
Division of Environmental Remediation

Remedial Investigation Report



Eighteenmile Creek Corridor, Lockport, Niagara County, New York Site Number 932121

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New York State Department of Environmental Conservation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999

Remedial Investigation Report

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TABLE OF CONTENTS

SECTION	PAGE
1.0 EXECUTIVE SUMMARY	<u>1</u>
1.1 Eighteenmile Creek and Millrace Sediment	<u>1</u>
1.2 Residential Properties	<u>3</u>
1.3 Conclusions and Recommendations	<u>5</u>
2.0 INTRODUCTION	<u>7</u>
2.1 Background	<u>7</u>
2.2 Previous Investigations	<u>9</u>
2.3 Report Organization	<u>9</u>
3.0 SAMPLING OBJECTIVE AND SCOPE OF WORK	<u>11</u>
3.1 Objectives	<u>11</u>
3.2 Scope of Work	<u>11</u>
3.2.1 <i>Property Inspections</i>	<u>11</u>
3.2.2 <i>Soil Boring and Test Pit Program</i>	<u>12</u>
3.2.3 <i>Surface Soil Samples</i>	<u>12</u>
3.2.4 <i>Sediment Samples</i>	<u>12</u>
3.2.5 <i>Sample Collection and Analysis</i>	<u>13</u>
3.2.6 <i>Mapping</i>	<u>13</u>
3.2.7 <i>Report Preparation</i>	<u>14</u>
4.0 PREVIOUS INVESTIGATIONS OF POTENTIAL SOURCE AREAS	<u>15</u>
4.1 Former Flintkote Plant Site	<u>15</u>
4.1.1 <i>Site Description</i>	<u>15</u>
4.1.2 <i>Site History</i>	<u>15</u>
4.1.3 <i>Previous Investigations</i>	<u>16</u>
4.2 White Transportation	<u>18</u>
4.2.1 <i>Location and Description</i>	<u>18</u>
4.2.2 <i>Site History</i>	<u>19</u>
4.2.3 <i>Previous Investigations</i>	<u>19</u>
4.3 United Paperboard Company	<u>21</u>
4.3.1 <i>Location and Description</i>	<u>21</u>
4.3.2 <i>Site History</i>	<u>22</u>
4.3.3 <i>Previous Investigations</i>	<u>22</u>
4.4 Upson Park	<u>22</u>
4.4.1 <i>Location and Description</i>	<u>22</u>
4.4.2 <i>Site History</i>	<u>23</u>
4.4.3 <i>Previous Investigations</i>	<u>23</u>
5.0 INVESTIGATION RESULTS	<u>24</u>
5.1 Property Inspections and Sample Collection	<u>24</u>
5.2 Nature and Extent of Contamination	<u>26</u>
5.2.1 <i>Eighteenmile Creek and Millrace Sediment</i>	<u>26</u>
5.2.1.1 <u>Polychlorinated Biphenyls (PCBs)</u>	<u>27</u>

TABLE OF CONTENTS (CONTINUED)

SECTION	PAGE
5.2.1.2	Arsenic 29
5.2.1.3	Chromium 29
5.2.1.4	Copper 29
5.2.1.5	Lead 30
5.2.1.6	Zinc 30
5.2.2	<i>Residential Surface Soil</i> 31
5.2.2.1	Polychlorinated Biphenyls (PCBs) 32
5.2.2.2	Arsenic 32
5.2.2.3	Chromium 33
5.2.2.4	Copper 33
5.2.2.5	Lead 33
5.2.2.6	Zinc 34
5.2.3	<i>Residential Subsurface Soil and Fill</i> 34
5.2.3.1	Semivolatile Organic Compounds (SVOCs) 35
5.2.3.2	Polychlorinated Biphenyls (PCBs) 36
5.2.3.3	Arsenic 36
5.2.3.4	Chromium 36
5.2.3.5	Copper 36
5.2.3.6	Lead 37
5.2.3.7	Zinc 37
5.3	Potential Source Areas 38
5.3.1	<i>New York State Barge Canal</i> 38
5.3.1.1	Polychlorinated Biphenyls (PCBs) 38
5.3.1.2	Arsenic 38
5.3.1.3	Chromium 38
5.3.1.4	Copper 38
5.3.1.5	Lead 39
5.3.1.6	Zinc 39
5.3.2	<i>Upson Park</i> 39
5.3.2.1	Semivolatile Organic Compounds (SVOCs) 40
5.3.2.2	Polychlorinated Biphenyls (PCBs) 40
5.3.2.3	Metals 40
5.3.3	<i>White Transportation</i> 41
5.3.3.1	Semivolatile Organic Compounds (SVOCs) 41
5.3.3.2	Polychlorinated Biphenyls (PCBs) 42
5.3.3.3	Metals 42
5.3.4	<i>United Paperboard Company</i> 42
5.3.4.1	Semivolatile Organic Compounds (SVOCs) 43
5.3.4.2	Polychlorinated Biphenyls (PCBs) 43
5.3.4.3	Metals 43
6.0	DISCUSSIONS AND CONCLUSIONS 45
6.1	SVOC Contamination 45
6.1.1	<i>Eighteenmile Creek and the Millrace</i> 45

TABLE OF CONTENTS (CONTINUED)

SECTION	PAGE
6.1.2 Residential Properties	46
6.2 PCB Contamination	46
6.2.1 Eighteenmile Creek and the Millrace	46
6.2.2 Residential Properties	48
6.3 Arsenic Contamination	48
6.3.1 Eighteenmile Creek and the Millrace	48
6.3.2 Residential Properties	49
6.4 Chromium Contamination	49
6.4.1 Eighteenmile Creek and the Millrace	49
6.4.2 Residential Properties	50
6.5 Copper Contamination	50
6.5.1 Eighteenmile Creek and the Millrace	50
6.5.2 Residential Properties	51
6.6 Lead Contamination	52
6.6.1 Eighteenmile Creek and the Millrace	52
6.6.2 Residential Properties	53
6.7 Zinc Contamination	54
6.7.1 Eighteenmile Creek and the Millrace	54
6.7.2 Residential Properties	55
7.0 CONCLUSIONS AND RECOMMENDATIONS	57
8.0 REFERENCES	58

LIST OF FIGURES

(Following Text)

Figure 1-1	Site Location Map
Figure 1-2	Study Area Site Map
Figure 3-1	Soil Boring and Test Pit Location Map
Figure 3-2	Surface Soil/Waste Sample Location Map
Figure 3-3	Sediment Sample Location Map
Figure 3-4	Sediment Sample Location Map for the New York State Barge Canal
Figure 5-1	Photograph of Ash from a Small Ridge along Eighteenmile Creek
Figure 5-2	Photograph of the Small Ridge of Ash Fill along Eighteenmile Creek
Figure 5-3	Closeup Photograph of Ash Fill in the Creek Bank along Eighteenmile Creek
Figure 5-4	Photograph of the Property Line Between 131 and 127 Water Street
Figure 5-5	Photograph of the Slag and Cinder Fill on the White Transportation Property
Figure 5-6	Closeup Photograph of the Slag and Cinder Fill on the White Transportation Property
Figure 5-7	Photograph of the Ash-Like Fill Along Eighteenmile Creek in Upson Park
Figure 5-8	Closeup Photograph of the Ash-Like Fill Along Eighteenmile Creek in Upson Park
Figure 5-9	PCB Sediment Criterion Exceedance Map
Figure 5-10	Arsenic Sediment Criterion Exceedance Map
Figure 5-11	Chromium Sediment Criterion Exceedance Map
Figure 5-12	Copper Sediment Criterion Exceedance Map
Figure 5-13	Lead Sediment Criterion Exceedance Map
Figure 5-14	Zinc Sediment Criterion Exceedance Map
Figure 5-15	Residential Surface Soil PCB Exceedance Map
Figure 5-16	Residential Surface Soil Arsenic Exceedance Map
Figure 5-17	Residential Surface Soil Chromium Exceedance Map

LIST OF FIGURES (CONTINUED)

- Figure 5-18 Residential Surface Soil Copper Exceedance Map
- Figure 5-19 Residential Surface Soil Lead Exceedance Map
- Figure 5-20 Residential Surface Soil Zinc Exceedance Map
- Figure 5-21 Residential Subsurface Soil Total SVOC Exceedance Map
- Figure 5-22 Residential Subsurface Soil PCB Exceedance Map
- Figure 5-23 Residential Subsurface Soil Arsenic Exceedance Map
- Figure 5-24 Residential Subsurface Soil Chromium Exceedance Map
- Figure 5-25 Residential Subsurface Soil Copper Exceedance Map
- Figure 5-26 Residential Subsurface Soil Lead Exceedance Map
- Figure 5-27 Residential Subsurface Soil Zinc Exceedance Map
- Figure 6-1 PCB Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-2 PCB Concentrations in Deep Sediment of Eighteenmile Creek
- Figure 6-3 Arsenic Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-4 Arsenic Concentrations in Deep Sediment of Eighteenmile Creek
- Figure 6-5 Chromium Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-6 Chromium Concentrations in Deep Sediment of Eighteenmile Creek
- Figure 6-7 Copper Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-8 Copper Concentrations in Deep Sediment of Eighteenmile Creek
- Figure 6-9 Lead Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-10 Lead Concentrations in Deep Sediment of Eighteenmile Creek
- Figure 6-11 Zinc Concentrations in Shallow Sediment of Eighteenmile Creek
- Figure 6-12 Zinc Concentrations in Deep Sediment of Eighteenmile Creek

LIST OF TABLES

Table 3-1	Summary Key for Samples Collected During the Remedial Investigation
Table 5-1	Analytical Results of Sediment Samples Collected from Eighteenmile Creek and the Millrace
Table 5-2	Analytical Results of Surface Soil Samples Collected from 97 Water Street
Table 5-3	Analytical Results of Surface Soil Samples Collected from 99 Water Street
Table 5-4	Analytical Results of Surface Soil Samples Collected from 105 Water Street
Table 5-5	Analytical Results of Surface Soil Samples Collected from 113 Water Street
Table 5-6	Analytical Results of Surface Soil Samples Collected from 117 and 125 Water Street
Table 5-7	Analytical Results of Surface Soil Samples Collected from 127 Water Street
Table 5-8	Analytical Results of Surface Soil Samples Collected from 131 Water Street
Table 5-9	Analytical Results of Surface Soil Samples Collected from 143 Water Street
Table 5-10	Analytical Results of Subsurface Soil/Fill Samples Collected from Water Street Residential Properties
Table 5-11	Analytical Results of Sediment Samples Collected from the New York State Barge Canal Between Pine Street and Eighteenmile Creek
Table 5-12	Analytical Results of Surface and Subsurface Fill Samples Collected from Upson Park
Table 5-13	Analytical Results of Surface and Subsurface Fill Samples Collected from the White Transportation Property
Table 5-14	Analytical Results of Surface Soil and Fill Samples Collected from the United Paperboard Company Property
Table 5-15	Analytical Results of Subsurface Soil/Fill Samples Collected from the United Paperboard Company Property
Table 6-1	Nature and Extent of Contamination at the Former Flintkote Plant Site

LIST OF APPENDICES

- Appendix A Detailed Site Histories
- Appendix B Sanborn Fire Insurance Maps
- Appendix C Stratigraphic Logs

1.0 EXECUTIVE SUMMARY

The Eighteenmile Creek Corridor Site (Site No. 932121) is located between the New York State Barge Canal and Harwood Street in the City of Lockport, Niagara County, New York (Figure 1-1). The Site consists of approximately 4,000 linear feet of the creek, and the millrace adjacent to the Former Flintkote Plant Site. During 2002 the New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH) and Niagara County Health Department (NCHD), conducted three separate sampling events of Eighteenmile Creek and properties along Water Street (Figures 1-1 and 1-2). The objective of these sampling events was to obtain information sufficient to determine if the properties along Water Street are being impacted by the Former Flintkote Plant Site and/or Eighteenmile Creek. This objective was evaluated through the analysis of waste, surface soil and sediment samples obtained from Water Street properties, Eighteenmile Creek and the former United Paperboard Company property south of the Former Flintkote Plant Site (Figure 1-2).

The results of these sampling events were presented in two NYSDEC publications entitled: (1) *“Sampling Report, Former Flintkote Plant Site, 143 Water Street, City of Lockport, Niagara County, New York”*, Division of Environmental Remediation, June 2002 and (2) *“Sampling Report, Water Street Properties, City of Lockport, Niagara County, New York”*, Division of Environmental Remediation, March 2003. These publications recommended the collection of additional surface soil samples from residential properties along Water Street and sediment samples from Eighteenmile Creek and the millrace to further evaluate the extent of PCB and metals contamination.

During the Fall of 2005 the NYSDEC completed a Remedial Investigation of the Eighteenmile Creek Corridor Site to better define the nature and extent of sediment contamination in Eighteenmile Creek and the millrace for the purpose of evaluating remedial alternatives, to further evaluate the impact of creek flooding on residential properties along Water Street and to evaluate potential sources of contaminants to the creek. These source areas include the Former Flintkote Plant Site, the White Transportation property, the former United Paperboard Company property, Upson Park and the New York State Barge Canal (Figure 1-2). The objectives of the Remedial Investigation were evaluated through the analysis of waste, surface soil and sediment samples obtained from Water Street properties, Eighteenmile Creek, the New York State Barge Canal and other properties along the creek between the canal and the Former Flintkote Plant Site.

1.1 Eighteenmile Creek and Millrace Sediment

PCBs were detected in fifty-eight of sixty-one sediment samples collected from Eighteenmile Creek

and the millrace at concentrations ranging from 7.0J to 1,400,000 µg/kg. The principal aroclors detected were 1248, 1254 and 1260, although aroclor 1242 was detected in several samples. Thirty-eight of the samples contained PCBs at concentrations that exceeded the NYSDEC sediment criterion (606.0 µg/kg) for chronic toxicity to benthic aquatic life. The majority of these samples (31) also exceeded the NYSDEC TAGM 4046 surface soil cleanup objective (1,000 µg/kg). Additionally, seven samples at four locations contained PCBs at concentrations that exceeded the 50,000 µg/kg hazardous waste criterion.

PCBs were also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek, and in fill material from Upson Park. Contaminated sediment and fill, therefore, have the potential to adversely impact Eighteenmile Creek. The concentrations of PCBs (and aroclors) in creek and millrace sediment, however, suggest that other sources of PCBs to the creek exist. Contaminated fill on the White Transportation property, the former United Paperboard Company property and at the Former Flintkote Plant Site do not appear to be significant sources of PCBs to the creek and millrace.

Arsenic was detected in all fifty-seven sediment samples analyzed for arsenic at concentrations ranging from 1.5 to 50.5 mg/kg. These data indicate that sediment in Eighteenmile Creek between the New York State Barge Canal and Harwood Street, with the exception of one location adjacent to the Former Flintkote Plant Site, contains arsenic at concentrations below the NYSDEC sediment criterion (33.0 mg/kg) for the severe effect level. As a result, arsenic contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is not a major concern.

Chromium was detected in all fifty-seven sediment samples analyzed for chromium at concentrations ranging from 2.8 to 121 mg/kg. These data indicate that sediment in Eighteenmile Creek between the New York State Barge Canal and Harwood Street, with the exception of one location adjacent to the Former Flintkote Plant Site, contains chromium at concentrations below the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. As a result, chromium contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is not a major concern.

Copper was detected in all fifty-seven sediment samples analyzed for copper at concentrations ranging from 20.5 to 7,900 mg/kg. Thirty-six of these samples contained copper at concentrations that exceeded the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. Copper was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek, and in fill material from Upson Park, the White Transportation property, the former United Paperboard

Company property and the Former Flintkote Plant Site. The concentrations of copper at all of these source areas are higher than the NYSDEC sediment criterion for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek.

Lead was detected in all sixty-one sediment samples analyzed for lead at concentrations ranging from 15.3 to 25,400 mg/kg. Fifty-six of these samples contained lead at concentrations that exceeded the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. Lead was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek, and in fill material from Upson Park, the White Transportation property, the former United Paperboard Company property and the Former Flintkote Plant Site. The concentrations of lead at all of these source areas are higher than the NYSDEC sediment criterion for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek. Lead concentrations in fill material from Upson Park, the former United Paperboard Company property and the Former Flintkote Plant Site exceed 1,000 mg/kg, suggesting that these sites could be major sources of lead to the creek.

Zinc was detected in all fifty-seven sediment samples analyzed for zinc at concentrations ranging from 37.1 to 23,600 mg/kg. Thirty-seven of these samples contained zinc at concentrations that exceeded the NYSDEC sediment criterion (270.0 mg/kg) for the severe effect level. Zinc was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek, and in fill material from Upson Park, the White Transportation property, the former United Paperboard Company property and the Former Flintkote Plant Site. The concentrations of zinc at all of these source areas are higher than the NYSDEC sediment criterion for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek. Zinc concentrations in fill material from Upson Park, the former United Paperboard Company property and the Former Flintkote Plant Site exceed 1,000 mg/kg, suggesting that these sites could be major sources of zinc to the creek.

1.2 Residential Properties

Semivolatile organic compounds (SVOCs) were detected in seven of eight residential subsurface samples with total SVOC concentrations ranging from 80.0 to 73,370 µg/kg. None of these concentrations, however, exceeded the NYSDEC TAGM 4046 soil cleanup objective for total SVOCs (500,000 µg/kg). Surface soil samples were not analyzed for these contaminants.

PCBs were detected in twenty of twenty-seven residential surface soil samples at concentrations

ranging from 24J to 27,000 µg/kg. Five of these samples contained PCBs at concentrations (1,060 to 27,000 µg/kg) that exceeded the NYSDEC TAGM 4046 surface soil cleanup objective (1,000 µg/kg). These samples were collected near Eighteenmile Creek, suggesting that the creek is the source of the PCB contamination (i.e., sediment deposition along the creek during flood events). PCBs were also detected in seven of nineteen subsurface samples at concentrations ranging from 32J to 4,160 µg/kg. None of these samples, however, contained PCBs at concentrations that exceeded the NYSDEC TAGM 4046 subsurface soil cleanup objective (10,000 µg/kg).

Arsenic was detected in all twenty-one residential surface soil samples analyzed for arsenic at concentrations ranging from 5.3 to 66.5 mg/kg. Arsenic was also detected in all nineteen residential subsurface samples at concentrations ranging from 3.8 to 24.0 mg/kg. These data indicate that most residential soil and fill contains arsenic at concentrations that exceed the NYSDEC soil cleanup objective (7.5 mg/kg). The widespread occurrence of arsenic suggests that the fill material observed at these properties is the source of the arsenic contamination.

Chromium was detected in all twenty-one residential surface soil samples analyzed for chromium at concentrations ranging from 10.7 to 164 mg/kg. Chromium was also detected in all nineteen residential subsurface samples at concentrations ranging from 5.1 to 262 mg/kg. These data indicate that most residential surface soil, and subsurface soil and fill collected from the 97 to 127 Water Street properties, contains chromium at concentrations that exceed the NYSDEC soil cleanup objective (14.0 mg/kg). The widespread occurrence of chromium in residential surface soil at these properties is likely related to the presence of chromium in the subsurface soil and fill. Because chromium exceedances were not documented in the subsurface samples collected from the 131 and 143 Water Street properties, the presence of chromium in surface soil at these properties is not related to the ash, slag and cinder fill observed at these parcels. Creek flooding may explain the high chromium concentrations in surface soil samples close to Eighteenmile Creek.

Copper was detected in all twenty-one residential surface soil samples analyzed for copper at concentrations ranging from 32.2 to 2,260 mg/kg. Copper was also detected in all nineteen residential subsurface samples at concentrations ranging from 20.7 to 2,240 mg/kg. These data indicate that most residential soil and fill contains copper at concentrations that exceed the NYSDEC soil cleanup objective (25.0 mg/kg). The widespread occurrence of copper suggests that the fill material observed at these properties is the source of the copper contamination. Creek flooding may explain the high copper concentrations in surface soil samples close to Eighteenmile Creek. Surface water/solids runoff from a small ash ridge on the

Water Street Section of the Former Flintkote Plant Site may explain the relatively high concentrations of copper in surface soil at the 143 Water Street property.

Lead was detected in all thirty-nine residential surface soil samples analyzed for lead at concentrations ranging from 29.8 to 4,630 mg/kg. Eleven of these samples contained lead at concentrations above 1,000 mg/kg. Seven of these samples were collected near Eighteenmile Creek, suggesting that the creek is the source of the lead contamination (i.e., sediment deposition along the creek during flood events). Surface water/solids runoff from the small ash ridge on the Water Street Section of the Former Flintkote Plant Site may explain the relatively high concentrations of lead in surface soil at the 143 Water Street property. Lead was also detected in all nineteen residential subsurface samples at concentrations ranging from 5.4 to 1,030 mg/kg. These data indicate that twenty-two of the residential surface soil samples, and most of the subsurface samples collected from the 97 to 117 Water Street properties, contain lead at concentrations that exceed the NYSDEC soil cleanup objective (400.0 mg/kg). Lead exceedances were not documented in the subsurface samples collected from the 127, 131 and 143 Water Street properties.

Zinc was detected in all twenty-one residential surface soil samples analyzed for zinc at concentrations ranging from 146 to 2,390 mg/kg. Six of these samples contained zinc at concentrations above 1,000 mg/kg. Four of these samples were collected near Eighteenmile Creek, suggesting that the creek is the source of the zinc contamination (i.e., sediment deposition along the creek during flood events). Surface water/solids runoff from the small ash ridge on the Water Street Section of the Former Flintkote Plant Site may explain the relatively high concentrations of zinc in surface soil at the 143 Water Street property. Zinc was also detected in all nineteen residential subsurface samples at concentrations ranging from 19.6 to 2,560 mg/kg. These data indicate that fifteen of the residential surface soil samples, and most of the subsurface sample collected from the 97 to 127 Water Street properties, contain zinc at concentrations that exceed the NYSDEC soil cleanup objective (254.5 mg/kg). Zinc exceedances were not documented in the subsurface samples collected from the 131 and 143 Water Street properties.

1.3 Conclusions and Recommendations

The Remedial Investigation of the Eighteenmile Creek Corridor Site documented elevated concentrations of PCBs and metals (i.e., arsenic, chromium, copper, lead and zinc) in the sediment of Eighteenmile Creek and the millrace adjacent to the Former Flintkote Plant Site. The Remedial Investigation also documented contaminated sediment in the New York State Barge Canal immediately upstream of Eighteenmile Creek, and contaminated fill at Upson Park, the White Transportation property, the former

United Paperboard Company property and the Former Flintkote Plant Site. The concentrations of PCBs, arsenic, chromium, copper, lead and zinc detected at these areas suggest that these properties have the potential to adversely impact Eighteenmile Creek. The Remedial Investigation did not fully investigate these potential source areas, nor did it quantify the volume of contaminated sediment requiring remediation. The Remedial Investigation also determined the need to investigate deeper sediment in the creek between the canal and the Clinton Street dam, and the depositional area on the east side of the mill pond south of the dam. These data gaps need to be addressed before a Feasibility Study (FS) can be prepared for the Site. As a result, the NYSDEC recommends that a Supplemental Remedial Investigation be completed at the Eighteenmile Creek Corridor Site to more fully determine the nature and extent of contamination in creek and millrace sediment, to further characterize the contamination at the potential source areas (i.e., the White Transportation property, the former United Paperboard Company property and Upson Park), and to determine the extent to which releases or potential releases from the site pose a threat to human health and the environment.

2.0 INTRODUCTION

The Eighteenmile Creek Corridor Site is located between the New York State Barge Canal and Harwood Street in the City of Lockport, Niagara County, New York (Figure 1-1). The Site consists of approximately 4,000 linear feet of the creek, and the millrace adjacent to the Former Flintkote Plant Site. Eighteenmile Creek originates south of the canal in Lockport, New York and flows under the canal near Mill Street (Figure 1-2). While operating, the New York State Barge Canal discharges approximately 50 cubic feet per second (cfs) of water into the East and West Branches of the creek (Figure 1-2). This water forms a significant portion of the creek's flow, especially during periods of dry weather. The East and West Branches of the creek merge at Clinton Street (Figure 1-2).

During the Fall of 2005 the New York State Department of Environmental Conservation (NYSDEC) completed a Remedial Investigation of the Eighteenmile Creek Corridor Site (Site No. 932121) to better define the nature and extent of sediment contamination in Eighteenmile Creek and the millrace for the purpose of evaluating remedial alternatives, to further evaluate the impact of creek flooding on residential properties along Water Street and to evaluate potential sources of contaminants to the creek. These source areas include the Former Flintkote Plant Site, the White Transportation property, the former United Paperboard Company property, Upson Park and the New York State Barge Canal (Figure 1-2). This report summarizes the results and findings of the Remedial Investigation.

2.1 Background

In early April 2002, Mr. Paul Dicky of the Niagara County Health Department (NCHD) received a citizen request for sample collection and evaluation of soils from their property at 143 Water Street. Mr. Dicky telephoned the NYSDEC about this request, and following a discussion of the issues, agreed to complete an inspection of the property. During this inspection, which was conducted on April 8, 2002, Mr Dicky had further discussion with the property owners. The residents concerns and issues regarding the property are summarized as follows:

- The property owners first became concerned of possible contaminant migration from Eighteenmile Creek after a family case of cancer inspired research into available environmental data regarding the creek. Concern was raised over elevated PCB concentrations;
- Eighteenmile Creek abuts the back and side yard of 143 Water Street and occasionally floods

the yard due to debris or ice blocking the cross-culverts under William Street. The property owners expressed concern about the poor to non-existent maintenance of the creek by the City of Lockport;

- Severe flooding occurs about 100 feet into the yard approximately once every two years. Lesser flooding may occur several times a year depending upon local precipitation and blockage of the cross-culverts; and
- Frequent flooding also occurs on a small strip of wooded property between Eighteenmile Creek and the 143 Water Street property. This strip of land is about 20 feet wide.

Mr Dicky identified a portion of the yard that would flood during high water events, and concluded that the flood complaint was plausible. In addition, a small vegetable garden was observed within the reported flood area. Based upon these findings, the Niagara County Health Department requested the investigatory assistance of the NYSDEC as the county was concerned that “a potential migration pathway may exist between *contaminated* creek sediments and backyard soils due to regular flooding events [italics ours].”

On April 16, 2002 the NYSDEC collected four samples from the property at 143 Water Street. Based upon the results of this sampling event, the New York State Department of Health (NYSDOH) determined that it was necessary to sample additional Water Street properties. As a result, on July 23, 2002 the NYSDEC, in consultation with the NYSDOH and NCHD, collected fifteen samples from properties along Water Street, one sediment sample from Eighteenmile Creek and two waste samples from wooded property south of the Former Flintkote Plant Site on Mill Street (Figure 1-2). On November 26, 2002 the NYSDEC collected two soil samples and three sediment samples near the Clinton Street dam (Figure 1-2) from an area identified as a potential source of PCBs to Eighteenmile Creek.

The results of these sampling events were presented in two NYSDEC publications entitled: (1) “*Sampling Report, Former Flintkote Plant Site, 143 Water Street, City of Lockport, Niagara County, New York*”, Division of Environmental Remediation, June 2002 and (2) “*Sampling Report, Water Street Properties, City of Lockport, Niagara County, New York*”, Division of Environmental Remediation, March 2003. The findings and results from these reports have been incorporated into this Remedial Investigation and will be discussed in detail in Section 5.0 of this report.

2.2 Previous Investigations

Between 1987 and 1998 the NYSDEC's Division of Water collected ten sediment samples from Eighteenmile Creek between Remick Parkway (south of the New York State Barge Canal; Figure 1-1) and the Former Flintkote Plant Site in the City of Lockport, Niagara County, New York (Figure 1-2). Six additional sediment samples between Clinton Street and the Former Flintkote Plant Site were collected by the NYSDEC's Division of Environmental Remediation in 1996. The analytical results for these samples have been presented in various NYSDEC publications including: (1) "*Trackdown of Chemical Contaminants to Lake Ontario from New York State Tributaries*", Division of Water, April 1996; (2) "*Eighteenmile Creek Remedial Action Plan*", Division of Water, August 1997; (3) "*Site Investigation Report, Former Flintkote Plant Site*", Division of Environmental Remediation, September 2000; and (4) "*Final Report, Eighteenmile Creek Sediment Study*", Division of Water, December 2001.

The analytical results for these samples indicated that PCBs were detected in fifteen of sixteen samples (the sixteenth sample was not analyzed for PCBs) at concentrations ranging from 13.3 to 24,926 µg/kg. The concentrations in eleven of these samples exceeded the NYSDEC's sediment criteria (606.0 µg/kg) for chronic toxicity to benthic aquatic life and the NYSDEC's Technical and Administrative Guidance Memoranda (TAGM) No. 4046 surface soil cleanup objective (1,000 µg/kg).

The analytical results also indicated that lead was detected in all eleven samples in which this contaminant was analyzed at concentrations ranging from 103.0 to 5,940 mg/kg. Although ten of these concentrations exceed the sediment criteria (110 mg/kg) for the severe effect level, only five concentrations exceed the TAGM 4046 soil cleanup objective (400 mg/kg). Other inorganic contaminants are also present in Eighteenmile Creek sediment. Metal concentrations that exceed sediment criteria include arsenic (1 sample), cadmium (1 sample), chromium (1 sample), copper (9 samples), iron (1 sample), mercury (3 samples), nickel (2 samples), silver (4 samples) and zinc (10 samples). The most exceedances were observed in a sediment sample collected near the Former Flintkote Plant Site.

2.3 Report Organization

Following this introductory section (Section 2.0), the remaining sections of this report are organized as follows:

- **Section 3.0, Sampling Objective and Scope of Work:** Section 3.0 describes the objectives of the Remedial Investigation and the activities that were completed as part of the

investigation.

- **Section 4.0, Previous Investigations of Potential Source Areas:** Section 4.0 presents a brief description and history of sites located adjacent to the Eighteenmile Creek Corridor Site that could be potential sources of contaminants to the creek, and briefly summarizes key historic investigations conducted at these sites.
- **Section 5.0, Investigation Results:** Section 5.0 presents the results of the Remedial Investigation, including general observations and a summary of the analytical results obtained from various environmental media (i.e., waste, soil and sediment).
- **Section 6.0, Discussions and Conclusions:** Section 6.0 discusses the results of the Remedial Investigation as they relate to the objectives presented in Section 3.0. Conclusions drawn from the investigation are also discussed.
- **Section 7.0, Recommendations:** Section 7.0 discusses the NYSDEC's recommendations for future activities regarding Eighteenmile Creek, the residential properties along Water Street and the source areas adjacent to the Eighteenmile Creek Corridor Site.
- **Section 8.0, References:** Section 8.0 contains a list of references utilized or cited in this report.

Figures, tables and appendices, in that order, follow Section 8.0.

3.0 SAMPLING OBJECTIVE AND SCOPE OF WORK

3.1 Objectives

The principle objective of the Remedial Investigation was to better define the nature and extent of sediment contamination in Eighteenmile Creek from the New York State Barge Canal to Harwood Street for the purpose of evaluating remedial alternatives. A secondary objective was to evaluate the impact of flooding on residential properties along Water Street that are adjacent to the creek. The third objective was to evaluate fill materials deposited on property adjacent to the Eighteenmile Creek Corridor Site that could be potential sources of contaminants to the creek. These objectives were evaluated through the analysis of waste, surface soil and sediment samples obtained from the Water Street properties, Eighteenmile Creek and other properties along the creek between the New York State Barge Canal and the Former Flintkote Plant Site.

3.2 Scope of Work

To meet the above objectives, the following activities were completed as part of the Remedial Investigation: (1) property inspections, (2) completion of a soil boring and test pit program, (3) collection of environmental samples for chemical analysis, (4) preparation of a site map, and (5) preparation of this report. Following the property inspections, a soil boring and test pit program was completed at properties along Water Street for the purpose of collecting subsurface soil and waste samples for chemical analysis, and for delineating the areal extent of the ash-cinder fill observed at the 131 and 143 Water Street properties. In addition, sediment samples were collected from Eighteenmile Creek between the New York State Barge Canal and Harwood Street, and from the millrace adjacent to the Former Flintkote Plant Site. The map of the project area was modified to include all soil boring locations and all samples collected as part of the Remedial Investigation. All field work was conducted in level D personal protective equipment with dedicated sampling equipment. Specific details of the work completed are described in the following sections.

3.2.1 *Property Inspections*

Prior to collecting any samples, a walk through of each property was conducted to identify sample locations. All sample locations were selected based upon visual observations or the potential for human exposure through direct contact with contaminated environmental media. The surface soil sample locations selected for the 2005 investigation were selected to supplement the analytical data obtained from the surface soil samples collected in 2002.

3.2.2 *Soil Boring and Test Pit Program*

To determine the areal extent of contaminated soil and fill at properties along Water Street, a series of borings were completed during the Remedial Investigation. Three test pits were also completed during the Remedial Investigation in an area where drill rig access was restricted by large trees and rocks. The locations of these borings and test pits are shown on Figure 3-1. The test pit program was completed with standard excavation equipment, while the soil boring program was completed with direct-push technology. During the soil boring program, continuous soil samples were collected with dedicated acetate liners. Each boring was advanced to a depth of 4 feet below ground surface (bgs) or to native soil if waste material was encountered, for the purpose of geologic logging and subsurface soil/waste collection. In general, one sample of fill material from each boring and test pit location was collected and submitted to an analytical laboratory for chemical analysis (see Section 3.2.5 for details).

Subsurface waste samples were also collected from the former White Transportation property and Upson Park using a hand auger. These samples, collected to depths of 10 inches with a hand auger, are shown on Figure 3-2A. One sample of fill material from each location was collected and submitted to an analytical laboratory for chemical analysis (see Section 3.2.5 for details).

3.2.3 *Surface Soil Samples*

To further evaluate the extent of PCB and lead contamination of residential properties along Water Street, additional surface soil samples were collected for chemical analysis. The locations of these samples, along with those collected in 2002, are shown on Figure 3-2B. The 2005 locations were selected to compliment the locations sampled in 2002. Surface soil samples were also collected from the former United Paperboard Company property (Figure 3-2B), the former White Transportation property (Figure 3-2A), and Upson Park (Figure 3-2A). All samples were collected from 0" to 2" depth and submitted to an analytical laboratory for chemical analysis (see Section 3.2.5 for details).

3.2.4 *Sediment Samples*

The historical sediment data set of the Eighteenmile Creek Corridor Site spans an eleven year period. As a result, it is difficult to evaluate spatial trends in this data set. To resolve this issue, sixty-one sediment samples from thirty-two locations were collected by the NYSDEC from Eighteenmile Creek between the New York State Barge Canal and Harwood Street, and from the millrace adjacent to the Former Flintkote Plant Site. The locations of these samples are shown on Figure 3-3. One sample from each location was collected from 0" to 2" depth to evaluate potential exposure to direct contact with creek sediments and

light flooding events. A second sample at each location was collected to depths ranging to 1.1 feet to characterize the total “reservoir” of what may be suspended during a large flood event or has been deposited over time.

During April 2005 the URS Corporation collected nine sediment samples from five locations in the New York State Barge Canal immediately upstream of Eighteenmile Creek (Figure 3-4). These samples were collected as part of the Remedial Investigation of the NYSEG Substation at South Transit Street and State Road in the City of Lockport, Niagara County, New York. Because contaminated canal sediment is a potential source of contamination to Eighteenmile Creek, these data were compiled and evaluated as part of the Remedial Investigation of the Eighteenmile Creek Corridor Site.

3.2.5 *Sample Collection and Analysis*

With the exception of the sample collection discussed in Section 3.2.2 above, all sample collection for the Remedial Investigation was completed by NYSDEC staff utilizing Department owned equipment. Sample analysis was completed by Severn Trent Laboratories, Inc. in Amherst, New York, a NYSDEC contract laboratory. All twenty-seven samples collected during 2002 were analyzed for lead, with fifteen of the samples also analyzed for PCBs. Four waste samples and one surface soil sample were also analyzed for lead using the Toxicity Characteristic Leaching Procedure (TCLP) to determine if these samples were characteristic hazardous waste. All 109 samples collected during 2005 were analyzed for arsenic, chromium, copper, lead, zinc and PCBs, with 21 surface and subsurface waste samples additionally analyzed for semivolatile organic compounds and TAL metals. Chromium, copper and zinc were added to the parameter list for the 2005 investigation because, like lead, the sediment criteria for these contaminants were exceeded in a large number of historic sediment samples from Eighteenmile Creek and the millrace. Arsenic was added to the parameter list because this contaminant was detected in a large percentage of waste samples collected from the Former Flintkote Plant Site. Information concerning sample collection and analysis is given in Table 3-1.

3.2.6 *Mapping*

A map of the Former Flintkote Plant Site was prepared by the NYSDEC as part of its 1999 Site Investigation. The area mapped included the Flintkote property boundaries; Flintkote buildings; the shoreline of the island, millrace, and Eighteenmile Creek in the vicinity of the Site; all soil boring and monitoring well locations; and the locations of all samples collected as part of the Site Investigation. For the March 2003 Sampling Report concerning the Water Street properties, the Flintkote map was expanded to the New York

State Barge Canal by digitizing City of Lockport tax maps. All samples collected during 2002 were located using a tape measure and plotted on the expanded map. As part of the Remedial Investigation of the Eighteenmile Creek Corridor Site, the map was further modified to include the locations of all borings completed and samples collected as part of the investigation.

3.2.7 *Report Preparation*

This report was prepared to describe the activities completed during the Remedial Investigation of the Eighteenmile Creek Corridor Site; present the analytical results of the samples collected during the investigation; discuss how the results relate to known contamination at the Former Flintkote Plant Site and other sites along the creek (i.e., the White Transportation property, the former United Paperboard Company property and Upson Park); and present recommendations for further evaluation, study and remedial work.

4.0 PREVIOUS INVESTIGATIONS OF POTENTIAL SOURCE AREAS

Several sites adjacent to the Eighteenmile Creek Corridor Site are known or suspected contributors of contaminants to Eighteenmile Creek. As a result, a brief description and history of these sites will be included in this section, along with a summary of previous evaluations and investigations completed at these sites.

4.1 Former Flintkote Plant Site

4.1.1 *Site Description*

The Former Flintkote Plant consisted of property at 198, 225 and 300 Mill Street in the City of Lockport, Niagara County, New York (Figure 1-2). Only the property at 198 and 300 Mill Street has been investigated. The site is bordered by Eighteenmile Creek to the west, Mill Street to the east, a commercial property to the north and vacant land of the former United Paperboard Company to the south (Figure 1-2). The Flintkote property was formerly operated as a felt and composite laminate plant, but is now vacant and in disrepair. Residential property is located west of the site across Eighteenmile Creek and east of the site across Mill Street. The site is bisected by William Street (Figure 1-2), which divides the site into north (300 Mill Street) and south portions (198 Mill Street). William Street is no longer open to vehicular traffic, but pedestrian use is common.

As shown on Figure 1-2, Eighteenmile Creek is diverted westward from its apparent natural course for approximately 300 feet along William Street by a dam approximately ten feet high. William Street is located on top of this dam. The creek then continues northward through cross-culverts beneath William Street to return to its original natural channel farther downstream. A pair of sluice gates are located at the east end of the dam and formerly allowed water from Eighteenmile Creek to enter a millrace. These sluice gates have been closed for at least thirty years. The millrace runs along the west side of the buildings at 300 Mill Street and empties into Eighteenmile Creek approximately 600 feet downstream (Figure 1-2). The millrace now contains a sluggish stream approximately six inches to one foot deep.

4.1.2 *Site History*

Flintkote began operations as a manufacturer of felt and felt products in 1928 when the property was purchased from the Beckman Dawson Roofing Company. In 1935, Flintkote began production of sound-deadening and tufting felt for installation and use in automobiles. Manufacturing of this product line was continued at Flintkote until December 1971, when operations ceased and the plant closed. It is also believed that Flintkote manufactured composite laminates similar to those produced at the Former Spaulding

Composites Company, in Tonawanda, New York. Such material was observed in the southernmost demolished building on the 198 Mill Street Property.

A portion of the property at 300 Mill Street near William Street and Eighteenmile Creek was formerly listed as Site No. 932072 in the Registry of Inactive Hazardous Waste Disposal Sites in New York State, and assigned a Classification Code of 3. This classification is given to sites that do not present a significant threat to public health or the environment and that further action can be deferred. The basis for listing the site in the Registry was the presence of seven drums containing sweepings, solid materials and PCB transformer oil stored in the basement of an on-site building. During an inspection of the site on May 12, 1983 the drums were observed to be stored in accordance with federal regulations. Analysis of the waste oil (March 1983) indicated that none of the oil contained more than 2 ppm of PCBs. In January 1984 the owner of the property had these drums removed from the site by a waste oil processor. As a result of this action the site was removed from the Registry in 1985.

In 1989, the City of Lockport Building Inspection Department reported that a number of drums containing chemicals were found in various locations throughout the buildings at 300 Mill Street. Subsequent investigation revealed that 28 of these drums contained hazardous wastes. These drums were disposed off site in May 1991 during a NYSDEC Drum Removal Action.

4.1.3 Previous Investigations

Analytical results of two ash samples from the Island (Figure 1-2) were included in an April 1996 NYSDEC study entitled “*Trackdown of Chemical Contaminants to Lake Ontario from New York State Tributaries*”. These samples contained mercury, dioxins and furans. As a result, the Former Flintkote Plant Site was cited by the NYSDEC Division of Water as a potential source of contaminants to Eighteenmile Creek. Two ash samples from the island were also collected by the Division of Environmental Remediation in August 1996. Both samples failed the TCLP Regulatory Limit for lead, making the ash a characteristic hazardous waste (D008). The findings and conclusions of the April 1996 study, and the results of the August 1996 sampling event, indicated that additional investigation of the site was required.

In late 1999 the NYSDEC conducted a Site Investigation of the Flintkote property, with the results of that investigation presented in a September 2000 report entitled “*Site Investigation Report, Former Flintkote Plant Site*”. This investigation revealed that the Flintkote property received various wastes, refuse and debris over the years, with much of these wastes being visible at the surface and along the embankments

of Eighteenmile Creek and the millrace. The subsurface investigation revealed that most of the waste at the site is ash containing glass, coal, coke, slag, ceramic, bottles, brick, buttons and wood. The thickness of this ash is variable, ranging from 0.9 to 23.1 feet. This waste material covers an area of approximately 3.6 acres.

During the Site Investigation, eighteen subsurface ash samples were analyzed for hazardous waste characteristics using the Toxicity Characteristic Leaching Procedure. Seven of these samples failed the TCLP Regulatory Limit for lead, indicating that some ash at the site is characteristic hazardous waste (D008). One ash sample also failed the TCLP Regulatory Limit for cadmium. The ash also contains numerous semivolatile (primarily PAHs) and inorganics compounds at concentrations above the NYSDEC's TAGM 4046 soil cleanup objectives. These exceedances were documented in waste samples collected throughout the site and are not restricted to those samples that are characteristic hazardous waste. Eleven ash samples were also analyzed for PCBs, with seven of these samples containing PCBs at concentrations ranging from 22J to 6,840 µg/kg (parts per billion). None of these concentrations, however, exceeded the 10,000 µg/kg TAGM 4046 soil cleanup objective.

In late 2003 Niagara County conducted a Site Investigation of the Former Flintkote Plant Site under the NYSDEC's Brownfield Program to further define the nature and extent of contamination at the site by filling in data gaps in the NYSDEC's 1999 investigation. The results of the County's investigation are presented in a July 2005 report entitled "*Site Investigation Report, Former Flintkote Site*", and are consistent with the results obtained by the NYSDEC. The combined investigations suggest that approximately 46,500 cubic yards of ash fill exist at the site.

In March 2006 the NYSDEC issued a Record of Decision for the Former Flintkote Plant Site. The major elements of the selected remedy are summarized as follows:

- Construction of a minimum 2 foot thick, clean soil cover with demarcation layer over the non-hazardous fill materials on the 300 Parcel of the site;
- Excavation of hazardous fill materials to native soils or bedrock (where native soils are absent) on the 198 Parcel, Island and Water Street Section (WSS) of the site. These materials would be disposed off-site in an approved facility;
- Removal of sediments from the Building C sump and trench drain, and evaluate options to

address sediments in the Building D deep basement;

- Removal of sediment from a portion of an outfall pipe to Eighteenmile Creek and closure of the pipe in place;
- Abatement of asbestos containing materials (ACMs). These materials would be disposed off-site in an approved facility;
- Demolition of all buildings to four feet below grade. Removal of C&D debris from exterior portions of the site. These materials would be disposed off-site in an approved facility;
- Installation of a minimum 2 foot thick, clean soil cover with demarcation layer over the demolished building footprint; and
- A remedial design program to provide the details necessary to implement the remedial program.

4.2 White Transportation

4.2.1 *Location and Description*

The White Transportation property is located at 30-40 Mill Street in the City of Lockport, Niagara County, New York (Figure 1-2). The property is bounded to the north by Clinton Street, to the east by Mill Street, to the south by the New York State Barge Canal and property owned by New York State, and to the west by forested vacant land owned by New York State. The East Branch of Eighteenmile Creek flows through the western portion of the property (Figure 1-2). The subject property is approximately 2.6 acres in size and consists of four (4) adjoining parcels that are currently zoned for commercial use. The parcels are irregularly shaped and have approximately 375 feet of frontage along Mill Street and 330 feet of frontage along Clinton Street. The section, block, and lot (SBL) numbers assigned to the four parcels include 109.10-1-58, 109.10-1-59, 109.10-1-60 and 109.10-1-61. There is a single-story concrete block building on the property that encompasses approximately 5,915 ft². A review of historical maps and tax records indicates that the structure was built in 1901 with an addition to the western end completed in the early 1950s. The building is currently vacant, but in the recent past was used to store tractor-trailer trucks and various other equipment associated with former trucking operations.

The surface topography of the White Transportation property is terraced, with three (3) different levels descending in elevation from approximately 495 feet above mean sea level (AMSL) along the southeastern property margin to approximately 480 feet AMSL along Clinton Street. In the vicinity of the East Branch of Eighteenmile Creek the property slopes steeply downward to the stream channel, which occurs at an elevation of approximately 465 feet AMSL.

4.2.2 Site History

The history of the White Transportation property was elucidated through a review of Sanborn Fire Insurance Maps, a 1908 Niagara County Historical Atlas, aerial photographs, R.L. Polk directories and records from the City of Lockport Assessor's Office. These sources indicate that the northern portion of the subject property operated as the New York Cotton Bating Company from at least 1909 until at least 1920, as the James O Ring Company during the early 1940's, and White Transportation from 1948 until the late 1990's when operations ceased. Use of this portion of the subject property during the 1920's and 1930's is unknown. The southern portion of the subject property operated as the Niagara Paper Mills from at least 1875 until approximately 1898, as a box factory by D.C. Graham in at least 1903, as a cold storage facility by L. Huston from at least 1903 until at least 1937, as the Lockport Leather Board Company from at least 1909 until sometime prior to September 1914, as the Simon William Brewery from at least 1940 to 1952, and White Transportation from 1952 until the late 1990's when operations ceased. Additional detail concerning the history of this property can be found in Appendix A, while the Sanborn Fire Insurance Maps can be found in Appendix B.

As of November 2005 the entire subject property was owned by Gertrude W. White, who purchased portions of the property in 1958 (109.10-1-60 and 109.10-1-61), 1990 (109.10-1-58) and an unknown date (109.10-1-59).

4.2.3 Previous Investigations

In 2002 TVGA Engineering, Surveying, P.C. (TVGA) was retained by the Niagara County Department of Planning, Development and Tourism to complete a Phase I Environmental Site Assessment (ESA) of the White Transportation property. This Phase I ESA was completed in connection with the County's efforts to redevelop the historic mill district along Eighteenmile Creek, and was funded through a U.S. Environmental Protection Agency (USEPA) Brownfields Assessment Demonstration Pilot grant. The results of the Phase I ESA were presented in an August 2002 report entitled "*Phase I Environmental Site Assessment Report for White Transportation*". In addition, the NYSDEC completed a site reconnaissance

on November 3, 2005 as part of the Eighteenmile Creek Corridor Remedial Investigation. The significant findings of the ESI and 2005 reconnaissance are summarized as follows:

- Historical record sources indicated the presence of a gasoline UST and associated dispensing facility on the subject property to the north of the existing structure in 1950.
- The subject property appears on the New York State Petroleum Bulk Storage (PBS) list as a registered PBS facility. The PBS records indicate that the site contained four (4) USTs that were either closed in place or removed prior to 1991, and currently contains one (1) 10,000-gallon diesel fuel UST and one (1) 275-gallon waste oil AST.
- Two (2) fill ports were observed in a concrete pad located in the center of the parking lot north of the existing structure, while two (2) fuel dispensers were observed south of this pad. A former employee at the trucking facility indicated that two (2) 4,000-gallon diesel fuel USTs located in this area were closed in place (filled with sand) in the 1980's.
- Two (2) fill ports were also observed in an area of mounded earth located on the south side of the existing building. The former employee of the trucking facility indicated that two (2) diesel USTs were formerly located in this area, but were removed and replaced with one (1) 10,000-gallon diesel UST in the 1980's. He also indicated that the 10,000-gallon diesel UST is not currently being used and contains approximately 275 gallons of product.
- An AST was noted on the south side of the building that was said to contain fuel oil. No leakage or staining was noted on or in the vicinity of this tank. The employee interviewed indicated that there was another fuel oil AST that was formerly located on the property, but was removed in the 1980s. However, no documentation of this tank was discovered during the records review.
- The subject property is not a New York State Chemical Bulk Storage (CBS) facility.
- An interview with a neighboring property owner indicated the possibility that fill originating from the Former Flintkote Plant Site was deposited on the subject property approximately 20 years ago.

- Based upon field reconnaissance of the subject property and interviews, operation of the former truck terminal included truck maintenance activities involving the use and storage of new and used petroleum products and other automotive fluids. Waste water generated within the building from vehicle and facility maintenance activities was reportedly intercepted by floor drains that discharge to a sediment trap, and ultimately to Eighteenmile Creek. Visual observations of the sediment trap and the orientation of the piping that enters and exits this structure support this conclusion.
- At least one of two truck trailers remaining on site contains drums and containers of various sizes. Two 55-gallon drums were lying on their sides outside the trailer during the November 3, 2005 reconnaissance. Both drums appeared to be full.
- Areas of solid waste disposal consisting of automobile/truck parts, scrap metal, deteriorated 55-gallon drums and other containers, fuel tanks, and wood and concrete debris were observed along the western and southern margins of the property, paralleling the Eighteenmile Creek stream channel on both banks.
- Suspect fill material was noted along the eastern bank of Eighteenmile Creek, while slag and cinder fill material was observed on the ground surface across much of the subject property.
- Visual evidence of past discharges of residual material from tanker trailers was observed on the ground surface along the western margin of the on-site parking lot.
- Two (2) electrical transformers were observed in the southeastern corner of the property, two (2) transformers were noted in the center of the property, and one (1) transformer was visible along Mill Street just south of the building. All of these transformers were pole-mounted units, and no evidence of leakage was noted in the vicinity of these units during the TVGA site visit.

4.3 United Paperboard Company

4.3.1 *Location and Description*

The former United Paperboard Company consisted of property at 62 and 70 Mill Street in the City of Lockport, Niagara County, New York (Figure 1-2). The property is bounded to the north by the Former

Flintkote Plant Site, to the east by Mill Street, to the south by Clinton Street and to the west by Water Street and residential properties. Eighteenmile Creek flows through the western portion of the property (Figure 1-2). The subject property is approximately 4.8 acres in size and consists of two adjoining parcels separated by Olcott Street. The parcels are irregularly shaped and have approximately 900 feet of frontage along Mill Street, 515 feet of frontage along Clinton Street, 780 feet of frontage along Water Street and 390 feet of frontage along the residential properties. The section, block, and lot (SBL) numbers assigned to the two parcels are 109.10-1-57 and 109.06-3-11.

The surface topography of the United Paperboard Company property is generally flat along Mill Street and slopes steeply downward toward Eighteenmile Creek. The Water Street portion of the property also slopes steeply downward toward the creek. The property has an elevation that ranges from approximately 470 to 490 feet above mean sea level (AMSL) based upon USGS topographic mapping of the area.

4.3.2 *Site History*

The history of the United Paperboard Company property was elucidated through a review of Sanborn Fire Insurance Maps, aerial photographs and tax records from Niagara County. These sources indicate that the subject property operated in the late 1880's and early 1890's as a lumber company, and as a paper company from the late 1890's to at least 1948. The history of the property after that time is unknown, although the portion near the Clinton Street/Mill Street intersection is currently occupied by Duraline Abrasives. Additional detail concerning the history of this property can be found in Appendix A, while the Sanborn Fire Insurance Maps can be found in Appendix B.

As of November 2005 the subject property was owned by Tri-Side LLC of Lockport, New York.

4.3.3 *Previous Investigations*

Previous investigations have not been completed at the United Paperboard Company property.

4.4 *Upton Park*

4.4.1 *Location and Description*

Upton Park occupies property on Clinton Street in the City of Lockport, Niagara County, New York (Figure 1-2). The property is bounded to the north by Clinton Street, to the east by property owned by New York State, to the south by the New York State Barge Canal and property owned by New York State,

and to the west by wooded, vacant land (Figure 1-2). The subject property is approximately 5.9 acres in size and consists of one (1) parcel. The parcel is irregularly shaped and has approximately 825 feet of frontage along Clinton Street. The section, block, and lot (SBL) number assigned to the parcel is 109.10-1-76.

The surface topography of the Upson Park property slopes downward from Clinton Street to a large parking area, which is relatively flat. From the parking area the property slopes steeply downward toward Eighteenmile Creek and steeply upward to the west. The property has an elevation that ranges from approximately 490 to 530 feet above mean sea level (AMSL) based upon USGS topographic mapping of the area.

4.4.2 *Site History*

The history of the Upson Park property was elucidated through a review of Sanborn Fire Insurance Maps, aerial photographs and tax records from Niagara County. These sources indicate that the subject property operated in the mid 1880's as a canal boat building company. By 1892 the canal boat company was no longer in operation, but a pulp mill and pulp company were operating on the property. The pulp mill operated until sometime between 1919 and 1928, while the pulp company operated until at least 1928. The pulp company was in ruins by 1948. The history of the property after that time is unknown. Additional detail concerning the history of this property can be found in Appendix A, while the Sanborn Fire Insurance Maps can be found in Appendix B.

As of November 2005 the subject property was owned by the City of Lockport. It is not known, however, when the city initially purchased the property.

4.4.3 *Previous Investigations*

Previous investigations have not been completed at the Upson Park property.

5.0 INVESTIGATION RESULTS

A brief description of the activities completed during the Remedial Investigation was presented in Section 3.0. In this section, a detailed evaluation of the observations made during the property inspections, and the analytical results obtained from the samples, are presented.

5.1 Property Inspections and Sample Collection

On April 16, 2002 the NYSDEC collected four samples from the property at 143 Water Street. This property was sampled due to its close proximity to the Former Flintkote Plant Site, and because of the potential for contaminants to migrate onto the property from Eighteenmile Creek during flood events. The sampling team consisted of individuals from the New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Niagara County Health Department (NCHD).

Prior to collecting any samples, a walk through of the property was conducted to identify sample locations. During this reconnaissance, ash fill (Figure 5-1) was observed at the surface of a small ridge along Eighteenmile Creek on a small strip of wooded property (Figure 5-2). Tax records indicate that this property is part of the former Flintkote property that is now owned by Niagara County. Extensive ash fill was also observed in the bank of Eighteenmile Creek (Figure 5-3).

A small vegetable garden in the backyard was also inspected; buttons, coal and glass were observed. When asked, the property owners informed us that the garden was rototilled in place. The portion of the yard that floods during high water events was also identified.

As a result of the property inspection, four sample locations were selected (SS-1 through S-4). These sample locations, shown on Figure 3-2B, were selected based upon visual observations or the potential for human exposure through direct contact or ingestion.

On July 23, 2002 the NYSDEC collected fifteen samples from eight properties along Water Street, one sediment sample from Eighteenmile Creek and two waste samples from the former United Paperboard Company property south of the Former Flintkote Plant Site. The Water Street properties were sampled to determine the extent of contamination identified during the April 2002 sampling event, while the sediment sample was collected to determine upstream contaminant concentrations. The waste samples were collected to determine if the ash observed on the former United Paperboard Company property was similar chemically

to the ash at the adjacent Former Flintkote Plant Site. The sampling team for the second sampling event consisted of individuals from the NYSDEC, NYSDOH and NCHD.

Prior to collecting any samples, a walk through of the properties was conducted to identify sample locations. During this reconnaissance, extensive ash, slag and cinder fill was observed throughout the 131 and 143 Water Street properties. Based upon ground surface elevation differences (Figure 5-4), this fill was estimated to be at least 3 feet thick. Extensive ash fill was also observed along the entire eastern bank of Eighteenmile Creek from Olcott Street to the Former Flintkote Plant Site. Fill material intermixed with soil was observed at the 99, 113 and 117 Water Street properties. The small vegetable garden in the backyard of 143 Water Street was no longer being utilized and was overgrown with grass and weeds.

As a result of the property inspections, eighteen sample locations were selected (SS-5 through SS-21 and SED-6). These sample locations, shown on Figures 3-2B and 3-3, were selected based upon visual observations or the potential for human exposure through direct contact or ingestion. Nineteen additional surface soil samples (SS-25 thru SS-44) were collected from the residential properties between November 1 and November 3, 2005 to further delineate the extent of surface soil contamination identified in 2002. These sample locations are shown on Figure 3-2B. To characterize the fill material observed on the residential properties during the property inspections, twenty soil borings (SB-4 thru SB-23) were completed during the Remedial Investigation. The locations of these borings are shown on Figure 3-1.

On November 7, 2002 during an inspection of Eighteenmile Creek to identify potential sampling locations, individuals from the NYSDEC and NCHD discovered a fenced in containment structure immediately downstream of the Clinton Street dam. This structure may have housed transformers and/or capacitors, which historically contained PCB oil. As a result, this area was identified as a potential source of PCBs to Eighteenmile Creek. To evaluate this potential, two surface soil samples (SS-22 and SS-24) and three sediment samples (SED-7 through SED-9) were collected from this area on November 26, 2002. These sample locations are shown on Figures 3-2B and 3-3. To further evaluate this area, three test pits were completed on September 28, 2005. One surface and three subsurface soil samples were collected for analysis. These sample locations are shown on Figures 3-1 and 3-2B.

Collection of sediment samples from Eighteenmile Creek and the millrace began on September 13, 2005 and was completed on September 22, 2005. In total, sixty-one samples were collected for analysis. These sample locations, shown on Figure 3-3, were selected to better define the nature and extent of sediment

contamination in the creek and millrace. The sampling team for this sampling event consisted of individuals from the NYSDEC.

Prior to collecting any samples, a walk along the creek and millrace was conducted to identify sample locations. During this reconnaissance, extensive slag and cinder fill (Figures 5-5 and 5-6) was observed throughout the White Transportation property, while reddish-brown, ash-like fill containing glass, metal fragments, brick fragments, rubber and buttons (Figures 5-7 and 5-8) was observed on the Upson Park property along Eighteenmile Creek. In addition, ash and slag fill was observed on the former United Paperboard Company property between the Clinton Street dam and Olcott Street on the west side of the creek.

As a result of these findings, two sample locations were selected from the White Transportation property (WHITE-1 and WHITE-2) and two sample locations were selected from the Upson Park property (UPSON-1 and UPSON-2). These sample locations are shown on Figure 3-2A. To evaluate the fill on the former United Paperboard Company property, five soil borings and three test pits were completed during the Remedial Investigation. The locations of these borings and test pits are shown on Figure 3-1. Samples were collected from these three properties to determine if the fill materials could be contributing to the contamination of Eighteenmile Creek and millrace sediment.

5.2 Nature and Extent of Contamination

5.2.1 *Eighteenmile Creek and Millrace Sediment*

Sixty-one sediment samples from thirty-two locations in Eighteenmile Creek and the millrace were collected during the Remedial Investigation. The locations of these samples are shown on Figure 3-3. These samples were collected to define the nature and extent of sediment contamination in Eighteenmile Creek between the New York State Barge Canal and Harwood Street, and in the millrace adjacent to the Former Flintkote Plant Site. The number of samples collected, along with the dates of sample collection, are summarized as follows: one sample (SED-6) was collected on July 23, 2002; three samples (SED-7 through SED-9) were collected on November 26, 2002; one sample (SED-FS) was collected on September 11, 2003; one sample (SED-22) was collected on April 19, 2005; one sample (SED-37) was collected on April 26, 2005; two samples (SED-22 and SED-37) were collected on June 16, 2005; and fifty-two samples (SED-10 through SED-21, and SED-23 through SED-44) were collected between September 13 and September 22, 2005 (Table 3-1). All samples were submitted to Severn Trent Laboratories for chemical analysis of PCBs, arsenic, chromium, copper, lead and zinc (Table 3-1). The analytical results for these samples are summarized in Table 5-1.

5.2.1.1 Polychlorinated Biphenyls (PCBs)

The PCB results were evaluated using two independent sediment assessment protocols. The first sediment criterion was developed from the NYSDEC publication entitled “*Technical Guidance for Screening Contaminated Sediments*”, Division of Fish and Wildlife, January 1999. This document contains guidance values for several levels of protection including: (1) human health bioaccumulation, (2) wildlife bioaccumulation, (3) acute toxicity to benthic aquatic life, and (4) chronic toxicity to benthic aquatic life. These guidance values are derived using equilibrium partitioning methodology and are calculated as a function of the organic carbon content of the sediment being evaluated. Using historic Division of Water sediment sampling data (total organic carbon was not analyzed during the 2005 Remedial Investigation), the mean total organic carbon content was determined to be 3.14%. Using this value, along with the guidance values from the “*Technical Guidance for Screening Contaminated Sediments*” publication, the sediment criterion were calculated as follows:

- human health bioaccumulation: 0.0251 µg/kg;
- wildlife bioaccumulation: 44.0 µg/kg;
- acute toxicity to benthic aquatic life: 86,689 µg/kg; and
- chronic toxicity to benthic aquatic life: 606.0 µg/kg.

For this investigation, the sediment criterion to protect benthic aquatic life from chronic toxicity was utilized. There are two reasons for this choice. First, the sediment criteria calculated for wildlife and human health bioaccumulation are at or below the quantitation limit of the laboratory, meaning that concentrations can not be accurately determined at these concentrations. Second, the sediment criteria calculated for acute toxicity to benthic aquatic life exceeds the hazardous waste criterion for PCBs of 50,000 µg/kg.

The second sediment criterion was obtained from the NYSDEC publication entitled “*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*”, Division of Environmental Remediation, October 1995. Although the soil cleanup objectives in this publication are not intended for use with sediments, they are appropriate in this case because the deposition of contaminated sediment onto residential properties during flooding events could potentially result in direct human contact exposures. As a result, the surface soil PCB cleanup objective of 1,000 µg/kg was utilized in this investigation as a sediment criterion.

PCBs were detected in fifty-eight of the sixty-one samples at concentrations ranging from 7.0J to

1,400,000 µg/kg (Table 5-1). The principal aroclors detected were 1248, 1254 and 1260. Aroclor 1242 was also detected in several samples. Thirty-eight of the samples contained PCBs at concentrations that exceeded the NYSDEC sediment criterion for chronic toxicity to benthic aquatic life. The majority of these samples (31) also exceeded the NYSDEC TAGM 4046 surface soil cleanup objective. Additionally, seven samples at four locations (SED-22, SED-28, SED-34 and SED-37; Figure 3-3) contained PCBs at concentrations that exceeded the 50,000 µg/kg hazardous waste criterion.

To determine if there were any spatial trends for PCBs in the sediment data, the sample locations were plotted in different colors, with black representing no exceedances of the sediment criteria, magenta representing exceedances of the sediment criteria and green representing exceedances of the hazardous waste criterion (Figure 5-9). Figure 5-9 shows that sediment in Eighteenmile Creek between the New York State Barge Canal and the Clinton Street dam, with the exception of the two sediment locations from the east side of the mill pond, contained PCBs at concentrations below the NYSDEC sediment criterion for chronic toxicity to benthic aquatic life and the NYSDEC TAGM 4046 surface soil cleanup objective. The PCB concentrations of these samples ranged from ND to 506J µg/kg, while the PCB concentrations at the two locations that exceeded the NYSDEC sediment criteria ranged from 730J to 8,600 µg/kg (Table 5-1).

PCB concentrations increase downstream of the Clinton Street dam and generally remain elevated throughout the remainder of the Eighteenmile Creek Corridor Site. Figure 5-9 shows that sediment in Eighteenmile Creek between the Clinton Street dam and Olcott Street contained PCBs at concentrations that exceeded the NYSDEC sediment criteria. The PCB concentrations in sample SED-22 (201,000 and 1,400,000 µg/kg; Table 5-1) also exceeded the hazardous waste criterion. The PCB concentrations of the remaining samples ranged from 840 to 12,300 µg/kg (Table 5-1).

Figure 5-9 also shows that sediment in Eighteenmile Creek between Olcott and William Streets, with the exception of samples SED-30, SED-42 and SED-FS, contained PCBs at concentrations that exceeded the NYSDEC sediment criteria. The PCB concentrations of these samples ranged from 639J to 16,800 µg/kg, while the PCB concentrations of the samples that did not exceed the NYSDEC sediment criteria ranged from ND to 420J µg/kg (Table 5-1). The PCB concentration in the deep sample collected from the SED-28 location (150,000J µg/kg; Table 5-1) also exceeded the hazardous waste criterion.

Only one location from Eighteenmile Creek between William and Harwood Streets was sampled, while five locations were sampled from the millrace. Figure 5-9 shows that five of the six sediment locations

sampled from Eighteenmile Creek and the millrace contained PCBs at concentrations that exceeded the NYSDEC sediment criteria. The PCB concentrations in the deep samples collected from the SED-34 (390,000 $\mu\text{g}/\text{kg}$; Table 5-1) and SED-37 (66,000 to 234,000 $\mu\text{g}/\text{kg}$; Table 5-1) locations also exceeded the hazardous waste criterion. The PCB concentrations of the remaining samples that exceeded the sediment criteria ranged from 2,200 to 49,000 $\mu\text{g}/\text{kg}$ (Table 5-1).

5.2.1.2 Arsenic

Exceedances of the NYSDEC sediment criterion for arsenic are illustrated on Figure 5-10. This figure shows that only one sample location (SED-29) within the Eighteenmile Creek Corridor Site contained arsenic at a concentration (50.5 mg/kg ; Table 5-1) that exceeded the NYSDEC sediment criterion (33.0 mg/kg) for the severe effect level. Arsenic, however, was detected in all fifty-seven samples analyzed for this contaminant, with the concentrations in the samples that did not exceed the NYSDEC sediment criterion ranging from 1.5 to 26.9 mg/kg (Table 5-1).

5.2.1.3 Chromium

Exceedances of the NYSDEC sediment criterion for chromium are illustrated on Figure 5-11. This figure shows that only one sample location (SED-29) within the Eighteenmile Creek Corridor Site contained chromium at a concentration (121 mg/kg ; Table 5-1) that exceeded the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. Chromium, however, was detected in all fifty-seven samples analyzed for this contaminant, with the concentrations in the samples that did not exceed the NYSDEC sediment criterion ranging from 2.8 to 82.1 mg/kg (Table 5-1).

5.2.1.4 Copper

Exceedances of the NYSDEC sediment criterion for copper are illustrated on Figure 5-12. This figure shows that sediment in Eighteenmile Creek between the New York State Barge Canal and Clinton Street, with the exception of the sample collected from the SED-12 location, contained copper at concentrations below the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. The copper concentrations of these samples ranged from 31.3 to 86.8 mg/kg , while the copper concentrations of the two samples at the SED-12 location were 528 and 250 mg/kg for the shallow and deep samples, respectively (Table 5-1).

Copper concentrations increase downstream of Clinton Street and generally remain elevated throughout the remainder of the Eighteenmile Creek Corridor Site. Figure 5-12 shows that sediment in

Eighteenmile Creek between Clinton and Olcott Streets contained copper at concentrations that exceeded the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. There were three locations (SED-14, SED-16 and SED-20), however, where at least one sample did not exceed the NYSDEC sediment criterion. The copper concentrations of these samples ranged from 20.5 to 106 mg/kg (Table 5-1). For the samples that exceeded the NYSDEC sediment criterion, the copper concentrations ranged from 110 to 980 mg/kg (Table 5-1).

Figure 5-12 also shows that sediment in Eighteenmile Creek between Olcott and William Streets, with the exception of samples SED-23, SED-27, SED-30 and SED-32, contained copper at concentrations that exceeded the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. The copper concentrations of these samples ranged from 115 to 7,900 mg/kg, while the copper concentrations of the samples that did not exceed the NYSDEC sediment criterion ranged from 31.5 to 90.0 mg/kg (Table 5-1).

Only one location from Eighteenmile Creek between William and Harwood Streets was sampled, while five locations were sampled from the millrace. Figure 5-12 shows that all six sample locations contained copper at concentrations that exceeded the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. There were three locations (SED-34, SED-35 and SED-20), however, where at least one sample did not exceed the NYSDEC sediment criterion. The copper concentrations of these samples ranged from 75.5 to 85.1 mg/kg (Table 5-1). For the samples that exceeded the NYSDEC sediment criterion, the copper concentrations ranged from 123 to 6,300 mg/kg (Table 5-1).

5.2.1.5 Lead

Exceedances of the NYSDEC sediment criterion for lead are illustrated on Figure 5-10. This figure shows that every sample location within the Eighteenmile Creek Corridor Site, with the exception of sample location SED-44 (60.0 mg/kg), contained lead at concentrations that exceeded the NYSDEC sediment criterion (110 mg/kg) for the severe effect level. There were three additional locations (SED-14, SED-30 and SED-35) where at least one sample did not exceed the NYSDEC sediment criterion. The lead concentrations of these samples ranged from 15.3 to 71.6 mg/kg (Table 5-1). For the samples that exceeded the NYSDEC sediment criterion, the lead concentrations ranged from 116 to 25,400 mg/kg (Table 5-1).

5.2.1.6 Zinc

Exceedances of the NYSDEC sediment criterion for zinc are illustrated on Figure 5-14. This figure shows that eight of thirteen sample locations in Eighteenmile Creek between the New York State Barge Canal

and Olcott Street contained zinc at concentrations that exceeded the NYSDEC sediment criterion (270 mg/kg) for the severe effect level. The zinc concentrations of these samples ranged from 283 to 2,310 mg/kg (Table 5-1). For the samples that did not exceed the NYSDEC sediment criterion, the zinc concentrations ranged from 45.7 to 252 mg/kg (Table 5-1).

Figure 5-14 also shows that sediment in Eighteenmile Creek between Olcott and William Streets, with the exception of samples SED-23, SED-27 and SED-30, contained zinc at concentrations that exceeded the NYSDEC sediment criterion (270 mg/kg) for the severe effect level. There was one additional location (SED-32) where at least one sample did not exceed the NYSDEC sediment criterion. The zinc concentrations of the samples that did not exceed the NYSDEC sediment criterion ranged from 37.1 to 264 mg/kg, while the zinc concentrations of the samples that exceeded the NYSDEC sediment criterion ranged from 284 to 23,600 mg/kg (Table 5-1).

Only one location from Eighteenmile Creek between William and Harwood Streets was sampled, while five locations were sampled from the millrace. Figure 5-14 shows that all six sample locations contained zinc at concentrations that exceeded the NYSDEC sediment criterion (270 mg/kg) for the severe effect level. There were two locations (SED-34 and SED-35), however, where at least one sample did not exceed the NYSDEC sediment criterion. The zinc concentrations of these samples ranged from 178 to 197 mg/kg (Table 5-1). For the samples that exceeded the NYSDEC sediment criterion, the zinc concentrations ranged from 295 to 1,600 mg/kg (Table 5-1).

5.2.2 Residential Surface Soil

Thirty-eight surface soil samples from residential properties along Water Street were collected during the Remedial Investigation. One additional surface soil sample was collected from the 143 Water Street property during the Site Investigation of the Former Flintkote Plant Site. The locations of these samples are shown on Figure 3-2B. These samples were collected to define the nature and extent of surface soil contamination on these residential properties. The number of samples collected, along with the dates of sample collection, are summarized as follows: four samples (SS-1 thru SS-4) were collected on April 16, 2002; fifteen samples (SS-5 and SS-8 thru SS-21) were collected on July 23, 2002; and nineteen samples (SS-25 thru SS-44) were collected between November 1 and November 3, 2005. All samples were submitted to Severn Trent Laboratories for chemical analysis, with the 2002 samples analyzed for PCBs and/or lead, and the 2005 samples analyzed for PCBs, arsenic, chromium, copper, lead and zinc (Table 3-1). The analytical results for these samples are summarized in Tables 5-2 thru 5-9.

Twenty-five of the thirty-eight surface soil samples collected from residential properties during the Remedial Investigation consisted of native topsoil or peat-like soil. The remaining surface soil samples (SS-2, SS-5, SS-12, SS-13, SS-16, SS-18, SS-19, SS-20, SS-28, SS-31, SS-38, SS-41 and SS-44) consisted of fill material containing ash, slag, cinders, coal, brick and/or glass.

The soil cleanup objectives for surface soil were obtained from the NYSDEC publication entitled “*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*”, Division of Environmental Remediation, October 1995. For PCBs, the surface soil cleanup objective is 1,000 µg/kg. For metals, TAGM 4046 allows the use of background concentrations so long as the background samples are collected from areas not impacted by the site and any other source of contaminants. During the Site Investigation of the Former Flintkote Plant Site, two surface soil samples were collected from off-site locations to define background soil concentrations in the vicinity of the site. The metals results from these samples were similar, suggesting that they are representative of background metals concentrations. As a result, the average concentrations of the metals detected in these two samples were used as the Site Background values for the Flintkote Site Investigation. These values were also utilized as the Site Background values for comparison with metals data from surface soil samples collected during the Remedial Investigation of the Eighteenmile Creek Corridor Site.

5.2.2.1 Polychlorinated Biphenyls (PCBs)

PCBs were detected in twenty of the twenty-seven samples in which PCBs were analyzed (Tables 5-2 thru 5-9). The principal aroclors detected were 1248, 1254 and 1260, the same aroclors detected in Eighteenmile Creek sediment. Only five of these samples, however, contained PCBs at concentrations (1,060 to 27,000 µg/kg) that exceeded the NYSDEC TAGM 4046 surface soil cleanup objective (Tables 5-2 thru 5-9). These samples were collected near Eighteenmile Creek (Figure 5-15). For the samples that did not exceed the NYSDEC surface soil cleanup objective, the PCB concentrations ranged from 24J to 740 µg/kg (Tables 5-2 thru 5-9).

5.2.2.2 Arsenic

Arsenic was detected in all twenty-one samples in which this contaminant was analyzed (Tables 5-2 thru 5-9). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for arsenic are illustrated on Figure 5-16. This figure shows that every surface soil sample collected from the residential properties, with the exception of sample locations SS-31 and SS-40, contained arsenic at concentrations that exceeded the NYSDEC soil cleanup objective (7.5 mg/kg). The arsenic concentrations of these samples ranged from

7.7 to 66.5 mg/kg, although most of the samples (14 of 19) contained arsenic at concentrations below 20.0 mg/kg (Table 5-2 thru 5-9). The highest concentration of arsenic (66.5 mg/kg) was detected in sample SS-27 (Table 5-8). For the samples that did not exceed the NYSDEC soil cleanup objective, the arsenic concentrations ranged from 5.3 to 5.8 mg/kg (Tables 5-2 thru 5-9).

5.2.2.3 Chromium

Chromium was detected in all twenty-one samples in which this contaminant was analyzed (Tables 5-2 thru 5-9). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for chromium are illustrated on Figure 5-17. This figure shows that every surface soil sample collected from the residential properties, with the exception of sample locations SS-26, SS-33 and SS-40, contained chromium at concentrations that exceeded the NYSDEC soil cleanup objective (14.0 mg/kg). The chromium concentrations of these samples ranged from 14.4 to 164 mg/kg, although most of the samples (17 of 18) contained chromium at concentrations below 45.0 mg/kg (Tables 5-2 thru 5-9). The highest concentration of chromium (164 mg/kg) was detected in sample SS-29 (Table 5-9). For the samples that did not exceed the NYSDEC soil cleanup objective, the chromium concentrations ranged from 10.7 to 13.1 mg/kg (Tables 5-2 thru 5-9).

5.2.2.4 Copper

Copper was detected in all twenty-one samples in which this contaminant was analyzed (Tables 5-2 thru 5-9). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for copper are illustrated on Figure 5-18. This figure shows that every surface soil sample collected from the residential properties contained copper at concentrations that exceeded the NYSDEC soil cleanup objective (25.0 mg/kg). The copper concentrations of these samples ranged from 32.2 to 2,620 mg/kg, although most of the samples (19 of 21) contained copper at concentrations below 250 mg/kg (Tables 5-2 thru 5-9). The highest concentrations of copper (2,620 and 1,010 mg/kg) were detected in samples SS-10FS and SS-29, respectively (Table 5-9).

5.2.2.5 Lead

Lead was detected in all thirty-nine samples in which this contaminant was analyzed (Tables 5-2 thru 5-9). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for lead are illustrated on Figure 5-19. This figure shows that twenty-two of the samples collected from the residential properties contained lead at concentrations that exceeded the NYSDEC soil cleanup objective (400.0 mg/kg). The lead concentrations of these samples ranged from 438 to 4,630 mg/kg, with eleven of these samples containing lead at concentrations above 1,000 mg/kg (Tables 5-2 thru 5-9). The highest concentrations of lead (3,680 and 4,630 mg/kg) were detected in samples SS-21 and SS-10, respectively (Tables 5-2 and 5-8). For the

samples that did not exceed the NYSDEC soil cleanup objective, the lead concentrations ranged from 29.8 to 387 mg/kg (Tables 5-2 thru 5-9).

5.2.2.6 Zinc

Zinc was detected in all twenty-one samples in which this contaminant was analyzed (Tables 5-2 thru 5-9). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for zinc are illustrated on Figure 5-20. This figure shows that fifteen of the samples collected from the residential properties contained zinc at concentrations that exceeded the NYSDEC soil cleanup objective (254.5 mg/kg). The zinc concentrations of these samples ranged from 255 to 2,390 mg/kg, with six of these samples containing zinc at concentrations above 1,000 mg/kg (Tables 5-2 thru 5-9). The highest concentrations of zinc (1,660 and 2,390 mg/kg) were detected in samples SS-30 and SS-10FS, respectively (Tables 5-8 and 5-9). For the samples that did not exceed the NYSDEC soil cleanup objective, the zinc concentrations ranged from 146 to 231 mg/kg (Tables 5-2 thru 5-9).

5.2.3 Residential Subsurface Soil and Fill

Seventeen subsurface soil and fill samples from residential properties along Water Street were collected during the Remedial Investigation. Two additional subsurface samples were collected from the 143 Water Street property during the Site Investigation of the Former Flintkote Plant Site. The locations of these borings are shown on Figure 3-1, while the locations of the samples are shown on Figures 5-21 thru 5-27. These samples were collected to characterize the fill material observed on the residential properties during the property inspection phase of the investigation. The number of samples collected, along with the dates of sample collection, are summarized as follows: two samples (SP-6 and SP-7) were collected on September 10, 2003 and fifteen samples (SB-4 thru SB-23 not inclusive) were collected between September 27 and October 6, 2005. All samples were submitted to Severn Trent Laboratories for chemical analysis of PCBs, arsenic, chromium, copper, lead and zinc (Table 3-1). Eight of the subsurface samples were also analyzed for semivolatile organic compounds (Table 3-1). The analytical results for these samples are summarized in Table 5-10.

Fourteen of the seventeen subsurface samples collected from residential properties during the Remedial Investigation consisted of fill material containing ash, slag, cinders, coal, brick, and/or glass. The remaining subsurface samples consisted of native soil (SB-4) or creek sediment from the former mill pond (SB-13C and SB-14B).

The soil cleanup objectives for subsurface soil and fill were obtained from the NYSDEC publication entitled “*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*”, Division of Environmental Remediation, October 1995. The soil cleanup objectives for individual semivolatile organic compounds were taken directly from Table 2, while the soil cleanup objective for total semivolatile organic compounds was established at 500,000 µg/kg as described in the TAGM. The subsurface soil cleanup objective for PCBs is 10,000 µg/kg. For metals, the Site Background values obtained during the Site Investigation of the Former Flintkote Plant Site were again utilized for comparison to the subsurface soil and fill samples collected during the Remedial Investigation of the Eighteenmile Creek Corridor Site.

5.2.3.1 Semivolatile Organic Compounds (SVOCs)

Semivolatile organic compounds were detected in seven of the eight samples in which these contaminants were analyzed (Table 5-10). Seventeen SVOCs were detected in these samples with sixteen of these constituents being polycyclic aromatic hydrocarbons (PAHs). Of these compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives (Table 5-10). PAHs are a group of over 100 different chemicals that are ubiquitous in the environment. Sources of PAHs include incomplete combustion of coal, oil, gasoline, garbage and wood from stoves, automobiles and incinerators. PAHs are also found in coal tar, crude oil, creosote, roofing tar, medicines, dyes, plastics and pesticides. Because the fill material encountered at the residential properties consisted of ash, slag, cinders and shingles, the presence of PAHs in the fill material was not unexpected.

One phthalate, bis(2-ethylhexyl)phthalate, was also detected in four of seven subsurface samples collected from the residential properties along Water Street (Table 5-10). The concentrations of this contaminant (43J to 240BJ µg/kg), however, did not exceed the TAGM 4046 soil cleanup objective (50,000 µg/kg). No other SVOCs were detected in the subsurface samples.

Figure 5-21 shows that none of the samples collected from the residential properties contained total SVOCs at concentrations that exceeded the NYSDEC soil cleanup objective (500,000 µg/kg). The total SVOC concentrations of these samples ranged from 80.0 to 73,370 µg/kg (Table 5-10).

5.2.3.2 Polychlorinated Biphenyls (PCBs)

PCBs were detected in seven of the nineteen samples in which PCBs were analyzed (Table 5-10). The principal aroclors detected were 1248, 1254 and 1260. Figure 5-22 shows that none of the samples collected from the residential properties contained PCBs at concentrations that exceeded the NYSDEC subsurface soil cleanup objective (10,000 µg/kg). The PCB concentrations of these samples ranged from 32J to 4,160 µg/kg (Table 5-10). The highest concentration of PCBs (4,160 µg/kg) was detected in sample SB-13 near Eighteenmile Creek (Table 5-10).

5.2.3.3 Arsenic

Arsenic was detected in all nineteen samples in which this contaminant was analyzed (Table 5-10). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for arsenic are illustrated on Figure 5-23. This figure shows that every boring location where subsurface samples were collected, with the exception of boring locations SB-15 and SP-6, contained arsenic at concentrations that exceeded the NYSDEC soil cleanup objective (7.5 mg/kg). The arsenic concentrations of these samples ranged from 8.6 to 24.0 mg/kg (Table 5-10). For the samples that did not exceed the NYSDEC soil cleanup objective, the arsenic concentrations ranged from 3.8 to 6.8 mg/kg (Table 5-10).

5.2.3.4 Chromium

Chromium was detected in all nineteen samples in which this contaminant was analyzed (Table 5-10). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for chromium are illustrated on Figure 5-24. This figure shows that every boring location between 97 and 127 Water Street where subsurface samples were collected contained chromium at concentrations that exceeded the NYSDEC soil cleanup objective (14.0 mg/kg). The chromium concentrations of these samples ranged from 16.3 to 262 mg/kg, although most of the samples (9 of 11) contained chromium at concentrations below 45.0 mg/kg (Table 5-10). The highest concentrations of chromium (262 and 157 mg/kg) were detected in samples SB-10 and SB-13, respectively (Table 5-10). None of the subsurface samples collected from the 131 and 143 Water Street properties contained chromium at concentrations that exceeded the NYSDEC soil cleanup objective. The chromium concentrations in these samples ranged from 5.1 to 9.3 mg/kg (Table 5-10).

5.2.3.5 Copper

Copper was detected in all nineteen samples in which this contaminant was analyzed (Table 5-10). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for copper are illustrated on Figure 5-25. This figure shows that every boring location where subsurface samples were collected, with the exception

of boring locations SB-17, SB-20 and SP-6, contained copper at concentrations that exceeded the NYSDEC soil cleanup objective (25.0 mg/kg). The copper concentrations of these samples ranged from 30.4 to 2,240 mg/kg, although most of the samples (11 of 15) contained copper concentrations below 250 mg/kg (Table 5-10). The highest concentrations of copper (2,240 and 603 mg/kg) were detected in samples SB-11 and SB-13, respectively (Table 5-10). For the samples that did not exceed the NYSDEC soil cleanup objective, the copper concentrations ranged from 20.7 to 24.9 mg/kg (Table 5-10).

5.2.3.6 Lead

Lead was detected in all nineteen samples in which this contaminant was analyzed (Table 5-10). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for lead are illustrated on Figure 5-26. This figure shows that every boring location between 97 and 117 Water Street where subsurface samples were collected, with the exception of boring locations SB-12 and SB-14, contained lead at concentrations that exceeded the NYSDEC soil cleanup objective (400.0 mg/kg). The lead concentrations of these samples ranged from 587 to 1,030 mg/kg, although most of the samples (6 of 7) contained lead concentrations below 1,000 mg/kg (Table 5-10). The highest concentration of lead (1,030 mg/kg) was detected in sample SB-11 (Table 5-10). For the samples collected from the 97 to 117 Water Street properties that did not exceed the NYSDEC soil cleanup objective, lead concentrations ranged from 71.0 to 334 mg/kg (Table 5-10). In addition, none of the subsurface samples collected from the 127, 131 and 143 Water Street properties contained lead at concentrations that exceeded the NYSDEC soil cleanup objective. The lead concentrations in these samples ranged from 5.4 to 169 mg/kg (Table 5-10).

5.2.3.7 Zinc

Zinc was detected in all nineteen samples in which this contaminant was analyzed (Table 5-10). Exceedances of the NYSDEC TAGM 4046 soil cleanup objective for zinc are illustrated on Figure 5-27. This figure shows that every boring location between 97 and 127 Water Street where subsurface samples were collected, with the exception of boring location SB-4, contained zinc at concentrations that exceeded the NYSDEC soil cleanup objective (254.5 mg/kg). The zinc concentrations of these samples ranged from 293 to 2,560 mg/kg, although most of the samples (7 of 10) contained zinc concentrations below 1,000 mg/kg (Table 5-10). The highest concentrations of zinc (2,240, 2,140 and 2,560 mg/kg) were detected in samples SB-10 and SB-13 (two samples), respectively (Table 5-10). For the samples collected from the 97 to 127 Water Street properties that did not exceed the NYSDEC soil cleanup objective, zinc concentrations ranged from 225 to 254 mg/kg (Table 5-10). In addition, none of the subsurface samples collected from the 131 and 143 Water Street properties contained zinc at concentrations that exceeded the NYSDEC soil cleanup

objective. The zinc concentrations in these samples ranged from 19.6 to 172 mg/kg (Table 5-10).

5.3 Potential Source Areas

5.3.1 *New York State Barge Canal*

During April 2005 the URS Corporation collected nine sediment samples from five locations in the New York State Barge Canal immediately upstream of Eighteenmile Creek. These samples were collected as part of the Remedial Investigation of the NYSEG Substation at South Transit Street and State Road in the City of Lockport, Niagara County, New York. The locations of these samples are shown on Figure 3-4, while the analytical results are summarized in Table 5-11.

5.3.1.1 Polychlorinated Biphenyls (PCBs)

PCBs were detected in all nine samples at concentrations ranging from 7.0J to 310,000 µg/kg (Table 5-11). The principal aroclors detected were 1248 and 1254, although aroclor 1242 was detected in three of the samples. Six of the samples contained PCBs at concentrations that exceeded the NYSDEC sediment criterion for chronic toxicity to benthic aquatic life (606.0 µg/kg) and the NYSDEC TAGM 4046 surface soil cleanup objective (1,000 µg/kg). Additionally, two samples (SED-22 and SED-24; Figure 3-4) contained PCBs at concentrations that exceeded the 50,000 µg/kg hazardous waste criterion.

5.3.1.2 Arsenic

Arsenic was detected in all nine samples at concentrations ranging from 3.5 to 8.2 mg/kg (Table 5-11), and are similar to the concentrations of arsenic detected in Eighteenmile Creek sediment (compare Table 5-1 with Table 5-11). None of the arsenic concentrations in canal sediment exceeded the NYSDEC sediment criterion (33.0 mg/kg) for the severe effect level.

5.3.1.3 Chromium

Chromium was detected in all nine samples at concentrations ranging from 8.1 to 61.9 mg/kg (Table 5-11), and are similar to the concentrations of chromium detected in Eighteenmile Creek sediment (compare Table 5-1 with Table 5-11). None of the chromium concentrations in canal sediment exceeded the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level.

5.3.1.4 Copper

Copper was detected in all nine samples at concentrations ranging from 11.1 to 407 mg/kg (Table 5-11). Only the concentration of copper in samples SED-15B (407 mg/kg) and SED-24B (142 mg/kg),

however, exceeded the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. For the remaining samples, copper concentrations ranged from 11.1 to 95.1 mg/kg (Table 5-11), which are similar to the concentrations of copper in many of the Eighteenmile Creek sediment samples (compare Table 5-1 with Table 5-11).

5.3.1.5 Lead

Lead was detected in all nine samples at concentrations ranging from 48.4 to 286 mg/kg (Table 5-11). This table shows that every canal sediment sample, with the exception of samples SED-14B and SED-23B, exceeded the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. The lead concentrations of these samples ranged from 162 to 286 mg/kg, which are similar to the concentrations of lead in many of the Eighteenmile Creek sediment samples (compare Table 5-1 with Table 5-11). The lead concentrations for samples SED-14B and SED-23B were 48.4 and 54.0 mg/kg, respectively (Table 5-11).

5.3.1.6 Zinc

Zinc was detected in all nine samples at concentrations ranging from 46.3 to 427 mg/kg (Table 5-11). Only the concentration of zinc in samples SED-15 (323 mg/kg), SED-15B (377 mg/kg) and SED-22 (427 mg/kg), however, exceeded the NYSDEC sediment criterion (270.0 mg/kg) for the severe effect level. For the remaining samples, zinc concentrations ranged from 46.3 to 194 mg/kg (Table 5-11), which are similar to the concentrations of zinc in Eighteenmile Creek sediment (compare Table 5-1 with Table 5-11).

5.3.2 *Upson Park*

During the property inspections, fill material was observed on the Upson Park property in the embankment along Eighteenmile Creek. This material was a reddish-brown, ash-like fill containing glass, metal fragments, brick fragments, rubber and buttons. As a result of this finding, surface and subsurface fill samples were collected from two locations in the park during the Remedial Investigation. The locations of these samples are shown on Figure 3-2A. These samples were collected to determine if the fill material was a potential source of contaminants to Eighteenmile Creek. All four samples were submitted to Severn Trent Laboratories for chemical analysis of semivolatile organic compounds, PCBs and metals (Table 3-1). The analytical results for these samples are summarized in Table 5-12.

The soil cleanup objectives for surface and subsurface soil were obtained from the NYSDEC publication entitled “*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*”, Division of Environmental Remediation, October 1995. The soil cleanup

objectives for individual semivolatile organic compounds were taken directly from Table 2, while the soil cleanup objective for total semivolatile organic compounds was established at 500,000 µg/kg as described in the TAGM. The surface soil cleanup objective for PCBs is 1,000 µg/kg, while the subsurface soil cleanup objective for PCBs is 10,000 µg/kg. For metals, the Site Background values obtained during the Site Investigation of the Former Flintkote Plant Site were again utilized for comparison to the surface and subsurface soil and fill samples collected from Upson Park during the Remedial Investigation of the Eighteenmile Creek Corridor Site.

5.3.2.1 Semivolatile Organic Compounds (SVOCs)

Semivolatile organic compounds were detected in three of the four samples collected from Upson Park (Table 5-12). Ten SVOCs were detected in these samples with seven of these constituents being polycyclic aromatic hydrocarbons (PAHs). Of these compounds, only benzo(a)pyrene, was detected at a concentration that exceeded the TAGM 4046 soil cleanup objectives (Table 5-12). Three phthalates were also detected in these samples, but at concentrations that did not exceed the TAGM 4046 soil cleanup objectives (Table 5-12). In addition, the total SVOC concentrations did not exceed the TAGM 4046 soil cleanup objective (Table 5-12).

5.3.2.2 Polychlorinated Biphenyls (PCBs)

PCBs were detected in all four samples collected from Upson Park at concentrations ranging from 490J to 80,000 µg/kg (Table 5-12). The principal aroclors detected were 1254 (2 samples) and 1260 (2 samples). Both surface samples, and one of the subsurface samples, contained PCBs at concentrations that exceeded the NYSDEC TAGM 4046 soil cleanup objectives. In addition, the subsurface sample from the UPSON-2 location contained PCBs at a concentration that exceeded the 50,000 µg/kg hazardous waste criterion (Table 5-12).

5.3.2.3 Metals

Eighteen metals were detected in the fill samples collected from Upson Park (Table 5-12). Of these compounds, sixteen were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives, with twelve of these metals being USEPA priority pollutant metals. USEPA priority pollutant metals are toxic metals for which technology-based effluent limitations and guidelines are required by Federal law. The priority pollutant metals exceeding the soil cleanup objectives (with the number of exceedances and maximum concentrations) include antimony (4 samples; 166 mg/kg), arsenic (4 samples; 81.2 mg/kg), beryllium (2 samples; 0.92 mg/kg), cadmium (4 samples; 27.4 mg/kg), chromium (4 samples; 505 mg/kg),

copper (4 samples; 1,610 mg/kg), lead (4 samples; 3,090 mg/kg), mercury (4 samples; 21.5 mg/kg), nickel (4 samples; 150 mg/kg), selenium (4 samples; 7.7 mg/kg), silver (4 samples; 80.6 mg/kg) and zinc (4 samples; 7,870 mg/kg).

5.3.3 White Transportation

During the property inspections, extensive slag and cinder fill (Figures 5-5 and 5-6) was observed throughout the White Transportation property. As a result of this finding, surface and subsurface fill samples were collected from two locations on the property during the Remedial Investigation. The locations of these samples are shown on Figure 3-2A. These samples were collected to determine if the fill material was a potential source of contaminants to Eighteenmile Creek. All four samples were submitted to Severn Trent Laboratories for chemical analysis of semivolatile organic compounds, PCBs and metals (Table 3-1). The analytical results for these samples are summarized in Table 5-13.

The soil cleanup objectives for surface and subsurface soil were obtained from the NYSDEC publication entitled “*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*”, Division of Environmental Remediation, October 1995. The soil cleanup objectives for individual semivolatile organic compounds were taken directly from Table 2, while the soil cleanup objective for total semivolatile organic compounds was established at 500,000 µg/kg as described in the TAGM. The surface soil cleanup objective for PCBs is 1,000 µg/kg, while the subsurface soil cleanup objective for PCBs is 10,000 µg/kg. For metals, the Site Background values obtained during the Site Investigation of the Former Flintkote Plant Site were again utilized for comparison to the surface and subsurface soil and fill samples collected from the White Transportation property during the Remedial Investigation of the Eighteenmile Creek Corridor Site.

5.3.3.1 Semivolatile Organic Compounds (SVOCs)

Semivolatile organic compounds were detected in all four samples collected from the White Transportation property (Table 5-13). Thirteen SVOCs were detected in these samples with eleven of these constituents being polycyclic aromatic hydrocarbons (PAHs). Of these compounds, only benzo(a)anthracene and benzo(a)pyrene were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives (Table 5-13). Bis(2-ethylhexyl)phthalate and dibenzofuran were also detected in these samples, but at concentrations that did not exceed the TAGM 4046 soil cleanup objectives (Table 5-13). In addition, the total SVOC concentrations did not exceed the TAGM 4046 soil cleanup objective (Table 5-13).

5.3.3.2 Polychlorinated Biphenyls (PCBs)

PCBs were detected in one surface sample and one subsurface sample collected from the White Transportation property at concentrations of ranging from 41J to 58J $\mu\text{g}/\text{kg}$ (Table 5-13). The only aroclor detected was 1260. Neither concentration, however, exceeded the NYSDEC TAGM 4046 soil cleanup objectives (Table 5-13).

5.3.3.3 Metals

Eighteen metals were detected in the fill samples collected from the White Transportation property (Table 5-13). Of these compounds, eleven were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives, with ten of these metals being USEPA priority pollutant metals. The priority pollutant metals exceeding the soil cleanup objectives (with the number of exceedances and maximum concentrations) include antimony (1 sample; 2.8 mg/kg), arsenic (4 samples; 30.3 mg/kg), beryllium (1 sample; 0.67 mg/kg), cadmium (2 samples; 6.3 mg/kg), chromium (3 samples; 45.4 mg/kg), copper (3 samples; 189 mg/kg), nickel (3 samples; 133 mg/kg), selenium (2 samples; 3.2 mg/kg), silver (2 samples; 0.32 mg/kg) and zinc (1 sample; 713 mg/kg).

5.3.4 *United Paperboard Company*

During the property inspections, extensive ash fill was observed throughout the former United Paperboard Company property on both sides of Eighteenmile Creek. As a result of this finding, five surface and seven subsurface soil and fill samples were collected from this property during the Remedial Investigation. The locations of these samples are shown on Figures 3-1 and 3-2B. These samples were collected to determine if the fill material was a potential source of contaminants to Eighteenmile Creek. All samples were submitted to Severn Trent Laboratories for chemical analysis. The surface soil and fill samples collected in 2002 were analyzed for PCBs and lead, with the sample collected in 2005 additionally analyzed for arsenic, chromium, copper and zinc (Table 3-1). The subsurface soil and fill samples were analyzed for semivolatile organic compounds, PCBs and metals (Table 3-1). The analytical results for these samples are summarized in Tables 5-14 and 5-15.

The soil cleanup objectives for surface and subsurface soil were obtained from the NYSDEC publication entitled "*Technical and Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels*", Division of Environmental Remediation, October 1995. The soil cleanup objectives for individual semivolatile organic compounds were taken directly from Table 2, while the soil cleanup objective for total semivolatile organic compounds was established at 500,000 $\mu\text{g}/\text{kg}$ as described

in the TAGM. The surface soil cleanup objective for PCBs is 1,000 µg/kg, while the subsurface soil cleanup objective for PCBs is 10,000 µg/kg. For metals, the Site Background values obtained during the Site Investigation of the Former Flintkote Plant Site were again utilized for comparison to the surface and subsurface soil and fill samples collected from the former United Paperboard Company property during the Remedial Investigation of the Eighteenmile Creek Corridor Site.

5.3.4.1 Semivolatile Organic Compounds (SVOCs)

Semivolatile organic compounds were detected in the three samples (SB-1 thru SB-3) in which these contaminants were analyzed (Table 5-15). These samples consisted of slag fill (SB-1), black ash and slag fill (SB-2) and fill consisting of white ash, slag, brick, rust colored ash and soil (SB-3). Twenty SVOCs were detected in these samples with eighteen of these constituents being polycyclic aromatic hydrocarbons (PAHs). Of these compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives (Table 5-15). Bis(2-ethylhexyl)phthalate and dibenzofuran were also detected in these samples, but at concentrations that did not exceed the TAGM 4046 soil cleanup objectives (Table 5-15). In addition, the total SVOC concentrations did not exceed the TAGM 4046 soil cleanup objective (Table 5-15).

5.3.4.2 Polychlorinated Biphenyls (PCBs)

PCBs were only detected in five (2 surface and 3 subsurface) of the twelve soil and fill samples collected from the former United Paperboard Company property (Tables 5-14 and 5-15). The principal aroclors detected were 1248 (2 samples), 1254 (4 samples) and 1260 (3 samples). Of these samples, only one surface sample (SS-24) contained PCBs at a concentration (1,210J µg/kg) that exceeded the NYSDEC TAGM 4046 soil cleanup objectives (Tables 5-14 and 5-15). The concentrations of PCBs in the remaining four samples ranged from 15J to 499J µg/kg (Tables 5-14 and 5-15).

5.3.4.3 Metals

Lead was detected in all five surface soil and fill samples collected from the former United Paperboard Company property at concentrations ranging from 4.5 to 1,430 mg/kg (Table 5-14). Only the lead concentrations in samples SS-22 (1,060 mg/kg) and TP-3 (1,430 mg/kg), however, exceeded the TAGM 4046 soil cleanup objective. Arsenic, chromium, copper and zinc were detected in the only sample in which these contaminants were analyzed (Table 5-14). The concentration of each metal exceeded the respective TAGM 4046 soil cleanup objective.

Nineteen metals were detected in the subsurface samples collected from the former United Paperboard Company property (Table 5-15). Of these compounds, thirteen were detected at concentrations that exceeded the TAGM 4046 soil cleanup objectives, with twelve of these metals being USEPA priority pollutant metals. The priority pollutant metals exceeding the soil cleanup objectives (with the number of exceedances and maximum concentrations) include antimony (2 samples; 9.9 mg/kg), arsenic (5 samples; 22.5 mg/kg), beryllium (2 samples; 0.67 mg/kg), cadmium (1 sample; 2.3 mg/kg), chromium (4 samples; 33.3 mg/kg), copper (7 samples; 920 mg/kg), lead (3 samples; 4,340 mg/kg), mercury (1 sample; 0.774 mg/kg), nickel (1 sample; 19.3 mg/kg), selenium (2 samples; 2.8 mg/kg), silver (1 sample; 0.48 mg/kg) and zinc (3 samples; 933 mg/kg).

6.0 DISCUSSIONS AND CONCLUSIONS

The principle objective of the Remedial Investigation was to better define the nature and extent of sediment contamination in Eighteenmile Creek from the New York State Barge Canal to Harwood Street for the purpose of evaluating remedial alternatives. This objective was discussed in Section 5.2. A secondary objective was to evaluate the impact of flooding on residential properties along Water Street that are adjacent to the creek. The third objective was to evaluate fill materials deposited on property adjacent to the Eighteenmile Creek Corridor Site that could be potential sources of contaminants to the creek. This section discusses the analytical results presented in Sections 5.2 and 5.3 as they relate to the second and third objectives.

6.1 SVOC Contamination

6.1.1 *Eighteenmile Creek and the Millrace*

Semivolatile organic compounds were not analyzed in any of the sediment samples collected during the Remedial Investigation of the Eighteenmile Creek Corridor Site. Historic sediment samples collected by the NYSDEC's Division of Water (DOW), however, have revealed the presence of SVOCs, and in particular polycyclic aromatic hydrocarbons (PAHs), throughout the creek. High PAH concentrations can adversely affect aquatic organisms in the environment.

In 1998 the Division of Water conducted a limited sediment sampling program to further delineate the spatial and temporal extent of sediment contamination identified by previous DOW sampling events. During the 1998 investigation sediment cores and surface sediment samples were collected at twelve locations in Eighteenmile Creek, its tributaries and the New York State Barge Canal. One of these locations was located within the Eighteenmile Creek Corridor Site. All sediment sampling was completed between August 17 and 20, 1998, with the results of the investigation summarized in a December 2001 Division of Water report entitled "*Final Report, Eighteenmile Creek Sediment Study*".

Total PAH concentrations in most of the surface samples were generally below the lowest effect level of 4,000 $\mu\text{g}/\text{kg}$. One exception to this was the surface sediment sample collected from the Eighteenmile Creek Corridor Site. The total PAH concentration in this sample was 13,272 $\mu\text{g}/\text{kg}$, indicating that there is severe PAH contamination in the biologically active surficial sediments. The deeper sediment sample collected from this location contained total PAHs at a concentration of 9,878 $\mu\text{g}/\text{kg}$.

During the RI of the Eighteenmile Creek Corridor Site, PAHs were detected in fill material from

Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). These data suggest that PAH contaminated fill at Upson Park, the former United Paperboard Company property and the Former Flintkote Plant Site has the potential to adversely impact Eighteenmile Creek.

6.1.2 Residential Properties

Surface soil samples collected from residential properties during the Remedial Investigation of the Eighteenmile Creek Corridor Site were not analyzed for semivolatile organic compounds. Eight subsurface samples collected during the RI, however, were analyzed for these contaminants (Figure 5-21). Seventeen SVOCs were detected in these samples with sixteen of these constituents being polycyclic aromatic hydrocarbons (PAHs). The total PAH concentrations of these samples ranged from 80.0 to 73,370 µg/kg (Table 5-10), suggesting that some PAH contaminated fill on the residential properties has the potential to adversely impact Eighteenmile Creek.

6.2 PCB Contamination

6.2.1 Eighteenmile Creek and the Millrace

PCBs were detected in the sediment of Eighteenmile Creek and the millrace; fifty-eight of sixty-one samples contained PCBs at concentrations ranging from 7.0J to 1,400,000 µg/kg (Table 5-1). The principal aroclors detected were 1248, 1254 and 1260, although aroclor 1242 was detected in several samples. PCBs were also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek at concentrations ranging from 7.0J to 310,000 µg/kg (Table 5-11). The principal aroclors detected in these samples were 1248 and 1254, although aroclor 1242 was detected in some samples. Additionally, PCBs were detected in fill samples collected from Upson Park at concentrations ranging from 490J to 80,000 µg/kg (Table 5-12). The principal aroclors detected were 1254 and 1260. The presence of PCBs in the canal and Upson Park suggest that contaminated sediment and fill associated with these source areas have the potential to adversely impact Eighteenmile Creek. Contaminated fill on the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and at the Former Flintkote Plant Site (Table 6-1) do not appear to be significant sources of PCBs to the creek and millrace.

The sediment PCB results for the Eighteenmile Creek Corridor Site are shown graphically on Figures 6-1 and 6-2, and are plotted from upstream to downstream locations to show spatial variability. These figures show that sediment in Eighteenmile Creek between the New York State Barge Canal and the Clinton Street dam, with the exception of the two sediment locations from the east side of the mill pond (SED-15 and

SED-17 locations), contains PCBs at concentrations below the NYSDEC sediment criterion (606.0 µg/kg) for chronic toxicity to benthic aquatic life. The low level of PCB contamination in this stretch of the creek appears anomalous, however, considering the high concentrations of PCBs in canal sediment and fill in Upson Park. It is possible that deeper sediment is more contaminated with PCBs, or that the relatively swift currents in this portion of the creek have carried PCB contaminated sediment and fill further downstream. The latter scenario may explain the higher concentrations of PCBs in the samples collected from the east side of the mill pond, which is a depositional area. It is also possible that this contamination results from an unknown source of PCBs on the east side of the mill pond on the former United Paperboard Company property.

PCB concentrations increase downstream of the Clinton Street dam and generally remain elevated throughout the remainder of the Eighteenmile Creek Corridor Site, although significant fluctuations occur. Figures 6-1 and 6-2 show that sediment in Eighteenmile Creek between the Clinton Street dam and Olcott Street contains PCBs at concentrations that exceed the NYSDEC sediment criterion. Initially it was believed that PCBs downstream of the dam originated from a former transformer area on the west side of the creek near the dam. Although PCBs were detected in surface and subsurface samples collected from this area, the concentrations were relatively low (20J to 1,210J µg/kg), suggesting that this area is not currently a significant source of PCBs to Eighteenmile Creek. The principal aroclors detected (1248, 1254 and 1260), however, are consistent with the aroclors detected in Eighteenmile Creek sediment. Samples collected from the former United Paperboard Company property between the dam and Olcott Street also indicate that this portion of the property is not a current source of PCBs to the creek. As a result, a specific source of PCBs that would account for the high concentrations detected at the SED-22 location has not been identified.

Figures 6-1 and 6-2 also show that sediment in Eighteenmile Creek between Olcott and William Streets, with the exception of the SED-30, SED-42 and SED-FS locations, contains PCBs at concentrations that exceed the NYSDEC sediment criterion. Elevated PCB concentrations were detected in samples collected from the SED-23, SED-28 and SED-43 locations. PCBs at the SED-23 location are likely related to the PCB contamination at SED-22, which is located immediately upstream of the SED-23 location. The SED-28 and SED-43 locations are adjacent to the Former Flintkote Plant Site, suggesting that this site is a potential source of PCBs. PCBs, however, were only detected in fill samples collected from the Former Flintkote Plant Site at concentrations ranging to 6,800 µg/kg (Table 6-1).

PCB concentrations increase significantly downstream of William Street and remain elevated throughout the remainder of the Eighteenmile Creek Corridor Site. Figures 6-1 and 6-2 show that sediment

in the millrace between William and Harwood Streets contains PCBs at concentrations that exceed the NYSDEC sediment criterion. The PCB concentrations in the deep samples collected from the SED-34 and SED-37 locations also exceed the hazardous waste criterion (50,000 µg/kg). Although PCBs were detected at concentrations (108,000 µg/kg) above the hazardous waste criterion in sediment collected from a deep basement at the Former Flintkote Plant Site, the PCB aroclors in that sample (1242 and 1260) are different from the aroclors detected in samples SED-34 and SED-37 (1248 and 1254). As a result, the deep basement sediment does not appear to be the source of the PCBs detected in the millrace sediment.

6.2.2 Residential Properties

PCBs were detected in twenty of twenty-seven residential surface soil samples at concentrations ranging from 24J to 27,000 µg/kg (Tables 5-2 thru 5-9). The principal aroclors detected were 1248, 1254 and 1260. Five of these samples contained PCBs at concentrations (1,060 to 27,000 µg/kg) that exceeded the NYSDEC TAGM 4046 surface soil cleanup objective (1,000 µg/kg; Figure 5-15). These samples were collected near Eighteenmile Creek, suggesting that the creek is the source of the PCB contamination (i.e., sediment deposition along the creek during flood events). The presence of the same aroclors in creek sediment and residential surface soil appears to support this suggestion.

PCBs were also detected in seven of nineteen subsurface samples at concentrations ranging from 32J to 4,160 µg/kg (Table 5-10). The principal aroclors detected were 1248, 1254 and 1260. None of these samples, however, contained PCBs at concentrations that exceeded the NYSDEC TAGM 4046 subsurface soil cleanup objective (10,000 µg/kg; Figure 5-22).

6.3 Arsenic Contamination

6.3.1 Eighteenmile Creek and the Millrace

Arsenic was detected in all fifty-seven sediment samples analyzed for arsenic at concentrations ranging from 1.5 to 50.5 mg/kg (Table 5-1). Arsenic was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek (Table 5-11), and in fill material from Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). Only the concentrations of arsenic at Upson Park and the Former Flintkote Plant Site, however, are higher than the NYSDEC sediment criterion (33.0 mg/kg) for the severe effect level. This suggests that arsenic contaminated fill at Upson Park and the Former Flintkote Plant Site has the potential to adversely impact Eighteenmile Creek.

The sediment arsenic results are shown graphically in Figures 6-3 and 6-4, and are plotted from upstream to downstream locations to show spatial variability. These figures show that sediment in Eighteenmile Creek between the New York State Barge Canal and Harwood Street, with the exception of the SED-29 location adjacent to the Former Flintkote Plant Site, contains arsenic at concentrations below the NYSDEC sediment criterion. As a result, arsenic contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is not a major concern.

6.3.2 Residential Properties

Arsenic was detected in all twenty-one residential surface soil samples analyzed for arsenic at concentrations ranging from 5.3 to 66.5 mg/kg (Tables 5-2 thru 5-9). Arsenic was also detected in all nineteen residential subsurface samples at concentrations ranging from 3.8 to 24.0 mg/kg (Table 5-10). The highest concentration of arsenic (66.5 mg/kg) was detected in surface soil sample SS-27, which was collected from the 131 Water Street property (Figure 3-2B).

Figures 5-16 and 5-23 show that most residential soil and fill contains arsenic at concentrations that exceed the NYSDEC soil cleanup objective (7.5 mg/kg). The widespread occurrence of arsenic suggests that the fill material observed at these properties is the source of the arsenic contamination. The reason for the high arsenic concentration in sample SS-27 is unknown as the concentration in this sample is higher than those detected in residential fill and Eighteenmile Creek sediment.

6.4 Chromium Contamination

6.4.1 Eighteenmile Creek and the Millrace

Chromium was detected in all fifty-seven sediment samples analyzed for chromium at concentrations ranging from 2.8 to 121 mg/kg (Table 5-1). Chromium was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek (Table 5-11), and in fill material from Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). Only the concentrations of chromium at Upson Park and the Former Flintkote Plant Site, however, are higher than the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level. This suggests that chromium contaminated fill at Upson Park and the Former Flintkote Plant Site has the potential to adversely impact Eighteenmile Creek.

The sediment chromium results are shown graphically in Figures 6-5 and 6-6, and are plotted from

upstream to downstream locations to show spatial variability. These figures show that sediment in Eighteenmile Creek between the New York State Barge Canal and Harwood Street, with the exception of the SED-29 location adjacent to the Former Flintkote Plant Site, contains chromium at concentrations below the NYSDEC sediment criterion. As a result, chromium contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is not a major concern.

6.4.2 Residential Properties

Chromium was detected in all twenty-one residential surface soil samples analyzed for chromium at concentrations ranging from 10.7 to 164 mg/kg (Tables 5-2 thru 5-9). Chromium was also detected in all nineteen residential subsurface samples at concentrations ranging from 5.1 to 262 mg/kg (Table 5-10). The highest concentrations of chromium (164, 262 and 157 mg/kg) were detected in samples SS-29, SB-10 and SB-13, respectively (Figures 3-1 and 3-2B).

Figures 5-17 and 5-24 show that most residential surface soil, and subsurface soil and fill collected from the 97 to 127 Water Street properties, contains chromium at concentrations that exceed the NYSDEC soil cleanup objective (14.0 mg/kg). The widespread occurrence of chromium in residential surface soil at these properties is likely related to the presence of chromium in the subsurface soil and fill. Because chromium exceedances were not documented in the subsurface samples collected from the 131 and 143 Water Street properties, the presence of chromium in surface soil at these properties is not related to the ash, slag and cinder fill observed at these parcels. Creek flooding may explain the high chromium concentrations in surface soil samples close to Eighteenmile Creek (e.g., SS-28, SS-29 and SS-FS), but other samples collected from these properties appear to be outside the flood plain (e.g., SS-25, SS-27 and SS-30).

6.5 Copper Contamination

6.5.1 Eighteenmile Creek and the Millrace

Copper was detected in all fifty-seven sediment samples analyzed for copper at concentrations ranging from 20.5 to 7,900 mg/kg (Table 5-1). Copper was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek (Table 5-11), and in fill material from Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). The concentrations of copper at these source areas are higher than the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek.

The sediment copper results are shown graphically in Figures 6-7 and 6-8, and are plotted from upstream to downstream locations to show spatial variability. These figures show that sediment in Eighteenmile Creek between the New York State Barge Canal and Clinton Street (between samples SED-12 and SED-14), with the exception of the SED-12 location, contains copper at concentrations below the NYSDEC sediment criterion. The low level of copper contamination in this stretch of the creek appears anomalous, however, considering the high concentrations of copper in canal sediment and fill in Upson Park and the White Transportation property. It is possible that deeper sediment is more contaminated with copper, or that the relatively swift currents in this portion of the creek have carried copper contaminated sediment and fill further downstream. The latter scenario may explain the higher concentrations of copper in the samples collected from the east side of the mill pond (SED-15 and SED-17), which is a depositional area. It is also possible that this contamination results from an unknown source of copper on the east side of the mill pond on the former United Paperboard Company property.

Six of seven sediment samples collected from Eighteenmile Creek between the Clinton Street dam and Olcott Street contain copper at concentrations that exceed the NYSDEC sediment criterion (Figures 6-7 and 6-8). The elevated concentrations of copper in this stretch of the creek likely result from copper contaminated fill on the former United Paperboard Company property. Fill samples collected from this property between the dam and Olcott Street contained copper at concentrations ranging from 26.6 to 1,410 mg/kg; Tables 5-14 and 5-15).

Figures 6-7 and 6-8 also show that fourteen of twenty-two sediment samples collected from Eighteenmile Creek adjacent to the Former Flintkote Plant Site contain copper at concentrations that exceed the NYSDEC sediment criterion. Fill samples collected from the Former Flintkote Plant Site contained copper at concentrations ranging from 36.4 to 51,000 mg/kg (Table 6-1), suggesting that this site is a significant source of copper to the creek and millrace. The elevated concentrations of copper in sediment downstream of the Flintkote property are likely caused by sediment transport from the millrace.

6.5.2 Residential Properties

Copper was detected in all twenty-one residential surface soil samples analyzed for copper at concentrations ranging from 32.2 to 2,260 mg/kg (Tables 5-2 thru 5-9). Copper was also detected in all nineteen residential subsurface samples at concentrations ranging from 20.7 to 2,240 mg/kg (Table 5-10). The highest concentrations of copper in surface soil were detected in samples SS-10FS (2,620 mg/kg) and SS-29 (1,010 mg/kg) from the 143 Water Street property (Figure 3-2B), while the highest concentrations of

copper in subsurface soil and fill were detected in samples SB-11 (2,240 mg/kg) and SB-13 (603 mg/kg) collected from the 105 and 117 Water Street properties, respectively (Figure 3-1).

Figures 5-18 and 5-25 show that most residential soil and fill contains copper at concentrations that exceed the NYSDEC soil cleanup objective (25.0 mg/kg). The widespread occurrence of copper suggests that the fill material observed at these properties is the source of the copper contamination. The high copper concentration in sample SS-29 is likely related to creek flooding events as this sample was collected near the creek and contains copper at a concentration similar to those detected in Eighteenmile Creek sediment. Analytical results from an ash sample collected from the small ridge on the Water Street Section of the Former Flintkote Plant Site (Figure 5-2) contained copper at a concentration of 2,130 mg/kg. Surface water/solids runoff from this ridge to the 143 Water Street property likely explains the relatively high concentrations of copper in surface soil sample SS-10FS.

6.6 Lead Contamination

6.6.1 *Eighteenmile Creek and the Millrace*

Lead was detected in all sixty-one sediment samples analyzed for lead at concentrations ranging from 15.3 to 25,400 mg/kg (Table 5-1). Lead was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek (Table 5-11), and in fill material from Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). The concentrations of lead at these source areas are higher than the NYSDEC sediment criterion (110.0 mg/kg) for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek. Lead concentrations in fill material from Upson Park, the former United Paperboard Company property and the Former Flintkote Plant Site exceed 1,000 mg/kg, suggesting that these sites could be major sources of lead to the creek.

The sediment lead results are shown graphically in Figures 6-9 and 6-10, and are plotted from upstream to downstream locations to show spatial variability. These figures show that most sediment in Eighteenmile Creek between the New York State Barge Canal and Harwood Street contains lead at concentrations that exceed the NYSDEC sediment criterion. Eleven of these samples contain lead at concentrations above 1,000 mg/kg. As a result, lead contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is a major concern.

Figures 6-9 and 6-10 also show that sediment in Eighteenmile Creek between the New York State Barge Canal and the Clinton Street dam, with the exception of the two sediment locations from the east side of the mill pond (SED-15 and SED-17), contains lead at concentrations below 1,000 mg/kg. The relatively low level of lead contamination in this stretch of the creek appears anomalous, however, considering the high concentrations of lead in fill from Upson Park (1,770 to 3,090 mg/kg; Table 5-12). It is possible that deeper sediment is more contaminated with lead, or that the relatively swift currents in this portion of the creek have carried lead contaminated sediment and fill further downstream. The latter scenario may explain the higher concentrations of lead in the samples collected from the east side of the mill pond (SED-15 and SED-17), which is a depositional area. It is also possible that this contamination results from an unknown source of lead on the east side of the mill pond on the former United Paperboard Company property.

Four of fourteen sediment samples collected between the Clinton Street dam and the Former Flintkote Plant Site, and five of twenty-two sediment samples collected from Eighteenmile Creek adjacent to the Former Flintkote Plant Site, contain lead at concentrations above 1,000 mg/kg (Figures 6-9 and 6-10). Fill samples collected from the former United Paperboard Company property and the Former Flintkote Plant Site contained lead at concentrations ranging to 4,340 mg/kg (Tables 5-14 and 5-15) and 23,100 mg/kg (Table 6-1), respectively, suggesting that these sites are a significant source of lead to the creek and millrace. The elevated concentrations of lead in sediment downstream of the Flintkote property are likely caused by sediment transport from the millrace.

6.6.2 Residential Properties

Lead was detected in all thirty-nine residential surface soil samples analyzed for lead at concentrations ranging from 29.8 to 4,630 mg/kg (Tables 5-2 thru 5-9). Figure 5-19 shows that twenty-two of these samples contained lead at concentrations that exceed the NYSDEC soil cleanup objective (400.0 mg/kg). In addition, eleven of these samples (SS-4, SS-8, SS-9, SS-10, SS-10FS, SS-12, SS-15, SS-21, SS-29, SS-30 and SS-41; Figure 3-2B) contained lead at concentrations above 1,000 mg/kg. The highest concentrations of lead (4,630 and 3,680 mg/kg) were detected in samples SS-10 and SS-21, respectively (Figure 3-2B).

Lead was also detected in all nineteen residential subsurface samples at concentrations ranging from 5.4 to 1,030 mg/kg (Table 5-10). The highest concentrations of lead (1,030 mg/kg) was detected in sample SB-11, which was collected from the backyard of the 105 Water Street property (Figure 3-1). Figure 5-26 shows that every subsurface sample collected from the 97 to 117 Water Street properties, with the exception

of samples SB-12 and SB-14, contains lead at concentrations that exceed the NYSDEC soil cleanup objective. Lead exceedances were not documented in the subsurface samples collected from the 127, 131 and 143 Water Street properties.

The high lead concentrations in surface soil samples SS-4, SS-8, SS-9, SS-10, SS-15, SS-29 and SS-41 are likely related to creek flooding events as these samples were collected near the creek and contain lead at concentrations similar to those detected in Eighteenmile Creek sediment. Analytical results from an ash sample collected from the small ridge on the Water Street Section of the Former Flintkote Plant Site (Figure 5-2) contained lead at a concentration of 4,250 mg/kg. This sample also exceeded the TCLP Regulatory Limit for lead, indicating that this ash is a characteristic hazardous waste (D008). Surface water/solids runoff from this ridge to the 143 Water Street property likely explains the relatively high concentrations of lead in surface soil samples SS-10FS and SS-12. The reason for the high lead concentrations in samples SS-21, SS-30 and SB-11 is unknown as the concentrations in these samples are higher than those detected in residential fill. In addition, the two surface soil samples do not appear to be located in the flood plain.

6.7 Zinc Contamination

6.7.1 *Eighteenmile Creek and the Millrace*

Zinc was detected in all fifty-seven sediment samples analyzed for zinc at concentrations ranging from 37.1 to 23,600 mg/kg (Table 5-1). Zinc was also detected in sediment from the New York State Barge Canal immediately upstream of Eighteenmile Creek (Table 5-11), and in fill material from Upson Park (Table 5-12), the White Transportation property (Table 5-13), the former United Paperboard Company property (Tables 5-14 and 5-15) and the Former Flintkote Plant Site (Table 6-1). The concentrations of zinc at these source areas are higher than the NYSDEC sediment criterion (270.0 mg/kg) for the severe effect level, suggesting that these properties have the potential to adversely impact Eighteenmile Creek. Zinc concentrations in fill material from Upson Park, the former United Paperboard Company property and the Former Flintkote Plant Site exceed 1,000 mg/kg, suggesting that these sites could be major sources of zinc to the creek.

The sediment zinc results are shown graphically in Figures 6-11 and 6-12, and are plotted from upstream to downstream locations to show spatial variability. These figures show that thirty-seven of fifty-seven sediment samples collected from Eighteenmile Creek between the New York State Barge Canal and Harwood Street contain zinc at concentrations that exceed the NYSDEC sediment criterion. Eleven of these

samples contain zinc at concentrations above 1,000 mg/kg. As a result, zinc contamination in creek and millrace sediment of the Eighteenmile Creek Corridor Site is a major concern.

Figures 6-11 and 6-12 also show that sediment in Eighteenmile Creek between the New York State Barge Canal and the Clinton Street dam, with the exception of the deep sample collected from the SED-15 location, contains zinc at concentrations below 1,000 mg/kg. The relatively low level of zinc contamination in this stretch of the creek appears anomalous, however, considering the high concentrations of zinc in fill from Upson Park (2,950 to 7,870 mg/kg; Table 5-12). It is possible that deeper sediment is more contaminated with zinc, or that the relatively swift currents in this portion of the creek have carried zinc contaminated sediment and fill further downstream. The latter scenario may explain the higher concentration of zinc in the deep sample collected from the east side of the mill pond (SED-15), which is a depositional area. It is also possible that this contamination results from an unknown source of zinc on the east side of the mill pond on the former United Paperboard Company property.

Three of eleven sediment samples collected between the Clinton Street dam and the Former Flintkote Plant Site, and seven of twenty-two sediment samples collected from Eighteenmile Creek adjacent to the Former Flintkote Plant Site, contain zinc at concentrations above 1,000 mg/kg (Figures 6-11 and 6-12). Fill samples collected from the former United Paperboard Company property and the Former Flintkote Plant Site contained zinc at concentrations ranging to 1,640 mg/kg (Tables 5-14 and 5-15) and 21,900 mg/kg (Table 6-1), respectively, suggesting that these properties are a significant source of zinc to the creek and millrace. The elevated concentrations of zinc in sediment downstream of the Flintkote property are likely caused by sediment transport from the millrace.

6.7.2 Residential Properties

Zinc was detected in all twenty-one residential surface soil samples analyzed for zinc at concentrations ranging from 146 to 2,390 mg/kg (Tables 5-2 thru 5-9). Figure 5-20 shows that fifteen of these samples contain zinc at concentrations that exceed the NYSDEC soil cleanup objective (254.5 mg/kg). In addition, six of these samples (SS-10FS, SS-29, SS-30, SS-37, SS-41 and SS-44; Figure 3-2B) contained zinc at concentrations above 1,000 mg/kg. The highest concentrations of zinc (2,390 and 1,660 mg/kg) were detected in samples SS-10FS (143 Water Street) and SS-30 (131 Water Street), respectively.

Zinc was detected in all nineteen residential subsurface samples at concentrations ranging from 19.6 to 2,560 mg/kg (Table 5-10). The highest concentrations of zinc (2,240, 2,140 and 2,560 mg/kg) were

detected in samples SB-10 (105 Water Street) and SB-13 (117 Water Street), respectively (Figure 3-1). Figure 5-27 shows that every subsurface sample collected from the 97 to 127 Water Street properties, with the exception of sample SB-4, contains zinc at concentrations that exceed the NYSDEC soil cleanup objective. Zinc exceedances were not documented in the subsurface samples collected from the 131 and 143 Water Street properties.

The high zinc concentrations in surface soil samples SS-29, SS-37, SS-41 and SS-44 are likely related to creek flooding events as these samples were collected near the creek and contain zinc at concentrations similar to those detected in Eighteenmile Creek sediment. Analytical results from an ash sample collected from the small ridge on the Water Street Section of the Former Flintkote Plant Site (Figure 5-2) contained zinc at a concentration of 3,470 mg/kg. Surface water/solids runoff from this ridge to the 143 Water Street property likely explains the relatively high concentrations of zinc in surface soil sample SS-10FS. The reason for the high zinc concentration in sample SS-30 is unknown as the concentration in this sample is significantly higher than those detected in residential fill collected from the 131 Water Street property. In addition, this sample does not appear to be located in the flood plain.

The reason for the high zinc concentrations in samples SB-10 and SB-13 is unknown, although both borings are located in close proximity to Eighteenmile Creek.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The Remedial Investigation of the Eighteenmile Creek Corridor Site documented elevated concentrations of PCBs and metals (i.e., arsenic, chromium, copper, lead and zinc) in the sediment of Eighteenmile Creek and the millrace adjacent to the Former Flintkote Plant Site. The Remedial Investigation also documented contaminated sediment in the New York State Barge Canal immediately upstream of Eighteenmile Creek, and contaminated fill at Upson Park, the White Transportation property, the former United Paperboard Company property and the Former Flintkote Plant Site. The concentrations of PCBs, arsenic, chromium, copper, lead and zinc detected at these areas suggest that these properties have the potential to adversely impact Eighteenmile Creek. The Remedial Investigation did not fully investigate these potential source areas, nor did it quantify the volume of contaminated sediment requiring remediation. The Remedial Investigation also determined the need to investigate deeper sediment in the creek between the canal and the Clinton Street dam, and the depositional area on the east side of the mill pond south of the dam. These data gaps need to be addressed before a Feasibility Study (FS) can be prepared for the Site. As a result, the NYSDEC recommends that a Supplemental Remedial Investigation be completed at the Eighteenmile Creek Corridor Site to more fully determine the nature and extent of contamination in creek and millrace sediment, to further characterize the contamination at the potential source areas (i.e., the White Transportation property, the former United Paperboard Company property and Upson Park), and to determine the extent to which releases or potential releases from the site pose a threat to human health and the environment. Specific objectives of a Supplemental RI include the following:

- Better define the nature and extent of sediment contamination in Eighteenmile Creek from the New York State Barge Canal to Harwood Street for the purpose of evaluating remedial alternatives;
- Determine the thickness of Eighteenmile Creek and millrace sediment throughout the Eighteenmile Creek Corridor Site;
- Determine the extent and type of contamination in soil, waste and groundwater at properties adjacent to the Eighteenmile Creek Corridor Site that could be potential sources of contaminants to the creek; and
- Identify potential pathways for human exposure as part of a qualitative exposure assessment.

8.0 REFERENCES

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