# Biological and Water Quality Study of Armstrong Creek and the Miami-Erie Canal 2012

**Veyance Technologies**

**Auglaize County**

OHIO EPA Technical Report EAS/2012-12-16

Division of Surface Water
Ecological Assessment Section
December 4, 2012

# Biological and Water Quality Study of Armstrong Creek and the Miami-Erie Canal

## (Veyance Technologies)

## 2012

Auglaize County, Ohio
December 4, 2012
OEPA Report EAS/2012-12-16

prepared for
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## EXECUTIVE SUMMARY

A one mile section of Armstrong Creek and a one mile section of the Miami-Erie Canal in the St. Marys area were assessed by the Ohio EPA in 2012. Based on the performance of the biological communities, the entire one mile of Armstrong Creek and the entire one mile of the Miami-Erie Canal study area were in non-attainment of the Modified Warmwater Habitat (MWH) aquatic life use (Table 1). Biological communities were largely reflective of very poor to poor conditions; however, a marginally good fish community was noted in Armstrong Creek adjacent to Veyance Technologies. Poor stream habitat quality and excessive bottom sedimentation contributed to the impaired biological communities. Based on the sampling results of this survey, Veyance Technologies property did not cause impairment to the biological communities in Armstrong Creek or the Miami-Erie Canal in 2012.

## RECOMMENDATIONS

The overall habitat quality of Armstrong Creek was poor to fair and with the stream currently under county ditch maintenance, the Modified Warmwater Habitat (MWH) use is recommended. Consistent with the modified habitat conditions of the Miami-Erie Canal in the study area, and other Miami-Erie Canal sections already listed in the Ohio Water Quality Standards, the MWH use designation is recommended for this waterbody as well.

**ACKNOWLEDGEMENTS**

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Stream sampling: Mike Gray, David Altfater, Mia Hall, Chuck McKnight, Ellina Dovgopolaya
Data support: Dennis Mishne
Report preparation and analysis: David Altfater, Mike Gray
Reviewers - Jeff DeShon, Holly Tucker

## INTRODUCTION

A one mile section of Armstrong Creek and a one mile section of the Miami-Erie Canal were assessed during 2012, evaluating biological, sediment, and surface water resources. This study was undertaken to assess water resource conditions in Armstrong Creek and the Miami-Erie Canal upstream, adjacent, and downstream from Veyance Techologies property. This water resource project is part of a Voluntary Action Program (VAP) Memorandum of Agreement process.

Specific objectives of the evaluation were to:

- Assess biological conditions in Armstrong Creek and the Miami-Erie Canal by evaluating fish and macroinvertebrate communities,
- Evaluate surficial sediment and surface water chemical quality in Armstrong Creek and the Miami-Erie Canal,
- Determine the appropriate aquatic life use for the unlisted Armstrong Creek and unlisted Miami-Erie Canal at St. Marys in Ohio's Water Quality Standards, along with the attainment status of the recommended aquatic life uses, and
- Perform the work to satisfy the requirements of VAP rule OAC 3745-300-09.

Armstrong Creek and the Miami-Erie Canal at St. Marys are located in the Eastern Corn Belt Plains (ECBP) ecoregion. Armstrong Creek and the Miami-Erie Canal at St. Marys do not have assigned aquatic life use designations in the Ohio Water Quality Standards.

Aquatic life use attainment conditions are presented in Table 1, and sampling locations are detailed in Table 2 and graphically presented in Figure 1.

*Table 1. Aquatic life use attainment status for sampling locations in Armstrong Creek and the Miami-Erie Canal, Veyance Technologies area, 2012. The Index of Biotic Integrity (IBI), Modified Index of Well-being (MIwb), and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Eastern Corn Belt Plains (ECBP) ecoregion. Armstrong Creek and Miami-Erie Canal at St. Marys are not listed In the Ohio Water Quality Standards. Based on this survey, both are recommended as Modified Warmwater Habitat. If biological impairment has occurred, the cause(s) and source(s) of the impairment are noted.*

| Sample Location River Mile | Aquatic Life Use Designation | Aquatic Life Attainment Status | IBI | MIwb | ICI | Stream Habitat | Aquatic Life Use Impairment Cause/Source |
|---|---|---|---|---|---|---|---|
| *Armstrong Creek* | | | | | | | |
| 0.8[H] | MWH | **NON** | 26 | NA | Poor* | 42.5 (poor) | Habitat modification, sedimentation/ channelization, non-point sources |
| 0.4[H] | MWH | **NON** | 38 | NA | Poor* | 49.5 (fair) | |
| 0.1[H] | MWH | **NON** | 28 | NA | Poor* | 63.8 (good) | Sedimentation/non-point sources |
| *Miami-Erie Canal* | | | | | | | |
| 0.9[B] | MWH | **NON** | 26 | 2.1* | 0* | 17.0 (very | Canal habitat, sedimentation/ man-made habitat, non-point sources |
| 0.5[B] | MWH | **NON** | 31 | 1.4* | 0* | 29.8 (very | |
| 0.2[B] | MWH | **NON** | 22* | 3.0* | 0* | 26.3 (very | |

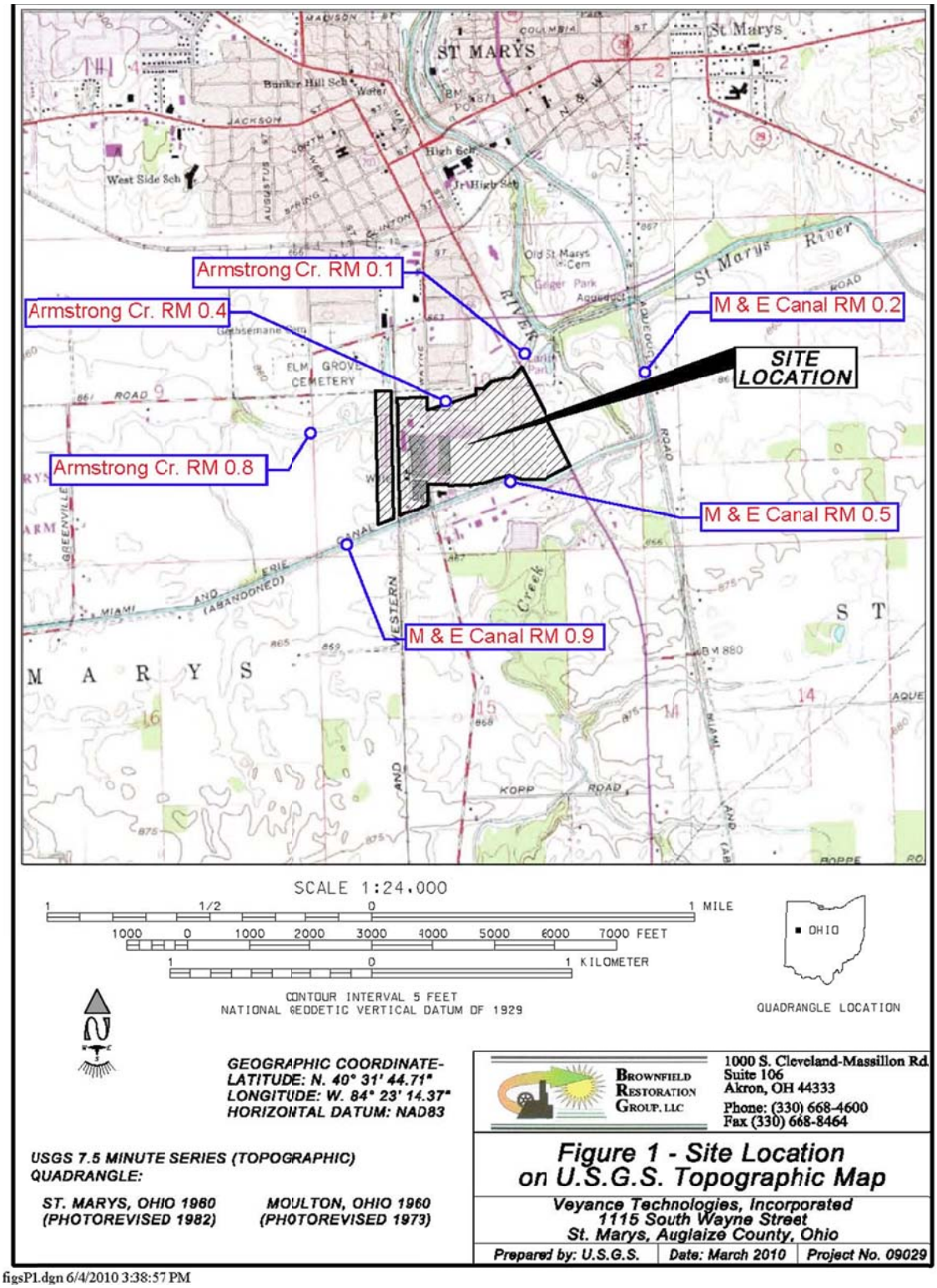
| BIOCRITERIA | | |
|---|---|---|
| INDEX - Site Type | WWH | MWH |
| IBI: Headwater/ Boat | 40/42 | 24/24 |
| MIwb: Boat | 8.5 | 5.8 |
| ICI | 36 | 22 |

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
NA Not applicable at headwater sites.
H Headwater site.
B Boat site.

*Table 2. Sampling locations in Armstrong Creek and the Miami-Erie Canal, Veyance Technologies area, 2012. Type of sampling included fish community (F), macroinvertebrate community (M), surface water (W), and sediment (S).*

| River Mile | Type of Sampling | Latitude | Longitude | Landmark |
|---|---|---|---|---|
| Armstrong Creek | | | | |
| 0.8 | F,M,W,S | 40.5298739 | -84.396313 | Farm lane, upstream Veyance Technologies |
| 0.4 | F,M,W,S | 40.5313295 | -84.387714 | Adjacent Veyance Technologies property |
| 0.1 | F,M,W,S | 40.5331642 | -84.383830 | SR 66 |
| Miami-Erie Canal | | | | |
| 0.9 | F,M,W,S | 40.525038 | -84.393979 | Upstream railroad west of Veyance Technologies |
| 0.5 | F,M,W,S | 40.527330 | -84.386147 | Adjacent Veyance Technologies property |
| 0.2 | F,M,W,S | 40.531994 | -84.377038 | Adjacent Aqueduct Road |

Figure 1. Sampling locations in Armstrong Creek and Miami-Erie Canal at the Veyance Technologies property area, 2012. Base map provided by Brownfield Restoration Group.



## METHODS

All chemical, physical, and biological field, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio Environmental Protection Agency 2012a), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987, 1989a, 1989b, 2008a, 2008b), The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989), Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (Ohio EPA 2006), and Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2012b).

### Determining Use Attainment

Use attainment status is a term describing the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing aquatic use attainment status involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These are confined to ambient assessments and apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (Table 1) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.,* full, partial, or non-attainment), the Qualitative Habitat Evaluation Index (QHEI), and a sampling location description. Biological results were compared to MWH biocriteria for Armstrong Creek (small drainage maintenance) and Miami-Erie Canal (channel modification).

### Stream Habitat Evaluation

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995; Ohio EPA 2006). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 were generally conducive to the establishment of warmwater faunas while those which scored in excess of 75 often typify habitat conditions which have the ability to support exceptional faunas.

### Sediment and Surface Water Assessment

Fine grain sediment samples were collected multi-incrementally in the upper four inches of bottom material at each biological location using decontaminated stainless steel scoops. At each location, between 20 and 25 scoops of fine grained material over a 150-500 meter section of stream were collected. Sediment incremental samples were mixed in aluminum pans (VOC sample jars were filled prior to mixing), transferred into glass jars with teflon lined lids, placed on ice (to maintain 4$^{o}$C) in a cooler, and shipped to an Ohio EPA contract lab. Sediment data are reported on a dry weight basis. Decontamination of sediment sampling equipment followed the procedures outlined in the Ohio EPA

sediment sampling guidance manual (Ohio EPA 2012b). Surface water samples were collected directly into appropriate containers, preserved and delivered to an Ohio EPA contract lab. Surface water samples were collected twice from each location from the upper 12 inches of water. Collected water was preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012a). Surface water samples were evaluated using comparisons to Ohio Water Quality Standards criteria, reference conditions, or published literature. Sediment evaluations were conducted using guidelines established in MacDonald *et al.* (2000), along with a comparison of metals results to Ohio Sediment Reference Values (Ohio EPA 2003) and Ecological Screening Values (USEPA 2003).

**Macroinvertebrate Community Assessment**

Macroinvertebrates were collected from artificial substrates (Miami-Erie Canal only) and from the natural habitats at all sites. The artificial substrate collection provided quantitative data and consisted of a composite sample of five modified Hester-Dendy multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multi-habitat composite sample was also collected. This sampling effort consisted of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (*e.g.,* riffle, run, pool, margin). Detailed discussion of macroinvertebrate field and laboratory procedures is contained in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989b, 2008b).

**Fish Community Assessment**

Fish were sampled twice at each Miami-Erie Canal site and once at Armstrong Creek sites using pulsed DC electrofishing methods. Fish were processed in the field, and included identifying each individual to species, counting and weighing (Miami-Erie Canal sites only) fish, and recording any external abnormalities. Discussion of the fish community assessment methodology used in this report is contained in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989b, 2008b).

## RESULTS

### Surface Water

Chemical analyses were conducted on surface water samples collected on August 13 and September 24, 2012 from three locations in Armstrong Creek and three locations in the Miami-Erie Canal (Appendix Tables 1 and 2). Surface water samples were analyzed for metals, PCBs, volatile organic compounds, and semivolatile organic compounds. Nearly all measurements of volatile organics and semivolatile organic compounds tested in stream water at all six locations were reported as not detected. Of the parameters reported with low detectable concentrations, none of the chemicals were above Ohio Water Quality Standards (WQS) criteria. PCB concentrations were reported as not detected. All metals concentrations were low, and were below applicable Ohio WQS for aquatic life criteria.

Nutrients, ammonia-N, dissolved oxygen and bacteriological parameters were not tested as part of this evaluation. For monitored parameters, good chemical water quality was evident in all stream samples.

### Sediment

Surficial sediment samples were collected at three locations in Armstrong Creek and three locations in the Miami-Erie Canal by the Ohio EPA on September 24, 2012. Sampling locations were co-located with biological sampling sites. Samples were analyzed for metal parameters, volatile organic compounds, semivolatile organic compounds, PCBs, and total petroleum hydrocarbons. Specific chemical parameters tested and results are listed in Appendix Table 3. Sediment data were evaluated using Ohio Sediment Reference Values (Ohio EPA 2003), along with guidelines established in *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald *et.al*. 2000), and *Ecological Screening Levels (ESLs)* (USEPA 2003). The consensus-based sediment guidelines define two levels of ecotoxic effects. A *Threshold Effect Concentration* (TEC) is a level of sediment chemical quality below which harmful effects are unlikely to be observed. A *Probable Effect Concentration* (PEC) indicates a level above which harmful effects are likely to be observed. ESL values, considered protective benchmarks, were derived by USEPA, Region 5 using a variety of sources and methods.

Sediment samples were conservatively sampled by focusing on depositional areas of fine grain material (silts and clays). These areas typically are represented by higher contaminant levels, compared to coarse sands and gravels. Fine grained substrates were predominant in the Miami-Erie Canal and at the two most upstream sites in Armstrong Creek (RMs 0.8 and 0.4). Armstrong Creek near the mouth had sparse amounts of fine substrates, even along the stream margins.

Chemical parameters measured above ecological screening guidelines are presented in Table 3. Miami-Erie Canal sediment results exhibited low metals levels, and organic chemical compounds were not detected in any of the three sampling locations. Sediment sampling results from Armstrong Creek were generally of good quality, with several parameters reported slightly above TEC screening benchmarks. Based on the sediment sampling results of this survey, the Veyance Technologies property did not contribute to impairment of the biological communities in Armstrong Creek or the Miami-Erie Canal.

*Table 3. Chemical parameters measured above screening levels in samples collected by Ohio EPA from surficial sediments in Armstrong Creek and the Miami-Erie Canal, September, 2012. Contamination levels were determined for parameters using Ohio Sediment Reference Values (SRVs), consensus-based sediment quality guidelines (MacDonald, et.al. 2000) and ecological screening levels (USEPA 2003). Shaded numbers indicate values above the following: SRVs (blue), Threshold Effect Concentration –TEC (yellow), Probable Effect Concentration – PEC (red) and Ecological Screening Levels (orange). Sampling locations are indicated by river mile (RM).*

| Parameter | Armstrong Creek RM 0.8 | Armstrong Creek RM 0.4 | Armstrong Creek RM 0.1 | Miami/Erie Canal RM 0.9 | Miami/Erie Canal RM 0.5 | Miami/Erie Canal RM 0.2 |
|---|---|---|---|---|---|---|
| Arsenic (mg/kg) | 11.9 | 11.9 | 8.87 | 7.66 | 8.16 | 7.6 |
| Nickel (mg/kg) | 19.2 | 18.8 | 13.2 | 24.3 | 22 | 19.4 |
| Zinc (mg/kg) | 88 | 172 | 411 | 91.9 | 85.3 | 65.3 |
| Benzo(a)anthracene (ug/kg) | ND | ND | 231 J | ND | ND | ND |
| Benzo(a)pyrene (ug/kg) | ND | ND | 238 J | ND | ND | ND |
| Chrysene (ug/kg) | ND | ND | 263 J | ND | ND | ND |
| Fluoranthene (ug/kg) | ND | 357 J | 459 | ND | ND | ND |
| Pyrene (ug/kg) | ND | ND | 358 | ND | ND | ND |

J - Estimated result. Result is less than RL.

ND - not detected at or above the method detection limit.

**Stream Physical Habitat**

Physical habitat was evaluated at each fish sampling location. Physical habitat was assessed using the Qualitative Habitat Evaluation Index (QHEI); scores are detailed in Table 4.

Armstrong Creek sampling locations had physical habitat conditions ranging from poor to good. Armstrong Creek is under ditch maintenance nearly its entire length (State Route 66 upstream), which included the sampling stations at RMs 0.8 and 0.4. Habitat scores at these two sites were 42.5 and 49.5, and these sites were represented by a predominance of muck, sand, and gravel substrates, along with extensive bottom embeddedness. Riffle areas were present, but comprised only a small area at each location. Improved habitat was noted at RM 0.1, with a QHEI score of 63.8. Coarse substrates were prevalent, along with a more natural channel and better developed pool, riffle, and run areas. The overall habitat quality of Armstrong Creek was poor to fair and, with the stream currently under ditch maintenance, the Modified Warmwater Habitat (MWH) use is recommended.

Miami-Erie Canal physical habitat was very poor quality, as evidenced by channel modification (a created channel), a dominance of soft mucky substrates, no riffles or runs, and sparse instream cover. The QHEI scores of 17.0 to 29.8, reflects severely impaired habitat quality. Consistent with the modified condition of the Miami-Erie Canal in the study area, and other Miami-Erie Canal sections already listed in the Ohio Water Quality Standards, the MWH use designation is recommended.

*Table 4. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in Armstrong Creek and the Miami-Erie Canal, Veyance Technologies property area, 2012.*

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | **MWH Attributes** | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | **WWH Attributes** | | | | | *High Influence* | | | | | *Moderate Influence* | | | | | | | | | | | | |
| **Key QHEI Components** | | | No Channelization or Recovered | Boulder/Cobble/Gravel Substrates | Silt Free Substrates | Good/Excellent Substrates | Moderate/High Sinuosity | Extensive/Moderate Cover | Fast Current/Eddies | Low-Normal Overall Embeddedness | Max. Depth >40 cm | Low-Normal Riffle Embeddedness | **Total WWH Attributes** | Channelized or No Recovery | Silt/Muck Substrates | No Sinuosity | Sparse/ No Cover | Max. Depth <40 cm (WD,HW sites) | **Total High Influence Attributes** | Recovering Channel | Heavy/Moderate Silt Cover | Sand Substrates (Boat) | Hardpan Substrate Origin | Fair/Poor Development | Low Sinuosity | Only 1-2 Cover Types | Intermittent & Poor Pools | No Fast Current | High/Mod. Overall Embeddedness | High/Mod. Riffle Embeddedness | No Riffle | **Total Moderate Influence Attributes** | **(MWH H.I.+1)/ (WWH+1) Ratio** | **(MWH M.I.+1)/ (WWH+1) Ratio** |
| **River Mile** | **QHEI** | **Habitat Rating** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Armstrong Creek Year: 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.8 | **42.5** | Poor | | | | | | | | | ■ | | 1 | | ◆ | | ◆ | | 2 | ● | ● | | | ● | ● | | | ● | ● | ● | | 7 | 1.50 | 4.00 |
| 0.4 | **49.5** | Fair | | ■ | | | | ■ | | | ■ | | 3 | | ◆ | | ◆ | | 2 | ● | ● | | | ● | ● | | | ● | ● | ● | | 7 | 0.75 | 2.00 |
| 0.1 | **63.8** | Good | ■ | ■ | | ■ | ■ | ■ | | | ■ | | 6 | | | | ◆ | | 1 | | ● | | | ● | | | | ● | ● | ● | | 5 | 0.29 | 1.00 |
| Miami-Erie Canal Year: 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.9 | **17.0** | Very Poor | | | | | | | | | ■ | | 1 | ◆ | ◆ | ◆ | ◆ | | 4 | | ● | | | ● | | ● | | ● | ● | | ● | 6 | 2.50 | 3.50 |
| 0.5 | **29.8** | Very Poor | | | | | | ■ | | | ■ | | 2 | ◆ | ◆ | ◆ | ◆ | | 4 | | ● | | | ● | | | | ● | ● | | ● | 5 | 1.67 | 2.00 |
| 0.2 | **26.3** | Very Poor | | | | | | | | | ■ | | 1 | ◆ | ◆ | ◆ | ◆ | | 4 | | ● | | | ● | | | | ● | ● | | ● | 5 | 2.50 | 3.00 |

**Fish Community**

A total of 3377 fish representing 23 species were collected from Armstrong Creek and the Miami-Erie Canal at the Veyance Technologies property area between August and September, 2012. Relative numbers and species collected per location are presented in Appendix Table 4 and IBI metrics are presented in Appendix Table 5. Sampling locations in Armstrong Creek and the Miami-Erie Canal were evaluated using MWH biocriteria.

Fish communities ranged from poor to marginally good quality in Armstrong Creek (Table 5). IBI scores from all three fish sites were achieving the MWH biocriterion, although each site had a predominance of pollution tolerant fish. Sampling adjacent to Veyance Technologies documented the highest IBI score in Armstrong Creek. This site was also immediately downstream from a sanitary sewer overflow pipe tied into the St. Marys wastewater treatment system. Results of fish sampling conducted in Armstrong Creek revealed no obvious impacts associated with the Veyance Technologies property.

A section of the Miami-Erie Canal runs along the south side of the Veyance Technologies property. The fish community of the canal was assessed upstream, adjacent, and immediately downstream from the Veyance property. Fish communities ranged from fair to very poor at all three locations and were largely impaired by the very poor habitat quality of the canal. Based on the very poor rating of the MIwb scores at all three locations, none of the Miami-Erie Canal fish sites achieved the MWH biocriterion. Results of fish sampling conducted in the Miami-Erie Canal revealed no obvious impacts associated with the Veyance Technologies property.

*Table 5. Fish community summaries based on pulsed D.C. electrofishing sampling conducted by Ohio EPA in Armstrong Creek and the Miami-Erie Canal, Veyance Technologies property area, from August and September, 2012. Relative numbers are per 0.3 km for headwater sites and 1.0 km for boat sites. The applicable aquatic life use designation is MWH for Armstrong Creek and the Miami-Erie Canal.*

| *Stream* River Mile | Sampling Method | Species (Mean) | Species (Total) | Relative Number | QHEI | Index of Biotic Integrity | Modified Index of Well-being | Narrative Evaluation |
|---|---|---|---|---|---|---|---|---|
| *Armstrong Creek* | | | | | | | | |
| 0.8 | Headwater | 9 | 9 | 1294 | 42.5 | 26 | NA | Poor |
| 0.4 | Headwater | 15 | 15 | 1024 | 49.5 | 38 | NA | Marginally good |
| 0.1 | Headwater | 17 | 17 | 2516 | 63.8 | 28 | NA | Fair |
| *Miami-Erie Canal* | | | | | | | | |
| 0.9 | Boat | 6.0 | 7 | 1154 | 17.0 | 26 | 2.1* | Fair/Very poor |
| 0.5 | Boat | 6.0 | 7 | 464 | 29.8 | 31 | 1.4* | Fair/Very poor |
| 0.2 | Boat | 7.5 | 9 | 316 | 26.3 | 22* | 3.0* | Poor/Very poor |

| **Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)** | | |
|---|---|---|
| INDEX - Site Type | WWH | MWH |
| IBI: Headwater/ Boat | 40/42 | 24/24 |
| MIwb: Boat | 8.5 | 5.8 |

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
NA Not applicable at headwater sites.

**Macroinvertebrate Community**

The macroinvertebrate communities from the Miami-Erie Canal in the vicinity of the Veyance Technologies property were sampled in 2012 using quantitative (artificial substrate) and qualitative (natural substrate multi-habitat composite) sampling protocols. Armstrong Creek was sampled using qualitative protocols only. Results are summarized in Table 6. The ICI metrics with the associated scores and the raw data are attached as Appendix Tables 6 and 7.

The macroinvertebrate communities from Miami- Erie canal sites were all evaluated as very poor with ICI scores of 0 and did not attain the recommended MWH use designation (Table 6). Very poor habitat conditions, with only pooled habitat blanketed in a thick layer of muck, limited the macroinvertebrate community. Predation from large numbers of mosquito fish probably also limited the macroinvertebrate community. The downstream sampling location at RM 0.2 had more taxa in the qualitative sample which can be attributed to somewhat better habitat conditions. The downstream site had some riprap and weeds along the margin which was lacking from the other sampling locations. The Veyance Technologies property did not appear to impact the macroinvertebrate community in the Miami- Erie Canal.

The macroinvertebrate communities from all three sampling locations in Armstrong Creek were evaluated as poor and not attaining the recommended MWH use designation. Poor instream habitat appeared to be the limiting factor for the macroinvertebrate community. Riffle development was sparse and of poor quality with embedded conditions. A predominance of silt and muck habitats contributed to the poor habitat. The similarity of the macroinvertebrate community from all three sampling locations in Armstrong Creek indicated no apparent impact from the Veyance Technologies property.

*Table 6. Summary of macroinvertebrate data collected from artificial substrates (quantitative sampling) and natural substrates (qualitative sampling) in Armstrong Creek and the Miami-Erie Canal, 2012.*

| Stream/ River Mile | Density Number/ft$^2$ | Total Taxa | Quantitative Taxa | Qualitative Taxa | Qualitative EPT[a] | ICI | Evaluation |
|---|---|---|---|---|---|---|---|
| *Armstrong Creek* | | | | | | | |
| 0.8 | - | 13 | - | 13 | 2 | - | Poor |
| 0.4 | - | 16 | - | 16 | 2 | - | Poor |
| 0.1 | - | 16 | - | 16 | 3 | - | Poor |
| *Miami-Erie Canal* | | | | | | | |
| 0.9 | 112 | 10 | 7 | 7 | 0 | 0* | Very Poor |
| 0.5 | 157 | 6 | 6 | 4 | 0 | 0* | Very Poor |
| 0.2 | 219 | 23 | 7 | 20 | 1 | 0* | Very Poor |

| Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP) | | |
|---|---|---|
| INDEX | WWH | MWH |
| ICI | 36 | 22 |

a EPT=total Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) taxa richness, a measure of pollution sensitive organisms.

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.

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APPENDICES – ARMSTRONG CREEK AND MIAMI-ERIE CANAL, 2012

Appendix Table 1. Surface water chemistry results for Armstrong Creek and the Miami-Erie Canal, August 13, 2012.

Appendix Table 2. Surface water chemistry results for Armstrong Creek and the Miami-Erie Canal, September 24, 2012.

Appendix Table 3. Sediment chemistry results for Armstrong Creek and the Miami-Erie Canal, 2012.

Appendix Table 4. Ohio EPA fish results for Armstrong Creek and the Miami-Erie Canal, 2012.

Appendix Table 5. Index of Biotic Integrity (IBI) scores and metrics for Armstrong Creek and the Miami-Erie Canal, 2012.

Appendix Table 6. Invertebrate Community Index (ICI) scores and metrics for the Miami-Erie Canal, 2012.

Appendix Table 7. Ohio EPA macroinvertebrate results for Armstrong Creek and the Miami-Erie Canal, 2012.

Appendix Table 1. Results of chemical surface water sampling conducted by Ohio EPA in Armstrong Creek and the Miami-Erie Canal, August 13, 2012.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 |
| **Metals (ug/l)** | | | | | | |
| Arsenic | ND | ND | ND | 5.63 J | 5.98 J | 5.74 J |
| Lead | ND | 3.07 J | ND | ND | ND | ND |
| Antimony | ND | ND | ND | 0.831 J | ND | ND |
| Barium | 41.1 | 55.4 | 64.3 | 45.5 | 42.3 | 43.6 |
| Selenium | ND | ND | ND | ND | ND | ND |
| Beryllium | ND | ND | ND | ND | ND | ND |
| Thallium | ND | ND | ND | ND | ND | ND |
| Cadmium | ND | ND | ND | ND | ND | ND |
| Chromium | ND | ND | ND | ND | ND | ND |
| Cobalt | ND | ND | ND | ND | ND | ND |
| Nickel | ND | ND | ND | ND | ND | ND |
| Silver | ND | ND | ND | ND | ND | ND |
| Vanadium | ND | ND | ND | ND | ND | ND |
| Zinc | ND | 23.7 | 24.0 | ND | ND | ND |
| Mercury | ND | ND | ND | ND | ND | ND |
| **Volatile Organic Analytes (ug/l)** | | | | | | |
| Acetone | ND | ND | 2.54 J | 4.91 J | 3.93 J | 4.25 J |
| Benzene | ND | ND | ND | ND | ND | ND |
| Bromobenzene | ND | ND | ND | ND | ND | ND |
| Bromochloromethane | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND | ND | ND |
| Bromoform | ND | ND | ND | ND | ND | ND |
| Bromomethane | ND | ND | ND | ND | ND | ND |
| 2-Butanone | ND | ND | ND | ND | ND | ND |
| n-Butylbenzene | ND | ND | ND | ND | ND | ND |
| sec-Butylbenzene | ND | ND | ND | ND | ND | ND |
| tert-Butylbenzene | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | ND | ND | ND | ND | ND | ND |
| Carbon tetrachloride | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | ND | ND | ND | ND | ND | ND |
| Chlorodibromomethane | ND | ND | ND | ND | ND | ND |
| Chloroethane | ND | ND | ND | ND | ND | ND |
| 2-Chloroethyl vinyl ether | ND | ND | ND | ND | ND | ND |
| Chloroform | ND | ND | ND | ND | ND | ND |
| Chloromethane | ND | ND | ND | ND | ND | ND |
| 2-Chlorotoluene | ND | ND | ND | ND | ND | ND |
| 4-Chlorotoluene | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromo-3-chloropropane | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromoethane | ND | ND | ND | ND | ND | ND |
| Dibromomethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| Dichlorodifluoromethane | ND | ND | ND | ND | ND | ND |

Appendix Table 1. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 |
| **Volatile Organic Analytes (ug/l)** | | | | | | |
| 1,1-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethene | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 1,3-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 2,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| trans-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloropropene | ND | ND | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | ND | ND | ND | ND |
| n-Hexane | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Isopropylbenzene | ND | ND | ND | ND | ND | ND |
| p-Isopropyltoluene | ND | ND | ND | ND | ND | ND |
| Methylene chloride | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | ND | ND | ND | ND | ND | ND |
| Methyl t-butyl ether (MTBE) | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| n-Propylbenzene | ND | ND | ND | ND | ND | ND |
| Styrene | ND | ND | ND | ND | ND | ND |
| 1,1,1,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| Tetrachloroethene | ND | ND | ND | ND | ND | ND |
| Toluene | ND | ND | 0.828 J | ND | ND | ND |
| 1,2,3-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | ND | ND | ND | ND | ND | ND |
| Trichloroethene | ND | ND | ND | ND | ND | ND |
| Trichlorofluoromethane | ND | ND | ND | ND | ND | ND |
| 1,2,3-Trichloropropane | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| 1,3,5-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| Vinyl acetate | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | ND | ND | ND | ND | ND | ND |
| o-Xylene | ND | ND | ND | ND | ND | ND |
| m-,p-Xylene | ND | ND | ND | ND | ND | ND |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | ND | ND | ND | ND | ND | ND |

Appendix Table 1. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| 2,4,6-Trichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2-Chloronaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Methylphenol | ND | ND | ND | ND | ND | ND |
| 2-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | ND | ND | ND | ND | ND | ND |
| 3-,4-Methylphenol | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Chloroaniline | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | ND | ND | ND | ND | ND | ND |
| Acenaphthene | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | ND | ND | ND | ND | ND | ND |
| Anthracene | ND | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | ND | ND | ND | ND | ND | ND |
| Benzo(a)pyrene | ND | ND | ND | ND | ND | ND |
| Benzo(b)fluoranthene | ND | ND | ND | ND | ND | ND |
| Benzo(ghi)perylene | ND | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | ND | ND | ND | ND | ND | ND |
| Benzoic acid | ND | ND | ND | ND | ND | ND |
| Benzyl alcohol | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethoxy)methane | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroisopropyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Ethylhexyl)phthalate | ND | ND | ND | ND | ND | ND |
| Butyl benzyl phthalate | ND | ND | ND | ND | ND | ND |
| Chrysene | ND | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | ND | ND | ND | ND | ND | ND |
| Di-n-octyl phthalate | ND | ND | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene | ND | ND | ND | ND | ND | ND |
| Dibenzofuran | ND | ND | ND | ND | ND | ND |
| Diethyl phthalate | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | ND | ND | ND | ND | ND | ND |
| Fluoranthene | ND | ND | ND | ND | ND | ND |
| Fluorene | ND | ND | ND | ND | ND | ND |

Appendix Table 1. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 | 8/13/2012 |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| Hexachlorobenzene | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | ND | ND | ND | ND | ND | ND |
| Isophorone | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | ND | ND | ND | ND | ND | ND |
| N-Nitrosodi-n-propyl-amine | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| Nitrobenzene | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | ND | ND | ND | ND | ND | ND |
| Phenanthrene | ND | ND | ND | ND | ND | ND |
| Phenol | ND | ND | ND | ND | ND | ND |
| Pyrene | ND | ND | ND | ND | ND | ND |
| **PCBs (ug/l)** | | | | | | |
| Aroclor 1016 | ND | ND | ND | ND | ND | ND |
| Aroclor 1221 | ND | ND | ND | ND | ND | ND |
| Aroclor 1232 | ND | ND | ND | ND | ND | ND |
| Aroclor 1242 | ND | ND | ND | ND | ND | ND |
| Aroclor 1248 | ND | ND | ND | ND | ND | ND |
| Aroclor 1254 | ND | ND | ND | ND | ND | ND |
| Aroclor 1260 | ND | ND | ND | ND | ND | ND |

J - Estimated result. Analyte was positively identified, but the quantitation was below the reporting limit (RL).

ND - not detected at or above the method detection limit.

Appendix Table 2. Results of chemical surface water sampling conducted by Ohio EPA in Armstrong Creek and the Miami-Erie Canal, September 24, 2012.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Metals (ug/l)** | | | | | | |
| Arsenic | ND | ND | ND | ND | ND | ND |
| Lead | ND | ND | ND | ND | ND | ND |
| Antimony | ND | ND | ND | 0.709 J | 0.646 J | 0.695 J |
| Barium | 50.5 | 63.6 | 75.1 | 37.4 | 36.8 | 37.6 |
| Selenium | ND | ND | ND | ND | ND | ND |
| Beryllium | ND | ND | ND | ND | ND | ND |
| Thallium | ND | ND | ND | ND | ND | ND |
| Cadmium | ND | ND | ND | ND | ND | ND |
| Chromium | ND | ND | ND | ND | ND | ND |
| Cobalt | ND | ND | ND | ND | ND | ND |
| Nickel | ND | ND | ND | ND | ND | ND |
| Silver | ND | ND | ND | ND | ND | ND |
| Vanadium | ND | ND | ND | ND | ND | ND |
| Zinc | ND | 13.3 J | ND | ND | ND | ND |
| Mercury | ND | ND | ND | ND | ND | ND |
| **Volatile Organic Analytes (ug/l)** | | | | | | |
| Acetone | ND | ND | ND | 3.98 J | 4.73 J | 5.91 J |
| Benzene | ND | ND | ND | ND | ND | ND |
| Bromobenzene | ND | ND | ND | ND | ND | ND |
| Bromochloromethane | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND | ND | ND |
| Bromoform | ND | ND | ND | ND | ND | ND |
| Bromomethane | ND | ND | ND | ND | ND | ND |
| 2-Butanone | ND | ND | ND | ND | ND | ND |
| n-Butylbenzene | ND | ND | ND | ND | ND | ND |
| sec-Butylbenzene | ND | ND | ND | ND | ND | ND |
| tert-Butylbenzene | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | ND | ND | ND | ND | ND | ND |
| Carbon tetrachloride | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | ND | ND | ND | ND | ND | ND |
| Chlorodibromomethane | ND | ND | ND | ND | ND | ND |
| Chloroethane | ND | ND | ND | ND | ND | ND |
| 2-Chloroethyl vinyl ether | ND | ND | ND | ND | ND | ND |
| Chloroform | ND | ND | ND | ND | ND | ND |
| Chloromethane | ND | ND | ND | ND | ND | ND |
| 2-Chlorotoluene | ND | ND | ND | ND | ND | ND |
| Dibromomethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| Dichlorodifluoromethane | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethene | ND | ND | ND | ND | ND | ND |

Appendix Table 2. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Volatile Organic Analytes (ug/l)** | | | | | | |
| cis-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 1,3-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 2,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| trans-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloropropene | ND | ND | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | ND | ND | ND | ND |
| n-Hexane | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Isopropylbenzene | ND | ND | ND | ND | ND | ND |
| p-Isopropyltoluene | ND | ND | ND | ND | ND | ND |
| Methylene chloride | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| n-Propylbenzene | ND | ND | ND | ND | ND | ND |
| Styrene | ND | ND | ND | ND | ND | ND |
| 1,1,1,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| Tetrachloroethene | ND | ND | ND | ND | ND | ND |
| Toluene | ND | ND | ND | ND | ND | ND |
| 1,2,3-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | ND | ND | ND | ND | ND | ND |
| Trichloroethene | ND | ND | ND | ND | ND | ND |
| Trichlorofluoromethane | ND | ND | ND | ND | ND | ND |
| 1,2,3-Trichloropropane | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| 1,3,5-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| Vinyl acetate | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | ND | ND | ND | ND | ND | ND |
| o-Xylene | ND | ND | ND | ND | ND | ND |
| m-,p-Xylene | ND | ND | ND | ND | ND | ND |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | ND | ND | ND | ND | ND | ND |

Appendix Table 2. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| 2,4-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2-Chloronaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Methylphenol | ND | ND | ND | ND | ND | ND |
| 2-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | ND | ND | ND | ND | ND | ND |
| 3-,4-Methylphenol | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Chloroaniline | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | ND | ND | ND | ND | ND | ND |
| Acenaphthene | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | ND | ND | ND | ND | ND | ND |
| Anthracene | ND | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | ND | ND | ND | ND | ND | ND |
| Benzo(a)pyrene | ND | ND | ND | ND | ND | ND |
| Benzo(b)fluoranthene | ND | ND | ND | ND | ND | ND |
| Benzo(ghi)perylene | ND | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | ND | ND | ND | ND | ND | ND |
| Benzoic acid | ND | ND | ND | ND | ND | ND |
| Benzyl alcohol | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethoxy)methane | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroisopropyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Ethylhexyl)phthalate | ND | ND | 2.63 J | ND | ND | ND |
| Butyl benzyl phthalate | ND | ND | ND | ND | ND | ND |
| Chrysene | ND | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | ND | ND | ND | ND | ND | ND |
| Di-n-octyl phthalate | ND | ND | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene | ND | ND | ND | ND | ND | ND |
| Dibenzofuran | ND | ND | ND | ND | ND | ND |
| Diethyl phthalate | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | ND | ND | ND | ND | ND | ND |
| Fluoranthene | ND | ND | ND | ND | ND | ND |
| Fluorene | ND | ND | ND | ND | ND | ND |
| Hexachlorobenzene | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | ND | ND | ND | ND | ND | ND |

Appendix Table 2. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Semi-volatile Organic Analytes (ug/l)** | | | | | | |
| Indeno(1,2,3-cd)pyrene | ND | ND | ND | ND | ND | ND |
| Isophorone | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | ND | ND | ND | ND | ND | ND |
| N-Nitrosodi-n-propyl-amine | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| Nitrobenzene | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | ND | ND | ND | ND | ND | ND |
| Phenanthrene | ND | ND | ND | ND | ND | ND |
| Phenol | ND | ND | ND | ND | ND | ND |
| Pyrene | ND | ND | ND | ND | ND | ND |
| **PCBs (ug/l)** | | | | | | |
| Aroclor 1016 | ND | ND | ND | ND | ND | ND |
| Aroclor 1221 | ND | ND | ND | ND | ND | ND |
| Aroclor 1232 | ND | ND | ND | ND | ND | ND |
| Aroclor 1242 | ND | ND | ND | ND | ND | ND |
| Aroclor 1248 | ND | ND | ND | ND | ND | ND |
| Aroclor 1254 | ND | ND | ND | ND | ND | ND |
| Aroclor 1260 | ND | ND | ND | ND | ND | ND |

J - Estimated result. Analyte was positively identified, but the quantitation was below the reporting limit (RL).

ND - not detected at or above the method detection limit.

Appendix Table 3. Results of sediment sampling conducted by Ohio EPA in Armstrong Creek and the Miami-Erie Canal, September 24, 2012.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Metals (mg/kg)** | | | | | | |
| Arsenic | 11.9 | 11.9 | 8.87 | 7.66 | 8.16 | 7.6 |
| Lead | 21.8 | 35.4 | 29.8 | 20.9 | 17.3 | 15.9 |
| Antimony | ND | ND | 0.882 J | ND | ND | ND |
| Barium | 63.1 | 60.4 | 46.5 | 72.5 | 63.8 | 44.4 |
| Selenium | 1.31 J | 1.62 J | ND | 1.64 J | 1.24 J | 1.08 J |
| Beryllium | ND | ND | 0.34 J | ND | 0.613 J | 0.484 J |
| Thallium | 0.459 | 0.501 | 0.257 | 0.531 | 0.492 | 0.403 |
| Cadmium | ND | ND | 0.77 | ND | ND | ND |
| Chromium | 13.8 | 14.3 | 10.5 | 16.7 | 15.4 | 14.3 |
| Cobalt | 6.52 | 6.19 | 4.40 | 8.15 | 7.53 | 7.85 |
| Nickel | 19.2 | 18.8 | 13.2 | 24.3 | 22 | 19.4 |
| Silver | ND | ND | ND | ND | ND | ND |
| Vanadium | 20.8 | 19.9 | 12.4 | 26.3 | 25.4 | 19.6 |
| Zinc | 88 | 172 | 411 | 91.9 | 85.3 | 65.3 |
| Mercury | 0.0443 J | 0.0639 J | 0.0349 J | 0.0784 J | 0.0638 J | 0.0356 J |
| **Volatile Organic Analytes (ug/kg)** | | | | | | |
| Acetone | ND | ND | ND | ND | ND | ND |
| Benzene | ND | ND | ND | ND | ND | ND |
| Bromobenzene | ND | ND | ND | ND | ND | ND |
| Bromochloromethane | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND | ND | ND |
| Bromoform | ND | ND | ND | ND | ND | ND |
| Bromomethane | ND | ND | ND | ND | ND | ND |
| 2-Butanone | ND | ND | ND | ND | ND | ND |
| n-Butylbenzene | ND | ND | ND | ND | ND | ND |
| sec-Butylbenzene | ND | ND | ND | ND | ND | ND |
| tert-Butylbenzene | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | ND | ND | ND | ND | ND | ND |
| Carbon tetrachloride | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | ND | ND | ND | ND | ND | ND |
| Chlorodibromomethane | ND | ND | ND | ND | ND | ND |
| Chloroethane | ND | ND | ND | ND | ND | ND |
| 2-Chloroethyl vinyl ether | ND | ND | ND | ND | ND | ND |
| Chloroform | ND | ND | ND | ND | ND | ND |
| Chloromethane | ND | ND | ND | ND | ND | ND |
| 2-Chlorotoluene | ND | ND | ND | ND | ND | ND |
| 4-Chlorotoluene | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromo-3-chloropropane | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromomethane | ND | ND | ND | ND | ND | ND |
| Dibromomethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| Dichlorodifluoromethane | ND | ND | ND | ND | ND | ND |

Appendix Table 3. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Volatile Organic Analytes (ug/kg)** | | | | | | |
| 1,1-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethene | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 1,3-Dichloropropane | ND | ND | ND | ND | ND | ND |
| 2,2-Dichloropropane | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| trans-1,3-Dichloropropene | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloropropene | ND | ND | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | ND | ND | ND | ND |
| n-Hexane | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Isopropylbenzene | ND | ND | ND | ND | ND | ND |
| p-Isopropyltoluene | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | ND | ND | ND | ND | ND | ND |
| Methylene chloride | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| n-Propylbenzene | ND | ND | ND | ND | ND | ND |
| Styrene | ND | ND | ND | ND | ND | ND |
| 1,1,1,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ND | ND | ND | ND | ND | ND |
| Tetrachloroethene | ND | ND | ND | ND | ND | ND |
| Toluene | ND | ND | 1.01 J | ND | ND | ND |
| 1,2,3-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | ND | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | ND | ND | ND | ND | ND | ND |
| Trichloroethene | ND | ND | ND | ND | ND | ND |
| Trichlorofluoromethane | ND | ND | ND | ND | ND | ND |
| 1,2,3-Trichloropropane | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| 1,3,5-Trimethylbenzene | ND | ND | ND | ND | ND | ND |
| Vinyl acetate | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | ND | ND | ND | ND | ND | ND |
| o-Xylene | ND | ND | ND | ND | ND | ND |
| m-,p-Xylene | ND | ND | ND | ND | ND | ND |
| **Semi-volatile Organic Analytes (ug/kg)** | | | | | | |
| 1,2,4-Trichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | ND | ND | ND | ND | ND | ND |

Appendix Table 3. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Semi-volatile Organic Analytes (ug/kg)** | | | | | | |
| 2,4-Dichlorophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | ND | ND | ND | ND | ND | ND |
| 2-Chloronaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Methylphenol | ND | ND | ND | ND | ND | ND |
| 2-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | ND | ND | ND | ND | ND | ND |
| 3-,4-Methylphenol | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | ND | ND | ND | ND | ND | ND |
| 4-Chloroaniline | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenylether | ND | ND | ND | ND | ND | ND |
| 4-Nitroaniline | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | ND | ND | ND | ND | ND | ND |
| Acenaphthene | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | ND | ND | ND | ND | ND | ND |
| Anthracene | ND | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | ND | ND | 231 J | ND | ND | ND |
| Benzo(a)pyrene | ND | ND | 238 J | ND | ND | ND |
| Benzo(b)fluoranthene | ND | ND | 234 J | ND | ND | ND |
| Benzo(ghi)perylene | ND | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | ND | ND | 223 J | ND | ND | ND |
| Benzoic acid | ND | ND | ND | ND | ND | ND |
| Benzyl alcohol | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethoxy)methane | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroisopropyl)-ether | ND | ND | ND | ND | ND | ND |
| bis(2-Ethylhexyl)phthalate | ND | ND | ND | ND | ND | ND |
| Butyl benzyl phthalate | ND | ND | ND | ND | ND | ND |
| Chrysene | ND | ND | 263 J | ND | ND | ND |
| Di-n-butyl phthalate | ND | ND | ND | ND | ND | ND |
| Di-n-octyl phthalate | ND | ND | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene | ND | ND | ND | ND | ND | ND |
| Dibenzofuran | ND | ND | ND | ND | ND | ND |
| Diethyl phthalate | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | ND | ND | ND | ND | ND | ND |
| Fluoranthene | ND | 357 J | 459 | ND | ND | ND |

Appendix Table 3. Continued.

| **Stream** | Armstrong Creek | Armstrong Creek | Armstrong Creek | Miami-Erie Canal | Miami-Erie Canal | Miami-Erie Canal |
|---|---|---|---|---|---|---|
| River Mile | 0.8 | 0.4 | 0.1 | 0.9 | 0.5 | 0.2 |
| Date Sampled | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 | 9/24/2012 |
| **Semi-volatile Organic Analytes (ug/kg)** | | | | | | |
| Fluorene | ND | ND | ND | ND | ND | ND |
| Hexachlorobenzene | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | ND | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | ND | ND | ND | ND | ND | ND |
| Isophorone | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | ND | ND | ND | ND | ND | ND |
| N-Nitrosodipropylamine | ND | ND | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND | ND | ND |
| Nitrobenzene | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | ND | ND | ND | ND | ND | ND |
| Phenanthrene | ND | ND | ND | ND | ND | ND |
| Phenol | ND | ND | ND | ND | ND | ND |
| Pyrene | ND | ND | 358 | ND | ND | ND |
| **PCBs (ug/kg)** | | | | | | |
| Aroclor 1016 | ND | ND | ND | ND | ND | ND |
| Aroclor 1221 | ND | ND | ND | ND | ND | ND |
| Aroclor 1232 | ND | ND | ND | ND | ND | ND |
| Aroclor 1242 | ND | ND | ND | ND | ND | ND |
| Aroclor 1248 | ND | ND | ND | ND | ND | ND |
| Aroclor 1254 | ND | ND | ND | ND | ND | ND |
| Aroclor 1260 | ND | ND | ND | ND | ND | ND |
| **Other Parameters** | | | | | | |
| Diesel Range Organics - mg/kg | ND | ND | ND | ND | ND | ND |
| Gasoline Range Organics (C6-C12) - ug/kg | ND | ND | ND | ND | ND | ND |
| PHC C10-C20 (mg/kg) | ND | ND | ND | 24.7 J | 12.7 J | 8.85 J |
| PHC C20-C34 (mg/kg) | 23.5 J | 25.6 J | 120 | 33.3 J | 16.9 J | 58.1 |
| Percent Solids | 29.5 | 25.6 | 52.8 | 27.0 | 30.9 | 42.9 |

J - Estimated result. Analyte was positively identified, but the quantitation was below the reportir

ND - not detected at or above the method detection limit.

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-535** | Stream: **Armstrong Run** | Sample Date: **2012** |
| River Mile: **0.80** | Location: upst. Veyance Tech, at farm lane | Date Range: 08/13/2012 |
| Time Fished: 1504 sec | Drainage: 4.8 sq mi | |
| Dist Fished: 0.15 km | Basin: Maumee River No of Passes: 1 | Sampler Type: E |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Common Carp | G | O | M | T | 5 | 10.00 | 0.77 | | | |
| Creek Chub | N | G | N | T | 14 | 28.00 | 2.16 | | | |
| Spotfin Shiner | N | I | M | | 3 | 6.00 | 0.46 | | | |
| Fathead Minnow | N | O | C | T | 281 | 562.00 | 43.43 | | | |
| Yellow Bullhead | | I | C | T | 12 | 24.00 | 1.85 | | | |
| Brown Bullhead | | I | C | T | 2 | 4.00 | 0.31 | | | |
| Western Mosquitofish | E | I | N | | 183 | 366.00 | 28.28 | | | |
| Green Sunfish | S | I | C | T | 124 | 248.00 | 19.17 | | | |
| Bluegill Sunfish | S | I | C | P | 19 | 38.00 | 2.94 | | | |
| Green Sf X Bluegill Sf | | | | | 4 | 8.00 | 0.62 | | | |
| | *Mile Total* | | | | 647 | 1,294.00 | | | | |
| | *Number of Species* | | | | 9 | | | | | |
| | *Number of Hybrids* | | | | 1 | | | | | |

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-535** | Stream: **Armstrong Run** | Sample Date: **2012** |
| River Mile: **0.40** | Location: adj. Veyance Tech. | Date Range: 08/13/2012 |
| Time Fished: 1550 sec | Drainage: 5.0 sq mi | |
| Dist Fished: 0.15 km | Basin: Maumee River No of Passes: 1 | Sampler Type: E |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| White Sucker | W | O | S | T | 5 | 10.00 | 0.98 | | | |
| Common Carp | G | O | M | T | 2 | 4.00 | 0.39 | | | |
| Goldfish | G | O | M | T | 5 | 10.00 | 0.98 | | | |
| Creek Chub | N | G | N | T | 41 | 82.00 | 8.01 | | | |
| Common Shiner | N | I | S | | 2 | 4.00 | 0.39 | | | |
| Spotfin Shiner | N | I | M | | 50 | 100.00 | 9.77 | | | |
| Fathead Minnow | N | O | C | T | 6 | 12.00 | 1.17 | | | |
| Bluntnose Minnow | N | O | C | T | 21 | 42.00 | 4.10 | | | |
| Central Stoneroller | N | H | N | | 8 | 16.00 | 1.56 | | | |
| Yellow Bullhead | | I | C | T | 32 | 64.00 | 6.25 | | | |
| Blackstripe Topminnow | | I | M | | 5 | 10.00 | 0.98 | | | |
| Western Mosquitofish | E | I | N | | 78 | 156.00 | 15.23 | | | |
| Largemouth Bass | F | C | C | | 3 | 6.00 | 0.59 | | | |
| Green Sunfish | S | I | C | T | 174 | 348.00 | 33.98 | | | |
| Bluegill Sunfish | S | I | C | P | 71 | 142.00 | 13.87 | | | |
| Green Sf X Bluegill Sf | | | | | 9 | 18.00 | 1.76 | | | |
| | *Mile Total* | | | | 512 | 1,024.00 | | | | |
| | *Number of Species* | | | | 15 | | | | | |
| | *Number of Hybrids* | | | | 1 | | | | | |

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-535** | Stream: **Armstrong Run** | Sample Date: **2012** |
| River Mile: **0.10** | Location: dst. St. Rt. 66 | Date Range: 08/13/2012 |
| Time Fished: 1985 sec | Drainage: 5.1 sq mi | |
| Dist Fished: 0.08 km | Basin: Maumee River No of Passes: 1 | Sampler Type: E |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| White Sucker | W | O | S | T | 62 | 232.50 | 9.24 | | | |
| Goldfish | G | O | M | T | 1 | 3.75 | 0.15 | | | |
| Creek Chub | N | G | N | T | 129 | 483.75 | 19.23 | | | |
| Common Shiner | N | I | S | | 1 | 3.75 | 0.15 | | | |
| Spotfin Shiner | N | I | M | | 6 | 22.50 | 0.89 | | | |
| Sand Shiner | N | I | M | M | 1 | 3.75 | 0.15 | | | |
| Fathead Minnow | N | O | C | T | 150 | 562.50 | 22.35 | | | |
| Bluntnose Minnow | N | O | C | T | 182 | 682.50 | 27.12 | | | |
| Central Stoneroller | N | H | N | | 44 | 165.00 | 6.56 | | | |
| Channel Catfish | F | | C | | 1 | 3.75 | 0.15 | | | |
| Yellow Bullhead | | I | C | T | 11 | 41.25 | 1.64 | | | |
| Brown Bullhead | | I | C | T | 1 | 3.75 | 0.15 | | | |
| Western Mosquitofish | E | I | N | | 30 | 112.50 | 4.47 | | | |
| Green Sunfish | S | I | C | T | 35 | 131.25 | 5.22 | | | |
| Bluegill Sunfish | S | I | C | P | 4 | 15.00 | 0.60 | | | |
| Green Sf X Bluegill Sf | | | | | 1 | 3.75 | 0.15 | | | |
| Blackside Darter | D | I | S | | 5 | 18.75 | 0.75 | | | |
| Johnny Darter | D | I | C | | 7 | 26.25 | 1.04 | | | |
| *Mile Total* | | | | | 671 | 2,516.25 | | | | |
| *Number of Species* | | | | | 17 | | | | | |
| *Number of Hybrids* | | | | | 1 | | | | | |

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-536** | Stream: **Miami-Erie Canal (from Grand Lake)** | Sample Date: **2012** |
| River Mile: **0.90** | Location: upst. Veyance | Date Range: 08/13/2012 |
| Time Fished: 2156 sec | Drainage: 45.0 sq mi | Thru: 09/24/2012 |
| Dist Fished: 0.80 km | Basin: Maumee River No of Passes: 2 | Sampler Type: A |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Gizzard Shad | | O | M | | 1 | 1.25 | 0.11 | 0.04 | 0.06 | 30.00 |
| Common Carp | G | O | M | T | 44 | 55.00 | 4.77 | 40.15 | 62.95 | 730.06 |
| Goldfish | G | O | M | T | 85 | 106.25 | 9.21 | 21.22 | 33.27 | 199.73 |
| Golden Shiner | N | I | M | T | 25 | 31.25 | 2.71 | 0.64 | 1.00 | 20.38 |
| Western Mosquitofish | E | I | N | | 756 | 945.00 | 81.91 | 0.56 | 0.87 | 0.59 |
| Green Sunfish | S | I | C | T | 2 | 2.50 | 0.22 | 0.16 | 0.25 | 65.00 |
| Bluegill Sunfish | S | I | C | P | 7 | 8.75 | 0.76 | 0.73 | 1.14 | 82.86 |
| Green Sf X Bluegill Sf | | | | | 2 | 2.50 | 0.22 | 0.28 | 0.43 | 110.00 |
| Green Sf X Pumpkinseed | | | | | 1 | 1.25 | 0.11 | 0.02 | 0.03 | 15.00 |
| *Mile Total* | | | | | 923 | 1,153.75 | | 63.79 | | |
| *Number of Species* | | | | | 7 | | | | | |
| *Number of Hybrids* | | | | | 2 | | | | | |

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-536** | Stream: **Miami-Erie Canal (from Grand Lake)** | Sample Date: **2012** |
| River Mile: **0.50** | Location: adj. Veyance | Date Range: 08/13/2012 |
| Time Fished: 2784 sec | Drainage: 45.0 sq mi | Thru: 09/24/2012 |
| Dist Fished: 0.80 km | Basin: Maumee River No of Passes: 2 | Sampler Type: A |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Common Carp | G | O | M | T | 20 | 25.00 | 5.39 | 27.28 | 89.79 | 1,091.13 |
| Goldfish | G | O | M | T | 5 | 6.25 | 1.35 | 1.80 | 5.92 | 288.00 |
| Golden Shiner | N | I | M | T | 4 | 5.00 | 1.08 | 0.10 | 0.34 | 20.75 |
| Black Bullhead | | I | C | P | 2 | 2.50 | 0.54 | 0.25 | 0.83 | 100.50 |
| Western Mosquitofish | E | I | N | | 303 | 378.75 | 81.67 | 0.30 | 0.99 | 0.79 |
| Green Sunfish | S | I | C | T | 34 | 42.50 | 9.16 | 0.55 | 1.80 | 12.88 |
| Bluegill Sunfish | S | I | C | P | 1 | 1.25 | 0.27 | 0.04 | 0.13 | 32.00 |
| Green Sf X Bluegill Sf | | | | | 2 | 2.50 | 0.54 | 0.06 | 0.20 | 24.00 |
| | *Mile Total* | | | | 371 | 463.75 | | 30.38 | | |
| | *Number of Species* | | | | 7 | | | | | |
| | *Number of Hybrids* | | | | 1 | | | | | |

# Appendix Table 4. Fish Species List

| | | |
|---|---|---|
| River Code: **04-536** | Stream: **Miami-Erie Canal (from Grand Lake)** | Sample Date: **2012** |
| River Mile: **0.20** | Location: dst. Veyance | Date Range: 08/13/2012 |
| Time Fished: 2494 sec | Drainage: 45.0 sq mi | Thru: 09/24/2012 |
| Dist Fished: 0.80 km | Basin: Maumee River No of Passes: 2 | Sampler Type: A |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Gizzard Shad | | O | M | | 4 | 5.00 | 1.58 | 0.50 | 0.82 | 100.25 |
| Common Carp | G | O | M | T | 55 | 68.75 | 21.74 | 50.44 | 82.87 | 733.64 |
| Goldfish | G | O | M | T | 27 | 33.75 | 10.67 | 5.56 | 9.14 | 164.81 |
| Golden Shiner | N | I | M | T | 33 | 41.25 | 13.04 | 0.75 | 1.23 | 18.09 |
| Yellow Bullhead | | I | C | T | 3 | 3.75 | 1.19 | 0.16 | 0.26 | 42.67 |
| Black Bullhead | | I | C | P | 2 | 2.50 | 0.79 | 0.35 | 0.58 | 140.50 |
| Western Mosquitofish | E | I | N | | 5 | 6.25 | 1.98 | 0.01 | 0.02 | 1.60 |
| Green Sunfish | S | I | C | T | 116 | 145.00 | 45.85 | 2.56 | 4.21 | 17.68 |
| Bluegill Sunfish | S | I | C | P | 3 | 3.75 | 1.19 | 0.25 | 0.41 | 67.33 |
| Green Sf X Bluegill Sf | | | | | 4 | 5.00 | 1.58 | 0.23 | 0.37 | 45.00 |
| Green Sf X Pumpkinseed | | | | | 1 | 1.25 | 0.40 | 0.05 | 0.08 | 41.00 |
| | *Mile Total* | | | | 253 | 316.25 | | 60.86 | | |
| | *Number of Species* | | | | 9 | | | | | |
| | *Number of Hybrids* | | | | 2 | | | | | |

Appendix Table 5. Index of Biotic Integrity (IBI) scores and metrics for the Miami-Erie Canal and Armstrong Creek, 2012.

| River Mile | Type | Date | Drainage area (sq mi) | Number of: Total species | Minnow species | Headwater species | Sensitive species | Darter & Sculpin species | Simple Lithophils | Percent of Individuals: Tolerant fishes | Omni-vores | Pioneering fishes | Insect-ivores | DELT anomalies | Rel.No. minus tolerants /(0.3km) | IBI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Armstrong Creek - (04-535)* | | | | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | | | | |
| 0.80 | E | 08/13/2012 | 4.8 | 7(3) | 3(3) | 0(1) | 0(1) | 0(1) | 0(1) | 68(1) | 44(1) | 65(1) | 53(5) | 0.0(5) | 418(3) | 26 |
| 0.40 | E | 08/13/2012 | 5.0 | 12(5) | 6(5) | 0(1) | 0(1) | 0(1) | 2(1) | 56(3) | 8(5) | 47(3) | 81(5) | 0.0(5) | 452(3) | 38 |
| 0.10 | E | 08/13/2012 | 5.1 | 15(5) | 7(5) | 0(1) | 1(1) | 2(3) | 3(3) | 85(1) | 59(1) | 75(1) | 15(1) | 0.3(3) | 375(3) | 28 |

Appendix Table 5. Index of Biotic Integrity (IBI) scores and metrics for the Miami-Erie Canal and Armstrong Creek, 2012.

| River Mile | Type | Date | Drainage area (sq mi) | Number of: Total species | Number of: Sunfish species | Number of: Sucker species | Number of: Intolerant species | Percent of Individuals: Rnd-bodied suckers | Percent of Individuals: Simple Lithophils | Percent of Individuals: Tolerant fishes | Percent of Individuals: Omni-vores | Percent of Individuals: Top carnivores | Percent of Individuals: Insect-ivores | DELT anomalies | Rel.No. minus tolerants /(1.0 km) | IBI | Modified Iwb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Miami-Erie Canal - (04-536) | | | | | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | | | | | |
| 0.90 | A | 08/13/2012 | 45 | 3(1) | 2(3) | 0(1) | 0(1) | 0(1) | 0(1) | 72(1) | 57(1) | 0(1) | 42(3) | 0.0(5) | 95(1) | 20 | 3.8 |
| 0.90 | A | 09/24/2012 | 45 | 3(1) | 1(1) | 0(1) | 0(1) | 0(1) | 0(1) | 7(5) | 7(5) | 0(1) | 93(5) | 0.0(5) | 1823(5) | 32 | 0.3 |
| 0.50 | A | 08/13/2012 | 45 | 3(1) | 1(1) | 0(1) | 0(1) | 0(1) | 0(1) | 25(3) | 2(5) | 0(1) | 96(5) | 0.0(5) | 245(3) | 28 | 1.7 |
| 0.50 | A | 09/24/2012 | 45 | 3(1) | 2(3) | 0(1) | 0(1) | 0(1) | 0(1) | 13(5) | 9(5) | 0(1) | 91(5) | 0.0(5) | 525(5) | 34 | 1.2 |
| 0.20 | A | 08/13/2012 | 45 | 3(1) | 2(3) | 0(1) | 0(1) | 0(1) | 0(1) | 92(1) | 33(3) | 0(1) | 64(5) | 0.0(5) | 25(1) | 22 | 2.4 |
| 0.20 | A | 09/24/2012 | 45 | 6(1) | 2(3) | 0(1) | 0(1) | 0(1) | 0(1) | 93(1) | 35(1) | 0(1) | 64(5) | 0.0(5) | 23(1) | 22 | 3.7 |

**Appendix Table 6. Invertebrate Community Index (ICI) scores and matrix values for the Miami-Erie Canal, 2012.**

| River Mile | Drainage Area (sq mi) | Number of | | | | Percent: | | | | | Qual. EPT | Eco-region | ICI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Taxa | Mayfly Taxa | Caddisfly Taxa | Dipteran Taxa | Mayflies | Caddis-flies | Tany-tarsini | Other Dipt/NI | Tolerant Organisms | | | |
| **Miami-Erie Canal (from Grand Lake) (04-536)** | | | | | | | | | | | | | |
| **Year: 2012** | | | | | | | | | | | | | |
| 0.90 | 45.0 | 7(0) | 0(0) | 0(0) | 5(0) | 0.0(0) | 0.0(0) | 0.0(0) | 99.6(0) | 80.6(0) | 0(0) | 5 | 0 |
| 0.50 | 45.0 | 6(0) | 0(0) | 0(0) | 4(0) | 0.0(0) | 0.0(0) | 0.0(0) | 100(0) | 87.7(0) | 0(0) | 5 | 0 |
| 0.20 | 45.0 | 7(0) | 0(0) | 0(0) | 3(0) | 0.0(0) | 0.0(0) | 0.0(0) | 100(0) | 89.6(0) | 1(0) | 5 | 0 |

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Armstrong Run
upst. Veyance Tech, at farm lane

Collection Date: 08/13/2012 River Code: 04-535 RM: 0.80

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|---|---|---|---|---|---|
| 01801 | *Turbellaria* | + | | | |
| 03600 | *Oligochaeta* | + | | | |
| 04664 | *Helobdella stagnalis* | + | | | |
| 04960 | *Mooreobdella sp* | + | | | |
| 05800 | *Caecidotea sp* | + | | | |
| 11200 | *Callibaetis sp* | + | | | |
| 17200 | *Caenis sp* | + | | | |
| 28955 | *Plathemis lydia* | + | | | |
| 60800 | *Haliplus sp* | + | | | |
| 60900 | *Peltodytes sp* | + | | | |
| 65800 | *Berosus sp* | + | | | |
| 79020 | *Tanypus neopunctipennis* | + | | | |
| 98200 | *Pisidium sp* | + | | | |

No. Quantitative Taxa: 0 Total Taxa: 13
No. Qualitative Taxa: 13 ICI:
Number of Organisms: 0 Qual EPT: 2

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Armstrong Run
adj. Veyance Tech.

Collection Date: 08/13/2012 River Code: 04-535 RM: 0.40

| Taxa Code | Taxa | Quant/Qual |
|---|---|---|
| 01801 | *Turbellaria* | + |
| 03600 | *Oligochaeta* | + |
| 04661 | *Helobdella elongata* | + |
| 04664 | *Helobdella stagnalis* | + |
| 04960 | *Mooreobdella sp* | + |
| 05800 | *Caecidotea sp* | + |
| 08250 | *Orconectes (Procericambarus) rusticus* | + |
| 11200 | *Callibaetis sp* | + |
| 17200 | *Caenis sp* | + |
| 22001 | *Coenagrionidae* | + |
| 28208 | *Erythemis simplicicollis* | + |
| 60800 | *Haliplus sp* | + |
| 65800 | *Berosus sp* | + |
| 77355 | *Clinotanypus pinguis* | + |
| 79020 | *Tanypus neopunctipennis* | + |
| 80420 | *Cricotopus (C.) bicinctus* | + |

| Taxa Code | Taxa | Quant/Qual |
|---|---|---|

No. Quantitative Taxa: 0 Total Taxa: 16
No. Qualitative Taxa: 16 ICI:
Number of Organisms: 0 Qual EPT: 2

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Armstrong Run
dst. St. Rt. 66

Collection Date: 08/13/2012 River Code: 04-535 RM: 0.10

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|---|---|---|---|---|---|
| 04664 | *Helobdella stagnalis* | + | | | |
| 04666 | *Helobdella triserialis* | + | | | |
| 04960 | *Mooreobdella sp* | + | | | |
| 05800 | *Caecidotea sp* | + | | | |
| 08250 | *Orconectes (Procericambarus) rusticus* | + | | | |
| 11200 | *Callibaetis sp* | + | | | |
| 17200 | *Caenis sp* | + | | | |
| 22001 | *Coenagrionidae* | + | | | |
| 28705 | *Pachydiplax longipennis* | + | | | |
| 52200 | *Cheumatopsyche sp* | + | | | |
| 77355 | *Clinotanypus pinguis* | + | | | |
| 78655 | *Procladius (Holotanypus) sp* | + | | | |
| 79020 | *Tanypus neopunctipennis* | + | | | |
| 82820 | *Cryptochironomus sp* | + | | | |
| 84450 | *Polypedilum (Uresipedilum) flavum* | + | | | |
| 96900 | *Ferrissia sp* | + | | | |

No. Quantitative Taxa: 0 Total Taxa: 16
No. Qualitative Taxa: 16 ICI:
Number of Organisms: 0 Qual EPT: 3

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Miami-Erie Canal (from Grand Lake)
upst. Veyance

Collection Date: 09/24/2012 River Code: 04-536 RM: 0.90

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|---|---|---|---|---|---|
| 03600 | *Oligochaeta* | 320 + | | | |
| 42700 | *Belostoma sp* | + | | | |
| 63700 | *Ilybius sp* | + | | | |
| 65800 | *Berosus sp* | 2 | | | |
| 74501 | *Ceratopogonidae* | 2 | | | |
| 80510 | *Cricotopus (Isocladius) sylvestris group* | + | | | |
| 82711 | *Chironomus (C.) sp 1* | 130 + | | | |
| 83300 | *Glyptotendipes (G.) sp* | 31 | | | |
| 83380 | *Goeldichironomus holoprasinus* | 70 + | | | |
| 84000 | *Parachironomus sp* | 3 + | | | |

No. Quantitative Taxa: 7 Total Taxa: 10
No. Qualitative Taxa: 7 ICI: **0**
Number of Organisms: 558 Qual EPT: 0

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Miami-Erie Canal (from Grand Lake)
adj. Veyance

Collection Date: 09/24/2012 River Code: 04-536 RM: 0.50

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|---|---|---|---|---|---|
| 03600 | *Oligochaeta* | 372 + | | | |
| 74501 | *Ceratopogonidae* | 30 + | | | |
| 82711 | *Chironomus (C.) sp 1* | 309 + | | | |
| 83300 | *Glyptotendipes (G.) sp* | 27 | | | |
| 83380 | *Goeldichironomus holoprasinus* | 40 + | | | |
| 95100 | *Physella sp* | 8 | | | |

No. Quantitative Taxa: 6 Total Taxa: 6
No. Qualitative Taxa: 4 ICI: **0**
Number of Organisms: 786 Qual EPT: 0

**Appendix Table 7. Ohio EPA/DSW Ecological Assessment Section**
**Macroinvertebrate Collection**

Site: Miami-Erie Canal (from Grand Lake)
dst. Veyance

Collection Date: 09/24/2012 River Code: 04-536 RM: 0.20

| Taxa Code | Taxa | Quant/Qual | | Taxa Code | Taxa | Quant/Qual |
|---|---|---|---|---|---|---|
| 01801 | *Turbellaria* | 1 | | | | |
| 03600 | *Oligochaeta* | 550 | + | | | |
| 04935 | *Erpobdella punctata punctata* | | + | | | |
| 06201 | *Hyalella azteca* | | + | | | |
| 11200 | *Callibaetis sp* | | + | | | |
| 22001 | *Coenagrionidae* | | + | | | |
| 28208 | *Erythemis simplicicollis* | | + | | | |
| 28500 | *Libellula sp* | | + | | | |
| 28705 | *Pachydiplax longipennis* | | + | | | |
| 42700 | *Belostoma sp* | | + | | | |
| 43570 | *Neoplea sp* | | + | | | |
| 45400 | *Trichocorixa sp* | | + | | | |
| 60800 | *Haliplus sp* | | + | | | |
| 65010 | *Hydrocanthus sp* | | + | | | |
| 66500 | *Enochrus sp* | | + | | | |
| 68201 | *Scirtidae* | | + | | | |
| 77130 | *Ablabesmyia rhamphe group* | | + | | | |
| 82711 | *Chironomus (C.) sp 1* | 430 | + | | | |
| 83300 | *Glyptotendipes (G.) sp* | 83 | | | | |
| 83380 | *Goeldichironomus holoprasinus* | 28 | + | | | |
| 84415 | *Polypedilum (P.) sp* | | + | | | |
| 95100 | *Physella sp* | 1 | + | | | |
| 95900 | *Gyraulus sp* | 2 | | | | |

No. Quantitative Taxa: 7 Total Taxa: 23
No. Qualitative Taxa: 20 ICI: **0**
Number of Organisms: 1095 Qual EPT: 1