < 0.098 | U | 0.11 | J | | 0.029 | J | 0.037 | | |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | 0.4 | | | < 0.098 | U | < 0.10 | U | | < 0.017 | U | < 0.0088 | U | |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 1.1 | | | < 0.098 | U | < 0.10 | U | | 0.02 | J | 0.023 | J | |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.39 | U | | < 0.098 | U | < 0.10 | U | | < 0.017 | U | < 0.0088 | U | |
| **Total of 19 Congeners Analyzed** | | | 201.91 | | | 6.44 | | 11.23 | | | 2.53 | | 2.63 | | |
| **Total of Aroclors** | | | 750.00 | | 79% | 22.00 | | 21.90 | | 0% | 5.70 | | 5.48 | | -4% |
| | | | | | 0 | | | | | 1 | | | | | 1 |

* Results do not meet QC acceptance criteria, see narrative
n/r - not run
J - Estimated value. Result is above method detection limit, but below limit of quar
Sample RR01-02A was not analyzed by Lancaster since the sample broke in transi

# Appendix B

**FISH TISSUE**

| **Parameters** | **Method** | **Units** | RR02-C1 | RR02-C1 | RR02-C1 | | RR02-C1 |
|---|---|---|---|---|---|---|---|
| **Replicate #** | | | Rep #1 | Rep #2 | Rep #3 | | Rep #4 |
| Date Collected | | | 8/20/02 | | | | |
| Latitude | NAD83 | dd.mmmm | 41.8965 | 41.8965 | | 41.8965 | 41.8965 |
| Longitude | NAD83 | dd.mmmm | -83.3482 | -83.3482 | | -83.3482 | -83.3482 |
| Location Description | | | Near DE Canal | Near DE Canal | Near DE Canal | | Near DE Canal |
| **PCB Aroclors** | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Aroclor-1221 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Aroclor-1232 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Aroclor-1242 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Aroclor-1248 | 8082 | mg/kg | 0.580 | 0.460 | 0.510 | | 0.860 |
| Aroclor-1254 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Aroclor-1260 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | | < 0.033 |
| Total PCB Aroclors | | mg/kg | 0.580 | 0.460 | 0.510 | | 0.860 |
| **PCB Congeners** | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | 8082 modified | mg/kg | < 0.0035 | < 0.0035 | < 0.0035 | | < 0.0035 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0180 | 0.0190 | | 0.0170 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | 8082 modified | mg/kg | 0.0130 | 0.0140 | 0.0160 | | 0.0130 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0210 | 0.0240 | 0.0270 | | 0.0230 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0280 | 0.0310 | 0.0340 | | 0.0300 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0180 | 0.0210 | 0.0240 | | 0.0200 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0012 J | 0.0039 | 0.0045 | | 0.0039 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0065 | 0.0076 | 0.0088 | | 0.0073 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0093 | 0.0110 | 0.0130 | | 0.0100 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0046 | 0.0054 | | 0.0045 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0012 J | 0.0015 J | 0.0018 J | | 0.0015 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0043 | 0.0052 | 0.0061 | | 0.0050 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | 0.0010 J | | < 0.0010 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | 0.0010 J | 0.0019 J | 0.0019 J | | 0.0017 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 |
| Total of 19 PCB Congeners | | mg/kg | 0.1001 | 0.1403 | 0.1578 | | 0.1337 |
| | | | | | | | **C1 AVERAGE** |
| | | | | | **Total Aroclors** | | 0.603 |
| | | | | | **Total Congeners** | | 0.133 |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

| **LOCATION** | **AVG PCB CONC.** |
|---|---|
| Near RR Bridge (Upsteam of SRA) | 0.00 |
| Adjacent to SRA | 0.77 |
| River Mouth (Downstream of SRA) | 0.60 |

**FISH TISSUE**

| **Parameters** | **Method** | **Units** | RR02-C2 | RR02-C2 | RR02-C2 | RR02-C2 |
|---|---|---|---|---|---|---|
| **Replicate #** | | | Rep #1 | Rep #2 | Rep #3 | Rep #4 |
| Date Collected | | | 8/20/02 | | | |
| Latitude | NAD83 | dd.mmmm | 41.9001 | 41.9001 | 41.9001 | 41.9001 |
| Longitude | NAD83 | dd.mmmm | -83.3551 | -83.3551 | -83.3551 | -83.3551 |
| Location Description | | | Just downstream of turning basin | Just downstream of turning basin | Just downstream of turning basin | Just downstream of turning basin |
| **PCB Aroclors** | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1221 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1232 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1242 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1248 | 8082 | mg/kg | 0.780 | 0.680 | 0.850 | 0.770 |
| Aroclor-1254 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1260 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Total PCB Aroclors | | mg/kg | 0.780 | 0.680 | 0.850 | 0.770 |
| **PCB Congeners** | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | 8082 modified | mg/kg | < 0.0035 | < 0.0028 | < 0.0028 | < 0.0028 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0008 | < 0.0008 | < 0.0008 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | 8082 modified | mg/kg | 0.0190 | 0.0250 | 0.0260 | 0.0320 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0180 | 0.0190 | 0.0250 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0210 | 0.0260 | 0.0280 | 0.0340 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0320 | 0.0360 | 0.0390 | 0.0470 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0150 | 0.0190 | 0.0200 | 0.0250 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0036 | 0.0039 | 0.0047 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0057 | 0.0076 | 0.0079 | 0.0099 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0093 | 0.0120 | 0.0120 | 0.0150 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0034 J | 0.0042 | 0.0044 | 0.0060 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0008 | 0.00083 J | 0.0010 J |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0015 J | 0.0016 J | 0.0021 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0041 | 0.0049 | 0.0053 | 0.0064 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0011 J | < 0.0008 | 0.0011 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.00097 J | 0.0010 J | 0.0014 J |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0008 | < 0.0008 | < 0.0008 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0017 J | 0.0017 J | 0.0024 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0008 | < 0.0008 | < 0.0008 |
| Total of 19 PCB Congeners | | mg/kg | 0.1061 | 0.1563 | 0.1655 | 0.2050 |
| | | | | | | **C2 AVERAGE** |
| | | | | | **Total Aroclors** | 0.770 |
| | | | | | **Total Congeners** | 0.158 |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**FISH TISSUE**

| **Parameters** | **Method** | **Units** | RR02-C2-B | RR02-C2-B | RR02-C2-B | RR02-C2-B |
|---|---|---|---|---|---|---|
| **Replicate #** | | | Rep #1 | Rep #2 | Rep #3 | Rep #4 |
| Date Collected | | | 8/20/02 | | | |
| Latitude | NAD83 | dd.mmmm | 41.9001 | 41.9001 | 41.9001 | 41.9001 |
| Longitude | NAD83 | dd.mmmm | -83.3551 | -83.3551 | -83.3551 | -83.3551 |
| Location Description | | | Just downstream of turning basin (duplicate) | Just downstream of turning basin (duplicate) | Just downstream of turning basin (duplicate) | Just downstream of turning basin (duplicate) |
| **PCB Aroclors** | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1221 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1232 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1242 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1248 | 8082 | mg/kg | 0.870 | 0.790 | 0.650 | 0.770 |
| Aroclor-1254 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Aroclor-1260 | 8082 | mg/kg | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Total PCB Aroclors | | mg/kg | 0.870 | 0.790 | 0.650 | 0.770 |
| **PCB Congeners** | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | 8082 modified | mg/kg | < 0.0035 | < 0.0035 | < 0.0035 | < 0.0035 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0010 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | 8082 modified | mg/kg | 0.0054 | 0.0160 | 0.0300 | 0.0074 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0290 | 0.0230 | 0.0240 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0260 | 0.0360 | 0.0290 | 0.0310 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0380 | 0.0500 | 0.0420 | 0.0440 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | 0.0160 | 0.0230 | 0.0190 | 0.0200 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0043 | 0.0033 J | 0.0036 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0067 | 0.0096 | 0.0079 | 0.0080 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0098 | 0.0140 | 0.0110 | 0.0120 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0031 J | 0.0050 | 0.0046 | 0.0049 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0010 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0012 J | 0.0019 J | 0.0016 J | 0.0016 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0041 | 0.0060 | 0.0051 | 0.0051 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0010 J | < 0.0010 | < 0.0010 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0011 J | < 0.0010 | < 0.0010 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0010 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | 0.0011 J | 0.0021 J | 0.0019 J | 0.0019 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0010 |
| Total of 19 PCB Congeners | | mg/kg | 0.1060 | 0.1929 | 0.1716 | 0.1600 |
| | | | | | **C2-B AVERAGE** | **RPD Values** |
| | | | | **Total Aroclors** | 0.770 | 0% |
| | | | | **Total Congeners** | 0.158 | 0% |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**FISH TISSUE**

| **Parameters** | **Method** | **Units** | RR02-C3 | RR02-C3 | RR02-C3 | RR02-C3 | RR02-Control |
|---|---|---|---|---|---|---|---|
| **Replicate #** | | | Rep #1 | Rep #2 | Rep #3 | Rep #4 | |
| Date Collected | | | 8/20/02 | | | | 8/20/02 |
| Latitude | NAD83 | dd.mmmm | 41.9086 | 41.9086 | 41.9086 | 41.9086 | N/A |
| Longitude | NAD83 | dd.mmmm | -83.3768 | -83.3768 | -83.3768 | -83.3768 | N/A |
| Location Description | | | Upstream of turning basin approaching railroad bridge | Upstream of turning basin approaching railroad bridge | Upstream of turning basin approaching railroad bridge | Upstream of turning basin approaching railroad bridge | Negative Control Sample for Lab |
| **PCB Aroclors** | | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1221 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1232 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1242 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1248 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1254 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Aroclor-1260 | 8082 | mg/kg | < 0.0066 | < 0.0017 | < 0.0017 | < 0.0017 | < 0.0066 |
| Total PCB Aroclors | | mg/kg | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **PCB Congeners** | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | 8082 modified | mg/kg | < 0.0035 | < 0.0042 | < 0.0042 | < 0.0042 | < 0.0035 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | 0.0024 J | < 0.0012 | < 0.0012 | < 0.0012 | 0.0021 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0021 J | < 0.0012 | 0.0027 J | 0.0027 J | 0.0017 J |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | 8082 modified | mg/kg | 0.0025 J | 0.0024 J | 0.0026 J | 0.0025 J | 0.0015 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | 0.0012 J | 0.0013 J | 0.0012 J | < 0.0010 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | 8082 modified | mg/kg | < 0.0010 | < 0.0012 | < 0.0012 | < 0.0012 | < 0.0010 |
| Total of 19 PCB Congeners | | mg/kg | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

**C3 AVERAGE**

J - Estimated value. Result is above method detection limit, but below limit of quantitation

| | |
|---|---|
| **Total Aroclors** | 0.000 |
| **Total Congeners** | 0.000 |

# U.S. Army Corps of Engineers
# Raisin River Sediment Analytical Results
# DACW35-01-D-0007, D.O. 3

## SEDIMENTS

| | | | | | | |
|---|---|---|---|---|---|---|
| | Sample ID | | RR-02-C1 | RR-02-C2A | RR-02-C2B | RR-02-C3 |
| | Date Collected | | 7/22/02 | 7/22/02 | 7/22/02 | 7/22/02 |
| | Time Collected | | 1900 | 1815 | 1820 | 1645 |
| **Parameters** | **Method** | **Units** | | | | |
| TOC | Walkley-Black | mg/kg | n/r | 20,000 | 29,000 | 22,000 |
| % Moisture (Trace) | D2974 | % | n/r | 40.9 | 47.1 | 42.5 |
| % Moisture (Lancaster) | EPA 160.3 modified | % | 39.4 | 37.2 | 39.8 | 41.0 |
| **Metals** | | | | | | |
| Total Arsenic | 6020 | mg/kg | n/r | 4.8 | 5.9 | 4.2 |
| Total Barium | 6010 | mg/kg | n/r | 63 | 81 | 60 |
| Total Cadmium | 6010 | mg/kg | n/r | 0.42 | 0.66 | 0.39 |
| Total Chromium | 6010 | mg/kg | n/r | 19 | 43 | 15 |
| Total Copper | 6010 | mg/kg | n/r | 22 | 42 | 15 |
| Total Iron | 6010 | mg/kg | n/r | 13,000 | 13,000 | 13,000 |
| Total Lead | 6010 | mg/kg | n/r | 23 | 55 * | 17 |
| Total Manganese | 6010 | mg/kg | n/r | 280 | 300 | 330 |
| Total Mercury | 7471 | mg/kg | n/r | 0.15 | 0.79 | < 0.10 |
| Total Nickel | 6010 | mg/kg | n/r | 16 | 25 | 14 |
| Total Selenium | 7740 | mg/kg | n/r | < 0.20 * | < 0.20 | < 0.20 |
| Total Silver | 6010 | mg/kg | n/r | < 0.50 | < 0.50 | < 0.50 |
| Total Zinc | 6010 | mg/kg | n/r | 82 | 150 | 73 |
| **PCB Aroclors (Dry Weight)** | | | | | | |
| Aroclor-1016 | 8082 | mg/kg | < 0.0054 | < 0.026 | < 0.55 | < 0.0056 |
| Aroclor-1221 | 8082 | mg/kg | < 0.0054 | < 0.026 | < 0.55 | < 0.0056 |
| Aroclor-1232 | 8082 | mg/kg | < 0.0054 | < 0.026 | < 0.55 | < 0.0056 |
| Aroclor-1242 | 8082 | mg/kg | < 0.0054 | < 0.026 | < 0.55 | < 0.0056 |
| Aroclor-1248 | 8082 | mg/kg | 0.23 | 1.8 | 7.6 | 0.029 |
| Aroclor-1254 | 8082 | mg/kg | < 0.0054 | < 0.026 | < 0.55 | < 0.0056 |
| Aroclor-1260 | 8082 | mg/kg | 0.029 | 0.48 | < 0.55 | 0.024 J |
| **PCB Congeners (Dry Weight)** | 8082 modified | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | mg/kg | 0.0061 | 0.019 J | < 0.12 | < 0.0012 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | mg/kg | < 0.00033 | < 0.0016 | < 0.033 | < 0.00034 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | mg/kg | 0.0096 | 0.081 | 0.29 | 0.00058 J |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | mg/kg | 0.013 | 0.097 | 0.48 | 0.00051 J |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | mg/kg | 0.0083 | 0.061 | 0.31 | 0.00070 J |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | mg/kg | 0.013 | 0.088 | 0.45 | 0.0010 J |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | mg/kg | 0.010 | 0.076 | 0.16 | 0.0013 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | mg/kg | 0.0019 | 0.018 | 0.037 J | 0.00083 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | mg/kg | 0.0028 | 0.033 | 0.061 J | < 0.00034 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | mg/kg | 0.0046 | 0.045 | 0.11 J | 0.00089 J |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | mg/kg | 0.0016 | 0.015 | < 0.033 | 0.00085 J |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | mg/kg | 0.00037 J | 0.0033 J | < 0.033 | < 0.00034 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | mg/kg | < 0.00033 | 0.0059 | < 0.033 | < 0.00034 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | mg/kg | 0.0017 | 0.015 | < 0.033 | 0.0010 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | mg/kg | 0.00093 J | 0.0078 | < 0.033 | 0.00044 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | mg/kg | 0.0011 J | 0.013 | < 0.033 | < 0.00034 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | mg/kg | < 0.00033 | 0.0030 J | < 0.033 | < 0.00034 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | mg/kg | 0.00071 J | 0.0068 | < 0.033 | < 0.00034 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | mg/kg | < 0.00033 | < 0.0016 | < 0.033 | < 0.00034 |

* Results do not meet QC acceptance criteria,
see narrative.

n/r - not run due to the amount of zebra mussels vs. sediment
Note: RR-02-C1 analysis results are of zebra mussels, not sediment.
J - Estimated value. Result is above method detection limit,
but below limit of quantitation

**WATER**

| Sample ID | | | RR-02-C1 | RR-02-C2A | RR-02-C2B | RR-02-C3 | RR-02-C1 | RR-02-C2A | RR-02-C2B | RR-02-C3 |
|---|---|---|---|---|---|---|---|---|---|---|
| Date Collected | | | 7/22/02 | 7/22/02 | 7/22/02 | 7/22/02 | 8/20/02 | 8/20/02 | 8/20/02 | 8/20/02 |
| Time Collected | | | 1900 | 1800 | 1805 | 1650 | 1135 | 1200 | 1200 | 1300 |
| **Parameters** | **Method** | **Units** | | | | | | | | |
| TOC | 415.1 | mg/l | 3.5 | 4.4 | 4.2 | 5.7 | 4.1 | 4.7 | 4.9 | 5.5 |
| **Metals** | | | | | | | | | | |
| Total Arsenic | 6020 | ug/l | < 20 | < 20 | < 20 | < 20 | < 20 | < 20 | < 20 | < 20 |
| Total Barium | 6020 | ug/l | < 100 | < 100 | < 100 | < 100 | < 100 | < 100 | < 100 | < 100 |
| Total Cadmium | 6020 | ug/l | < 0.50 | < 0.50 | 0.63 | < 0.50 | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Total Chromium | 6020 | ug/l | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Total Copper | 6020 | ug/l | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 |
| Total Iron | 6010 | ug/l | 250 | 950 | 650 | 320 | 310 | 1,100 | 440 | 190 |
| Total Lead | 7421 | ug/l | 6.6 | < 3.0 | < 3.0 | < 3.0 | < 3.0 | < 3.0 | < 3.0 | < 3.0 |
| Total Manganese | 6020 | ug/l | < 20 | 40 | 32 | 32 | 30 | 53 | 50 | 35 |
| Total Mercury | 7470 | ug/l | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Total Nickel | 6010 | ug/l | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 | < 25 |
| Total Selenium | 6020 | ug/l | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Total Silver | 7761 | ug/l | < 0.50 | < 0.50 | < 0.50 | < 0.50 * | < 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Total Zinc | 6020 | ug/l | < 10 | < 10 | 44 | < 10 | < 10 | < 10 | < 10 | < 10 |
| **PCB Aroclors** | | | | | | | | | | |
| Aroclor-1016 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1221 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1232 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1242 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1248 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1254 | 8082 | ug/l | < 0.097 | < 0.095 | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| Aroclor-1260 | 8082 | ug/l | < 0.097 | 0.250 J | < 0.095 | < 0.096 | < 0.095 | < 0.095 | < 0.095 | < 0.095 |
| **PCB Congeners** | 8082 modified | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | | ug/l | < 0.019 | < 0.019 | < 0.019 | < 0.019 | < 0.019 | n/r | < 0.019 | < 0.019 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | 0.0093 J | < 0.0048 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | 0.0071 J | < 0.0048 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | | ug/l | < 0.0048 | 0.0065 J | < 0.0047 | < 0.0047 | 0.0077 J | n/r | 0.013 J | < 0.0048 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0047 | < 0.0048 | n/r | < 0.0048 | < 0.0048 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0048 | < 0.0049 | n/r | < 0.0048 | < 0.0049 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0048 | < 0.0049 | n/r | < 0.0048 | < 0.0049 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0048 | < 0.0049 | n/r | < 0.0048 | < 0.0049 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | | ug/l | < 0.0048 | < 0.0048 | < 0.0047 | < 0.0048 | < 0.0049 | n/r | < 0.0048 | < 0.0049 |

* Results do not meet QC acceptance criteria, see narrative.

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**WHOLE SEDIMENT BIOACCUMULATION**

| | Sample ID | RR01-01P A | RR01-01P B | RR01-01P C | RR01-01P D | RR01-01P E | RR01-02P A | RR01-02P B | RR01-02P C | RR01-02P D | RR01-02P E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date Collected | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 |
| | Time Collected | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| **Parameters** | **Units** | | | | | | | | | | |
| **PCB Congeners** (Method 8082 modified) | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | mg/kg | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 | < 0.0053 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | mg/kg | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | mg/kg | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | mg/kg | 0.0061 | 0.0059 | 0.0060 | 0.0053 | 0.0057 | 0.0031 J | 0.0031 J | 0.0039 J | 0.0033 J | 0.0040 J |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | mg/kg | 0.0087 | 0.0081 | 0.0085 | 0.0074 | 0.0080 | 0.0061 | 0.0061 | 0.0076 | 0.0073 | 0.0083 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | mg/kg | 0.016 | 0.014 | 0.015 | 0.013 | 0.014 | 0.010 | 0.0098 | 0.013 | 0.012 | 0.013 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | mg/kg | 0.0048 J | 0.0042 J | 0.0045 J | 0.0038 J | 0.0040 J | 0.0028 J | 0.0029 J | 0.0039 J | 0.0039 J | 0.0044 J |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | mg/kg | < 0.0015 | 0.0025 J | 0.0021 J | 0.0022 J | 0.0024 J | 0.0019 J | 0.0020 J | 0.0024 J | 0.0023 J | 0.0023 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | mg/kg | 0.0058 | 0.0052 J | 0.0053 | 0.0044 J | 0.0054 | 0.0045 J | 0.0041 J | 0.0051 J | 0.0058 | 0.0059 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | mg/kg | 0.0067 | 0.0062 | 0.0065 | 0.0057 | 0.0063 | 0.0053 | 0.0051 J | 0.0066 | 0.0065 | 0.0072 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | mg/kg | 0.0052 J | 0.0030 J | 0.0028 J | 0.0028 J | 0.0035 J | 0.0022 J | 0.0028 J | 0.0027 J | 0.0037 J | 0.0034 J |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | mg/kg | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | mg/kg | 0.0030 J | 0.0034 J | 0.0020 J | 0.0024 J | 0.0039 J | < 0.0015 | 0.0018 J | 0.0018 J | 0.0024 J | 0.0023 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | mg/kg | 0.0058 | 0.0035 J | 0.0032 J | 0.0029 J | 0.0042 J | 0.0028 J | 0.0030 J | 0.0032 J | 0.0047 J | 0.0038 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | mg/kg | 0.0025 J | 0.0017 J | 0.0019 J | < 0.0015 | 0.0022 J | < 0.0015 | 0.0017 J | < 0.0015 | 0.0026 J | 0.0020 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | mg/kg | 0.0033 J | < 0.0015 | < 0.0015 | < 0.0015 | 0.0022 J | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | mg/kg | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | mg/kg | 0.0052 J | 0.0044 J | 0.0039 J | 0.0031 J | 0.0045 J | 0.0027 J | 0.0022 J | 0.0031 J | 0.0044 J | 0.0042 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | mg/kg | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 | < 0.0015 |
| | | 0.0491 | 0.0342 | 0.0413 | 0.0314 | 0.0394 | 0.0214 | 0.0159 | 0.0272 | 0.0316 | 0.0344 |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**Average = 0.03908** **Average = 0.0261**

**WHOLE SEDIMENT BIOACCUMULATION**

| Sample ID | | RR01-04P A | RR01-04P B | RR01-04P C | RR01-04P D | RR01-04P E | RR01-08P A | RR01-08P B | RR01-08P C | RR01-08P D | RR01-08P E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Collected | | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 | 12/19/01 |
| Time Collected | | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| **Parameters** | **Units** | | | | | | | | | | |
| **PCB Congeners** (Method 8082 modified) | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | mg/kg | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.053 | < 0.053 | < 0.053 | < 0.053 | < 0.053 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | mg/kg | 0.074 | 0.068 | 0.090 | 0.078 | 0.065 | 0.41 | 0.45 | 0.47 | 0.40 | 0.40 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | mg/kg | 0.11 | 0.096 | 0.12 | 0.10 | 0.090 | 0.55 | 0.60 | 0.64 | 0.58 | 0.55 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | mg/kg | 0.20 | 0.18 | 0.22 | 0.20 | 0.17 | 0.72 | 0.78 | 0.82 | 0.75 | 0.70 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | mg/kg | 0.055 | 0.048 | 0.062 | 0.052 | 0.047 | 0.46 | 0.49 | 0.54 | 0.47 | 0.45 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | mg/kg | 0.015 J | 0.014 J | 0.017 J | 0.016 J | 0.012 J | 0.099 | 0.11 | 0.12 | 0.11 | 0.10 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | mg/kg | 0.059 | 0.055 | 0.067 | 0.059 | 0.050 | 0.23 | 0.25 | 0.26 | 0.24 | 0.23 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | mg/kg | 0.071 | 0.069 | 0.088 | 0.075 | 0.063 | 0.28 | 0.30 | 0.33 | 0.30 | 0.28 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | mg/kg | 0.029 | 0.024 J | 0.029 | 0.026 | 0.022 J | 0.057 | 0.066 | 0.068 | 0.061 | 0.056 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | mg/kg | 0.019 J | 0.018 J | 0.023 J | 0.019 J | 0.018 J | 0.043 J | 0.050 J | 0.052 J | 0.050 J | 0.043 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | mg/kg | 0.029 | 0.025 J | 0.035 | 0.028 | 0.023 J | 0.066 | 0.085 | 0.079 | 0.071 | 0.066 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | mg/kg | 0.0088 J | < 0.0075 | 0.0095 J | 0.0087 J | 0.0081 J | 0.019 J | 0.019 J | 0.022 J | 0.017 J | 0.019 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | mg/kg | 0.037 | 0.033 | 0.043 | 0.037 | 0.032 | 0.048 J | 0.059 | 0.058 | 0.055 | 0.047 J |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.015 | < 0.015 | < 0.015 | < 0.015 | < 0.015 |
| | | 0.664 | 0.549 | 0.754 | 0.655 | 0.517 | 2.872 | 3.19 | 3.385 | 3.037 | 2.832 |
| | | | | | **Average =** | **0.6278** | | | | **Average =** | **3.0632** |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**WHOLE SEDIMENT BIOACCUMULATION**

| Sample ID | | RR01-12P A | RR01-12P B | RR01-12P C | RR01-12P D | RR01-12P E | RR01-17P A | RR01-17P B | RR01-17P C | RR01-17P D | RR01-17P E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Collected | | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 |
| Time Collected | | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| **Parameters** | **Units** | | | | | | | | | | |
| **PCB Congeners** (Method 8082 modified) | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | mg/kg | < 0.11 | < 0.11 | < 0.11 | < 0.11 | < 0.11 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | mg/kg | 0.29 | 0.31 | 0.24 | 0.34 | 0.29 | < 0.0075 | 0.21 | 0.13 | 0.12 | 0.19 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | mg/kg | 0.38 | 0.41 | 0.33 | 0.45 | 0.39 | 0.087 | 0.099 | 0.11 | 0.11 | 0.12 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | mg/kg | 0.60 | 0.64 | 0.52 | 0.70 | 0.62 | 0.23 | 0.26 | 0.30 | 0.29 | 0.31 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | mg/kg | 0.37 | 0.39 | 0.31 | 0.43 | 0.38 | 0.064 | 0.075 | 0.080 | 0.077 | 0.089 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | mg/kg | 0.085 J | 0.091 J | 0.079 J | 0.12 | 0.076 J | 0.020 J | 0.020 J | 0.026 J | 0.020 J | 0.023 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | mg/kg | 0.22 | 0.23 | 0.19 | 0.25 | 0.22 | 0.039 | 0.059 | 0.083 | 0.080 | 0.080 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | mg/kg | 0.23 | 0.24 | 0.19 | 0.26 | 0.22 | 0.06 | 0.069 | 0.088 | 0.079 | 0.085 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | mg/kg | 0.054 J | 0.057 J | 0.045 J | 0.065 J | 0.053 J | 0.024 J | 0.026 | 0.040 | 0.029 | 0.032 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | mg/kg | 0.054 J | 0.056 J | 0.049 J | 0.079 J | 0.034 J | 0.016 J | 0.019 J | 0.028 | 0.020 J | 0.025 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | mg/kg | 0.068 J | 0.069 J | 0.056 J | 0.077 J | 0.064 J | 0.025 J | 0.035 | 0.036 | 0.033 | 0.042 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | 0.017 J | 0.012 J | 0.011 J | 0.010 J | 0.013 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | mg/kg | 0.064 J | 0.068 J | 0.055 J | 0.074 J | 0.051 J | 0.039 | 0.045 | 0.055 | 0.050 | 0.056 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | mg/kg | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.030 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| | | 2.09 | 2.22 | 1.78 | 2.55 | 2.12 | 0.515 | 0.878 | 0.95 | 0.868 | 1.004 |
| | | | | | **Average =** | **2.152** | | | | **Average =** | **0.843** |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**WHOLE SEDIMENT BIOACCUMULATION**

| | | | | | | | *Field Rep of RR01-17P* | *Field Rep of RR01-17P* | *Field Rep of RR01-17P* | *Field Rep of RR01-17P* | *Field Rep of RR01-17P* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | RR01-18P A | RR01-18P B | RR01-18P C | RR01-18P D | RR01-18P E | RR01-21P A | RR01-21P B | RR01-21P C | RR01-21P D | RR01-21P E |
| Date Collected | | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 |
| Time Collected | | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| **Parameters** | **Units** | | | | | | | | | | |
| **PCB Congeners** (Method 8082 modified) | | | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | mg/kg | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | mg/kg | < 0.0075 | 0.095 | 0.067 | 0.060 | 0.054 | 0.11 | 0.11 | 0.11 | 0.13 | 0.12 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | mg/kg | 0.076 | 0.073 | 0.070 | 0.061 | 0.059 | 0.096 | 0.089 | 0.074 | 0.12 | 0.10 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | mg/kg | 0.12 | 0.11 | 0.11 | 0.11 | 0.095 | 0.27 | 0.25 | 0.22 | 0.29 | 0.29 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | mg/kg | 0.061 | 0.056 | 0.054 | 0.052 | 0.046 | 0.076 | 0.072 | 0.067 | 0.085 | 0.083 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | mg/kg | 0.017 J | 0.015 J | 0.014 J | 0.017 J | 0.012 J | 0.021 J | 0.019 J | 0.022 J | 0.023 J | 0.023 J |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | mg/kg | 0.039 | 0.040 | 0.043 | 0.041 | 0.037 | 0.077 | 0.071 | 0.060 | 0.082 | 0.086 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | mg/kg | 0.057 | 0.055 | 0.055 | 0.055 | 0.047 | 0.081 | 0.074 | 0.064 | 0.086 | 0.089 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | mg/kg | 0.018 J | 0.017 J | 0.017 J | 0.017 J | 0.014 J | 0.028 | 0.026 | 0.028 | 0.031 | < 0.0075 |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | mg/kg | 0.013 J | 0.013 J | 0.013 J | 0.017 J | 0.011 J | 0.020 J | 0.017 J | 0.016 J | 0.022 J | 0.022 J |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | mg/kg | 0.023 J | 0.022 J | 0.018 J | 0.019 J | 0.015 J | 0.033 | 0.031 | 0.025 J | 0.040 | 0.037 |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | 0.010 J | 0.0098 J | 0.0077 J | 0.014 J | 0.010 J |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | mg/kg | 0.028 | 0.027 | 0.026 J | 0.026 J | 0.023 J | 0.047 | 0.042 | 0.038 | 0.052 | 0.053 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 |
| | | 0.381 | 0.456 | 0.399 | 0.379 | 0.338 | 0.818 | 0.765 | 0.661 | 0.916 | 0.858 |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**Average =** **0.3906** **Average =** **0.8036**

**RPD%** -4.8%

| **WHOLE SEDIMENT BIOACCUMULATION** | | *Field Rep of RR01-4P* | *Field Rep of RR01-4P* | *Field Rep of RR01-4P* | *Field Rep of RR01-4P* | *Field Rep of RR01-4P* | *Control Sample* | *Control Sample* | *Control Sample* |
|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | RR01-22P A | RR01-22P B | RR01-22P C | RR01-22P D | RR01-22P E | RR01-23P C | RR01-24P C | RR01-25PC |
| Date Collected | | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 12/27/01 | 1/2/02 | 1/2/02 | 1/2/02 |
| Time Collected | | 1600 | 1600 | 1600 | 1600 | 1600 | 1400 | 1400 | 1400 |
| **Parameters** | **Units** | | | | | | | | |
| **PCB Congeners** (Method 8082 modified) | | | | | | | | | |
| PCB 1 (2-Chlorobiphenyl) | mg/kg | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.026 | < 0.0053 | < 0.0053 | < 0.0053 |
| PCB 5 ( 2,3-Dichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 18 (2,2',5-Trichlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 31 (2,4'5-Trichlorobiphenyl) | mg/kg | 0.067 | 0.077 | 0.080 | 0.078 | 0.081 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 44 (2,2',3,5'-Tetrachlorobiphenyl) | mg/kg | 0.087 | 0.10 | 0.10 | 0.10 | 0.11 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 52 (2,2',5,5'-Tetrachlorobiphenyl) | mg/kg | 0.17 | 0.20 | 0.20 | 0.20 | 0.20 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 66 (2,3',4,4'-Tetrachlorobiphenyl) | mg/kg | 0.045 | 0.052 | 0.052 | 0.051 | 0.053 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl) | mg/kg | 0.012 J | 0.014 J | 0.013 J | 0.014 J | 0.018 J | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl) | mg/kg | 0.044 | 0.057 | 0.058 | 0.056 | 0.060 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 110 (2,3,3',4',6-Pentachlorobiphenyl) | mg/kg | 0.061 | 0.075 | 0.077 | 0.074 | 0.080 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl) | mg/kg | 0.021 J | 0.027 | 0.035 | 0.026 J | 0.032 | 0.0021 J | 0.0016 J | 0.0017 J |
| PCB 141 (2,2',3,4,5,5'-Hexachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 151 (2,2',3,5,5',6-Hexachlorobiphenyl) | mg/kg | 0.023 J | 0.031 | 0.026 J | 0.024 J | 0.031 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl) | mg/kg | 0.026 J | 0.028 | 0.035 | 0.026 | 0.028 | 0.0029 J | 0.0018 J | 0.0023 J |
| PCB 170 (2,2',3,3',4,4',5-Heptachlorobiphenyl) | mg/kg | < 0.0075 | 0.011 J | 0.0095 J | 0.0079 J | 0.012 J | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 183 (2,2',3,4,4',5',6-Heptachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| PCB 187 (2,2',3,4',5,5',6-Heptachlorobiphenyl) | mg/kg | 0.040 | 0.046 | 0.049 | 0.044 | 0.046 | 0.0017 J | < 0.0015 | < 0.0015 |
| PCB 206 (2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl) | mg/kg | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0075 | < 0.0015 | < 0.0015 | < 0.0015 |
| | | 0.514 | 0.693 | 0.686 | 0.629 | 0.721 | 0 | 0 | 0 |

J - Estimated value. Result is above method detection limit, but below limit of quantitation

**Average =** **0.6486**
**RPD%** 3.3%

# WATER DEPTH, SEDIMENT DEPTH, AND SURFACE WATER ELEVATION

| Sample ID | Date Collected | Time Collected | Latitude dd.ddddd | Longitude dd.ddddd | Water Depth (feet) | Sediment Depth (feet) | Water Surface Elevation (ft. above mean sea level) |
|---|---|---|---|---|---|---|---|
| RR01-01 | 10/15/01 | 1405 | 41.89948 | -83.36106 | 17.4 | | 569.3 |
| RR01-01P | 10/17/01 | 0937 | 41.89938 | -83.36106 | 16.7 | | 568.5 |
| RR01-02 | 10/18/01 | 1545 | 41.90127 | -83.35805 | 10.5 | | 569.9 |
| RR01-02P | 10/19/01 | 1729 | 41.90123 | -83.35812 | 12.5 | | 569.6 |
| RR01-03 | 10/18/01 | 1444 | 41.90117 | -83.35587 | 18.6 | | 569.8 |
| RR01-04 | 10/18/01 | 1408 | 41.90115 | -83.35453 | 10.5 | 4.75 | 569.8 |
| RR01-04P | 10/20/01 | 0832 | 41.90113 | -83.35457 | 11.2 | | 570.1 |
| RR01-05 | 10/18/01 | 1034 | 41.90109 | -83.35429 | 3.6 | 0.50 | 570.5 |
| RR01-06 | 10/19/01 | 0924 | 41.90087 | -83.35417 | 18.9 | 2.00 | 570.0 |
| RR01-06P | 10/20/01 | 0916 | 41.90088 | -83.35417 | 17.0 | | 569.9 |
| RR01-07 | 10/18/01 | 1010 | 41.90090 | -83.35397 | 3.8 | 0.25 | 570.6 |
| RR01-08 | 10/19/01 | 0953 | 41.90065 | -83.35393 | 21.0 | 2.00 | 570.1 |
| RR01-08P | 10/20/01 | 0958 | 41.90063 | -83.35385 | 20.8 | | 569.9 |
| RR01-09 | 10/18/01 | 942 | 41.90061 | -83.35366 | 5.4 | 0.00 | 570.7 |
| RR01-10 | 10/19/01 | 1034 | 41.90047 | -83.35358 | 19.4 | 1.50 | 570.2 |
| RR01-11 | 10/18/01 | 0907 | 41.90042 | -83.35337 | 6.5 | 0.25 | 570.7 |
| RR01-12 | 10/19/01 | 1359 | 41.90017 | -83.35323 | 19.8 | 1.00 | 569.9 |
| RR01-12P | 10/19/01 | 1359 | 41.90017 | -83.35323 | 19.8 | | 569.9 |
| RR01-13 | 10/18/01 | 0826 | 41.90020 | -83.35297 | 3.4 | 0.25 | 570.7 |
| RR01-14 | 10/19/01 | 1500 | 41.89992 | -83.35293 | 19.7 | 0.08 | 569.7 |
| RR01-15 | 10/16/01 | 0820 | 41.90000 | -83.35281 | 5.3 | 0.17 | 572.6 |
| RR01-16 | 10/18/01 | 1654 | 41.89928 | -83.35203 | 13.3 | 4.00 | 569.9 |
| RR01-17 | 10/19/01 | 0827 | 41.89858 | -83.35100 | 10.2 | 4.00 | 569.8 |
| RR01-17P | 10/19/01 | 1526 | 41.89857 | -83.35107 | 11.8 | | 569.7 |
| RR01-18 | 10/15/01 | 0955 | 41.89744 | -83.35108 | 4.1 | | 568.5 |
| RR01-18P | 10/19/01 | 1614 | 41.89762 | -83.34973 | 7.7 | | 569.6 |
| RR01-19 | 10/15/01 | 1100 | 41.89442 | -83.34473 | 20.4 | | 568.5 |
| RR01-20 | 10/19/01 | Inaccessible, site above water line | | | | | N/A |
| RR01-21 | 10/18/01 | 0926 | 41.90020 | -83.35297 | 3.4 | | 570.7 |
| RR01-21P | 10/19/01 | 1556 | 41.89857 | -83.35107 | 11.8 | | 569.6 |
| RR01-22 | 10/18/01 | 1058 | 41.90109 | -83.35429 | 3.6 | | 570.5 |
| RR01-22P | 10/20/01 | 0859 | 41.90113 | -83.35457 | 11.2 | | 570.0 |
| RR01-23 | 10/18/01 | 1449 | 41.90117 | -83.35587 | 18.6 | | 569.8 |
| RR01-24 | 10/18/01 | 1602 | 41.90127 | -83.35805 | 10.5 | | 569.9 |
| RR01-25 | 10/19/01 | 1010 | 41.90065 | -83.35393 | 21.0 | | 570.2 |

| Removal Zone Corner # | Latitude dd.ddddd | Longitude dd.ddddd |
|---|---|---|
| 1 | 41.90127 | -83.35456 |
| 2 | 41.90111 | -83.35479 |
| 3 | 41.89997 | -83.35265 |
| 4 | 41.89978 | -83.35291 |

# Appendix E
## Calculation of Sediment Volumes and Average PCB Concentrations in the Sediment Removal Area (SRA)

Sediment depth and PCB concentration data were collected at each of the sediment core locations within the Sediment Removal Area (SRA), locations RR01-04 through RR01-15. Comparison of the coordinates for each of these sampling points to the coordinates of the corners of the SRA as provided by the U.S. Army Corp of Engineers (*Baxter*, 2001), confirms that these sampling locations are within the boundaries of the SRA. The measurement are used to calculate estimates for: average sediment depth in the SRA, estimated volume of contaminated sediments remaining in the SRA, average surficial PCB concentration in the SRA, and volume-weighted average PCB concentration of sediments within the SRA.

In order to simplify the calculation performed in this Appendix this report make the assumption that each sampling location equally represents the sediment depth and PCB concentrations of one-twelfth of the SRA. Although not exactly accurate, this simplification will provide rough estimates suitable for making screening level decisions.

### E.1 AVERAGE SEDIMENT DEPTH

The average sediment depth within the SRA is calculated using the arithmetic mean of the 12 sediment depth measurements shown in Table E-1. This method of calculating average sediment depth makes the broad assumption that each of the 12 sediment depth measurements represents the sediment depth of one-twelfth of the area of the SRA.

**Table E-1:** Sediment Depth Measurements for SRA Sampling Locations

| Location | Sediment Depth (feet) |
|---|---|
| RR01-04 | 4.8 |
| RR01-05 | 0.5 |
| RR01-06 | 2.0 |
| RR01-07 | 0.3 |
| RR01-08 | 2.0 |
| RR01-09 | 0.0 |
| RR01-10 | 1.5 |
| RR01-11 | 0.3 |
| RR01-12 | 1.0 |
| RR01-13 | 0.3 |
| RR01-14 | 0.1 |
| RR01-15 | 0.2 |
| ***Avg Sediment Detph in SRA = 1.1 feet*** | |

## E.2 ESTIMATED VOLUME OF CONTAMINATED SEDIMENTS IN SRA

The area of the SRA is calculated using the four SRA corner points as given by the UTM Zone 17 coordinates provided in Table E-2.

**Table E-2:** UTM Coordinates for Corner Points of SRA

| Point # | Easting (meters) | Northing (meters) |
|---|---|---|
| 1 | 304,693 | 4,641,495 |
| 2 | 304,674 | 4,641,477 |
| 3 | 304,848 | 4,641,346 |
| 4 | 304,826 | 4,641,326 |

These four corner points form an irregular quadrilateral. The area of the quadrilateral are calculated by dividing the quadrilateral into two, separate triangle as defined by points 1-2-3, and 2-3-4. In turn, the area of these triangles are calculated as follows:

1. The area of a triangle is defined as ½ * B * H, where B = length of the triangle base, and H = height of the triangle.

2. The length of the base of each triangle is calculated using the distance between the two sets of base points 1-3 and 2-4, respectively.

   Example Calculation:

   $$Dis\tan ce = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

   $B_{1\text{-}2\text{-}3}$

   $$= Dis\tan ce(1,3) = \sqrt{(304{,}848 - 304{,}693)^2 + (4642346 - 4641495)^2} = 215 meters$$

   Similarly, $B_{2\text{-}3\text{-}4}$ = Distance (2,4) = 214 meters

3. Next the normal equations for lines between points 1-3 and 2-4 are calculated using the standard geometric methods for calculating a line between two known points. The equations for normal lines are calculated in the form

   $lx + my + n = 0$

   where:

   $$l^2 + m^2 = 1$$

Equation for Line 1-3: $0.693x + 0.721y - 3557315 = 0$

Equation for Line 2-4: $0.705x + 0.709y - 3507559 = 0$

4. The distance from the apex to the base of each of the two triangles is then calculated using the equation for the distance between a point and a line, and is given as:

   $abs [ lx_i + my_i + n]$

   Example:

   $H_{1-2-3} = abs [0.693(304,674) + 0.721(4,641,477) - 3557315] = 26.1$ meters

   Similarly, $H_{2-3-4} = 29.7$ meters

5. The area of each triangle can then be calculated using the equation given in Step #1:

   $Area_{1-2-3} = 2,800$ square meters

   $Area_{2-3-4} = 3,200$ square meters

6. Total area of the SRA is then calculated by summing the areas of the triangles:

   Total Area of SRA = 6,000 square meters = 65,000 square feet

## E.3 AVERAGE SURFICAL PCB CONCENTRATION

Average surficial PCB concentrations in the SRA are calculated using the PCB concentration data provided for the uppermost core interval (0" to 6") in Table E-3. At locations where ponar samples were collected along with cores, the PCB concentration is assumed to be the average of the Interval A and ponar concentrations. The average concentration is the arithmetic average of the surficial PCB concentration at each of the 12 sampling locations. For location RR01-09, where no sediment was present, the PCB concentration was assumed to be 0 mg/kg.

**The average surficial PCB concentration in the SRA is approximately 35 mg/kg.**

**Table E-3**. Surficial PCB concentrations in SRA

| Sample # | Start Depth (inches) | End Depth (inches) | Total PCB Conc. (mg/kg) | Average PCB Conc. of Ponar and Slice A (mg/kg) |
|---|---|---|---|---|
| RR01-04A | 0 | 6 | 20.00 | 11.95 |
| RR01-04P | ponar | ponar | 3.90 | |
| RR01-05A | 0 | 4 | 0.40 | 0.40 |
| RR01-06A | 0 | 6 | 8.70 | 6.40 |
| RR01-06P | ponar | ponar | 4.10 | |
| RR01-07A | ponar | ponar | 27.00 | 27.00 |
| RR01-08A | 0 | 6 | 8.58 | 13.29 |
| RR01-08P | ponar | ponar | 18.00 | |
| RR01-09 | No Sample | No Sample | | 0.00 |
| RR01-10A | 0 | 6 | 207.00 | 207.00 |
| RR01-11A | ponar | ponar | 93.00 | 93.00 |
| RR01-12A | 0 | 6 | 12.00 | 11.00 |
| RR01-12P | ponar | ponar | 10.00 | |
| RR01-13A | ponar | ponar | 20.00 | 20.00 |
| RR01-14A | ponar | ponar | 6.60 | 6.60 |
| RR01-15A | ponar | ponar | 29.10 | 29.10 |
| | | | **Average =** | **35 mg/kg** |

## E.4 VOLUME-WEIGHTED PCB CONCENTRATION OF SRA SEDIMENTS

A volume weighted average PCB concentration for SRA sediment is calculated using the data provided in Table E-4. If a sediment core and a ponar were collected at the same location only the sediment core data is used. Volume weighted concentrations are calculated by multiplying the PCB concentration (mg/kg) of each sample by the length (inches) of core interval it represented. If only a ponar was collected at a given location, sediment depth is assumed to be equal to the sediment depth measurement provided in Table E-1.

Volume-weighted average concentration is calculated by summing the "interval length * concentration" values and dividing by the sum of the interval lengths.

**Volume-weighted average PCB concentration in the SRA is approximately 58 mg/kg.**

**Table E-4**. Interval Lengths and PCB Concentrations for SRA Samples

| Sample # | Start Depth (inches) | End Depth (inches) | Total PCB Conc. (mg/kg) | Interval Length (feet) | Length * Conc |
|---|---|---|---|---|---|
| RR01-04A | 0 | 6 | 20.0 | 0.5 | 10.0 |
| RR01-04B | 6 | 18 | 1.4 | 1.0 | 1.4 |
| RR01-04C | 18 | 46 | 0.3 | 2.3 | 0.8 |
| RR01-05A | 0 | 4 | 0.4 | 0.3 | 0.1 |
| RR01-06A | 0 | 6 | 8.7 | 0.5 | 4.4 |
| RR01-06B | 6 | 17 | 0.7 | 0.9 | 0.6 |
| RR01-07A | ponar | ponar | 27.0 | 0.3 | 8.1 |
| RR01-08A | 0 | 6 | 8.6 | 0.5 | 4.3 |
| RR01-08B | 6 | 18 | 46.0 | 1.0 | 46.0 |
| RR01-08C | 18 | 30 | 300.0 | 1.0 | 300.0 |
| RR01-09 | No Sample | No Sample | 0.0 | 0.0 | 0.0 |
| RR01-10A | 0 | 6 | 207.0 | 0.5 | 103.5 |
| RR01-10B | 6 | 16 | 160.0 | 0.8 | 133.3 |
| RR01-11A | ponar | ponar | 93.0 | 0.3 | 27.9 |
| RR01-12A | 0 | 6 | 12.0 | 0.5 | 6.0 |
| RR01-12B | 6 | 11 | 14.5 | 0.4 | 6.0 |
| RR01-13A | ponar | ponar | 20.0 | 0.3 | 6.0 |
| RR01-14A | ponar | ponar | 6.6 | 0.1 | 0.7 |
| RR01-15A | ponar | ponar | 29.1 | 0.2 | 5.8 |
| | | | | **Sum** | **Sum** |
| | | | | 11.5 | 664.9 |

**AVERAGE =** 58 mg/kg