**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

# STATEMENT OF BASIS

July 2010

**Bridgestone Americas Tire Operations, LLC**
1700 Firestone Blvd.
Noblesville, Indiana
EPA ID#: IND 006 418 263

## INTRODUCTION

This Statement of Basis (SB) for the Bridgestone Americas Tire Operations, LLC (Firestone) facility in Noblesville, Indiana identifies and explains the proposed remedies for the PCB contamination within the undeveloped and residentially developed floodplains of Stony Creek. EPA will select a final remedy only after the public comment period has ended and the information submitted during this time has been reviewed and considered. EPA is issuing this SB as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA).

Although this SB focuses on the floodplains, it also addresses adjacent areas, including the residentially developed Wilson Ditch floodplain and Stony Creek itself, addressed as part of a 2001 Administrative Order on Consent (AOC) between EPA and Firestone, as a means of providing context and understanding of the potential for migration and risk in these areas. It is important to note that although the residentially developed floodplain has been addressed through an interim measure, this SB memorializes that interim measure cleanup and the alternatives evaluated, as well as provides the public with another opportunity to comment. EPA conducted an informal public comment period in 2008 for the selection and implementation of the residential interim measure.

This document summarizes information that can be found in greater detail in the Construction Completion Reports (CCRs) and Corrective Measures Proposal (CMP) and other documents contained in the administrative record for this facility. EPA encourages the public to review these documents in order to gain a more comprehensive understanding of the facility and RCRA activities that have been conducted there. The administrative record can be found at the local repository located within the Noblesville Library and at the EPA's Chicago office[1].

EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on all corrective measure alternatives. The public can be involved in the remedy selection process by reviewing the documents contained in the administrative record.

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1) Noblesville Public Library: 1 Library Plaza, Noblesville, IN 46060, (317) 773-1384; EPA Region 5, 7th Floor Record Center, 77 W. Jackson Blvd., Chicago, IL 60604, (312) 886-4253.

PROPOSED REMEDIES

EPA is proposing the following remedies to address the polychlorinated biphenyl (PCB) contamination within the floodplains of Stony Creek:

- Area-wide habitat enhancement with focused vegetative stabilization/capping within the undeveloped floodplain.

- Risk-based removal of contaminated soils with homeowner input and post-excavation monitoring of restoration activities within the residentially developed floodplain (this remedy was implemented as an interim measure during 2008-2009 with significant public participation).

A more detailed discussion of the proposed remedies is included below.

FACILITY BACKGROUND

From 1936 to 2009, Firestone operated a rubber products manufacturing facility at 1700 Firestone Boulevard in Noblesville, Indiana. PCB-containing heat-transfer fluid was used at the facility in the late 1960s and early 1970s. It is believed that floor and roof drain outfalls at the facility released PCBs to Wilson Ditch, an engineered drainage channel that flows south from the facility for approximately 5,000 feet (ft) before draining into Stony Creek. PCBs were first identified in Wilson Ditch sediments in 1984, prompting Administrative Orders on Consent (AOCs) between EPA and Firestone in 1990 and 2001 that described Firestone's corrective action obligations at and in the vicinity of the facility. The first AOC required on- and off-site field investigations and sampling efforts and some corrective actions within one-quarter mile of Firestone's property. A subsequent Amendment to the first AOC required Firestone to implement interim remedial measures for groundwater near Firestone's property. The second AOC included corrective actions for sediments in Wilson Ditch, monitoring requirements for sediment and fish tissue in Stony Creek, and several other corrective actions related to groundwater underlying and in the vicinity of the facility. The PCB contaminated sediments in Wilson Ditch were remediated in 2005, thus eliminating the source of PCBs to Stony Creek and its floodplains. Although not part of the AOC, at the time Wilson Ditch was remediated the confluence of Wilson Ditch and Stony Creek was also remediated based upon visual evidence that the sediment within an approximate fifty foot area was impacted.

Site Specific Characteristics and Physical Setting

*Hydrologic Setting*

The Stony Creek floodplain is a small part of the larger Stony Creek watershed, which also encompasses Stony Creek upstream of its confluence with Wilson Ditch, tributaries to Stony Creek, and all of the land that is drained by those tributaries and Stony Creek itself. Within the Stony Creek Watershed, there are approximately 40 miles of streams and ditches that have regular flow, Stony Creek being one of the major waterways[2].

2) Stony Creek Watershed Management Plan, 2007, Christopher B. Burke Engineering, Ltd.; Hamilton County Surveyor's Office; http://www.co.hamilton.in.us/services.asp?id=2314#stony

The reach of Stony Creek between its confluence with Wilson Ditch and Allisonville Road (the study area, see Figure 2) is approximately 0.8 miles in length and 20 to 40 feet (ft) wide, depending on season and recent precipitation. Stony Creek is "flashy," in that its depth and flow are strongly affected by storm events and seasonal runoff. The creek routinely overtops its banks between Wilson Ditch and the White River, throughout the study area.

Two residential neighborhoods are located along Stony Creek between its confluence with Wilson Ditch and Allisonville Road: James Place and Wellington Northeast. A total of 45 residential properties are located along either Stony Creek or the undeveloped floodplain and have backyards that are subjected to periodic flooding of Stony Creek.

*Ecological Setting*

The undeveloped western floodplain of Stony Creek is a generally flat 59-acre patch of wetland and forested land within the Stony Creek watershed. The undeveloped floodplain is divided into two areas, the larger of which (approximately 49 acres) is designated as the Conservation Easement Area. It is a compensatory wetland leased by the city of Noblesville for 50 years. This area is also subject to a conservation easement in favor of the Central Indiana Land Trust, Inc. (CILTI), and therefore is not open to the general public. The smaller of the two areas of the undeveloped floodplain—designated as the Island Area—is surrounded by two branches of Stony Creek and is owned in separate parcels by five residents of neighboring Audubon Court. Land cover in the undeveloped floodplain consists of 37 acres of bottomland, riparian forest and roughly 22 acres of forested wetland and fallow field habitat, which was an agricultural hayfield through the 1990s. It was recently planted with tree seedlings as part of a compensatory wetlands mitigation program.

Within the Stony Creek Watershed, according to the Watershed Management Plan of 2007 (found at the website on the bottom of p.2), there are approximately 47.2 miles of streams, and of that, approximately 19.3 miles, or 41% have 30 feet or less of vegetated buffer on one or both of the stream banks. The study area included in this Statement of Basis is considered a "critical area" within the Stony Creek Watershed Management Plan, defined as a permanent vegetated buffer which provides a valuable water quality benefit and should be protected from encroaching development. These buffers benefit the watershed in multiple ways: reduce sediment, nutrient and chemical loadings; provide wildlife habitat and food sources; provide shaded areas which cools the environment, thereby maintaining a more consistent dissolved oxygen level within the water; and reduce erosion by slowing floodwaters.

As described in more detail later, the proposed remedy for the undeveloped floodplain is intended to compliment the Residential Interim Measure remedial work by preserving as much of this critical environment as possible.

*Investigations*

Since the issuance of the 2001 AOC, Firestone has conducted the following sampling programs within Stony Creek and its floodplains:

-Fish tissue and sediment samples were collected from Stony Creek in 2001, 2003, 2005, 2006, 2007, and 2009. The data is summarized below.

## Summary for PCBs in Stony Creek Sediment, 2009*

| Depth | Detection Frequency | Minimum Detected | Maximum Detected | Average | 95% UCL** | Units |
|---|---|---|---|---|---|---|
| Surface 0-6” | 18/24* | 0.12 | 2.1 | 0.45 | 0.69 | ppm |
| Subsurface 6-12” | 12/22* | 0.2 | 2.8 | 0.40 | 0.74 | ppm |

*The 2009 sediment sampling event included over 70 discrete sediment samples from 24 transects. In response to public comments, EPA characterized the subsurface sediment PCB contamination.
**See 95% UCL definition in following section.

## Summary for PCBs in Stony Creek Sediment (0-6”), 2003-2009

| Year | Detection Frequency | Minimum Detected | Maximum Detected | Average | Units |
|---|---|---|---|---|---|
| 2003 | 2/4 | 1.4 | 19 | 5.9 | ppm |
| 2005 | 3/3 | 0.76 | 6.1 | 2.6 | ppm |
| 2006* | 93/149 | 0.27 | 7.8 | 1.1 | ppm |
| 2007 | 3/3 | 0.84 | 1.2 | 1.0 | ppm |
| 2009 | 18/24 | 0.12 | 2.1 | 0.45 | ppm |

*In 2006, EPA fully characterized the PCB contamination within the first 6” of sediment with extensive sampling between Wilson Ditch and the White River.

## Summary for PCBs in Stony Creek Fish*, 2009

| Species | Sample Type | Average | Minimum Detected | Maximum Detected | 95% UCL | Units |
|---|---|---|---|---|---|---|
| Green sunfish | Whole Body | 4.8 | 0.92 | 18.3 | 9.4 | ppm |
| Northern hog sucker | Whole Body | 2.4 | 1.0 | 6.2 | 3.8 | ppm |
| Rock bass | Whole Body | 2.5 | 0.55 | 7.5 | 4.4 | ppm |
| Green sunfish | Fillets with skin | 0.64 | 0.15 | 2.0 | 1.1 | ppm |
| Rock bass | Fillets with skin | 0.35 | 0.10 | 0.72 | 0.47 | ppm |

*There is currently a fish consumption advisory issued by the State for Stony Creek. Please also note there is a State-wide advisory for all Carp within Indiana rivers and streams, http://www.in.gov/isdh/23650.htm.

-The four phase Stony Creek Supplemental Investigation Project (SCSIP) was initially conducted to identify areas within the Stony Creek system that had PCB concentrations exceeding the residential soil Toxic Substances Control Act cleanup objective of 1 part per million (ppm). The SCSIP later focused on residential soil from 45 properties subject to flooding by Stony Creek and it was conducted in multiple rounds from 2006 through 2008. Data is summarized below; however, property addresses are not provided in this document as a courtesy to homeowners. All homeowners have copies of their property data; therefore, the summary below provides a small, representative set.

**Summary (subset) of Residential Soil PCB Data, 2009***

| Property | Sample Depth | Number of Samples | Range Before Cleanup | Average Before Cleanup | 95%UCL Before Cleanup | Range *After* Cleanup | Average *After* Cleanup | 95%UCL *After* Cleanup |
|---|---|---|---|---|---|---|---|---|
| 1 | Surface | 39 | 0.64-15 | 3.1 | 4.0 | 0.64-2.6 | 0.79 | 0.93 |
| | Subsurface | 115 | 0.61-42 | 3.2 | 4.3 | 0.61-11 | 0.74 | 0.91 |
| 2 | Surface | 40 | 0.59-8 | 1.6 | 2.2 | 0.59-3.4 | 0.31 | 0.73 |
| | Subsurface | 109 | 0.59-22 | 2.0 | 2.6 | 0.59-6.2 | 0.85 | 1.0 |
| 3 | Surface | 26 | 0.8-2.6 | 0.8 | 1.1 | 0.8-0.8 | 0.074 | 0.085 |
| | Subsurface | 61 | 0.65-20 | 1.5 | 2.6 | 0.65-0.8 | 0.072 | 0.078 |
| 4 | Surface | 45 | 0.59-8.4 | 1.8 | 2.4 | 0.59-1.4 | 0.11 | 0.14 |
| | Subsurface | 112 | 0.59-18 | 1.7 | 2.2 | 0.59-3.9 | 0.19 | 0.23 |
| 5 | Surface | 24 | 0.76-3.2 | 1.0 | 1.3 | 0.76-2.2 | 0.52 | 0.67 |
| | Subsurface | 54 | 0.72-11.5 | 2.0 | 2.9 | 0.72-6.9 | 0.92 | 1.2 |

*All data reported as ppm

-Soil and biota samples were collected from the undeveloped floodplain of Stony Creek in 2008 to support human health and baseline ecological risk assessments (HHRA and BERA) completed in 2009. That data can be found in the summary table below in the Summary of Facility Risks section and includes: soil, invertebrates and small mammals.

The iterative sampling which took place under the Stony Creek Supplemental Investigation Project identified residential properties which had been impacted by the historic PCB release from the Firestone facility. EPA addressed those areas of contamination through interim measures in order to facilitate remedial work as swiftly as possible. Although most property specific risk assessments demonstrated that the PCB-contaminated soil did not exceed the risk based remedial goal, the presence of contamination on residential properties warranted immediate action and opportunity for public participation. With public comments, EPA proceeded with a cleanup which provided homeowners with the choice to remediate their

property in accordance with the risk based standards, or, to 1ppm. In general, the risk based approach was used to guide areas of soil removal which substantially lowered property-wide PCB levels (for the most part, very close to or even below 1ppm) while preserving the critical watershed habitat described above.

SUMMARY OF FACILITY RISKS

Stony Creek and its floodplains have been the subject of several human health risk assessments (HHRAs) and ecological risk assessments (ERAs) from 1994-2010. The objective of this section is to summarize the scope and findings of all pertinent risk assessments related to PCBs. The tables below summarize the risk assessments and the text which follows provides further explanation.

**Ecological Risk Assessments**

| Area or Location where Samples were Taken | Media or Material Sampled | Average Concentration of PCBs in Media[1] | 95%UCL[1,3] (see definition below) | Receptor: Risk (HQ)[4] (see definition below) | Source |
|---|---|---|---|---|---|
| Stony Creek | Fish | 3.2 ppm | NR[2] | Great blue heron: 0.01 | Dames & Moore, 1994 |
| Undeveloped Floodplain | Soil | 2.5 ppm | 5.5 ppm | American Robin: 0.04-0.4 | ENVIRON, 2010 |
| | Invertebrates | 0.44 ppm | 0.70 ppm | American kestrel: 0.003-0.03 | |
| | Small Mammals | 0.35 ppm | 0.81 ppm | Short-tailed shrew: 0.06-0.1 | |
| | | | | Red fox: 0.003-0.005 | |
| | | | | Indiana bat: 0.4 | |
| | | | | American mink 0.1-0.2 | |

[1] Concentrations in parts per million (ppm); one ppm is equivalent to 1 milligram per liter of water (mg/l) or 1 milligram per kilogram soil (mg/kg). The 'average' is a simple arithmetic average of the data available.
[2] Not Reported. In 1994 there was not enough data with which to calculate a 95% UCL, therefore, at that time the highest concentration found was used to conservatively assess risk.
[3] 95% UCL: 95% upper confidence limit on the mean concentration, calculated using bias-corrected accelerated (BCA) bootstrap method with 10,000 iterations. The 95% UCL, as a means to guide a risk based decision, is more conservative than the arithmetic average of the data. This is because it represents a concentration at which 95% of the time the actual concentration is below. Using the 95% UCL provides a wide margin of safety which takes into consideration the many variables and unknowns associated with environmental sampling and analysis.
[4] HQ: Hazard quotient=the ratio of an exposure level by a contaminant (e.g., maximum concentration) to a screening value selected for the risk assessment for that substance. If the exposure level is higher than the toxicity value, then there is the potential for risk to the receptor.

| | |
|---|---|
| HQ > 1.0 | Harmful effects are likely due to the contaminant in question |
| HQ = 1.0 | Contaminant *alone* is not likely to cause ecological risk |
| HQ < 1.0 | Harmful effects are NOT likely |

## Human Health Risk Assessments

| Area or Location where Samples were Taken | Media or Material Sampled | Average Concentration of PCBs in Media[1] | 95%UCL[1,3] (see definition below) | Receptor: Cancer Risk[5] (see explanation below) | Non-cancer Risk (HQ)[6] (see explanation below) | Source |
|---|---|---|---|---|---|---|
| Stony Creek | Sediment | NR[2] | 6.9 ppm | Child: $2x10^{-7}$ | 0.06 | ChemRisk, 1996 |
| Undeveloped floodplain | Surface Soil | 2.5 ppm | 5.2 ppm | Child: $1x10^{-6}$ | 0.2 | ENVIRON, 2009 |
| James Place[4] | Surface Soil<br><br>Subsurface Soil | 0.02-1.8 ppm<br><br>0.02-1.8 ppm | 0.52-2.4 ppm<br><br>0.48-2.3 ppm | Child: $1x10^{-6}$ – $6x10^{-6}$<br><br>Adult: $1x10^{-8}$ – $5x10^{-8}$ | 0.1 -0.4<br><br>0.02 – 0.1 | ENVIRON, 2008 |
| Stony Creek Circle and Audubon Court[4] | Surface Soil<br><br>Subsurface Soil | 0.28-0.72 ppm<br><br>0.31-0.93 ppm | 0.31-0.95 ppm<br><br>0.43-1.1 ppm | Child: $8x10^{-7}$ -$2x10^{-6}$<br><br>Adult: $9x10^{-9}$ -$2x10^{-8}$ | 0.05 – 0.1<br><br>0.02 – 0.04 | ENVIRON, 2009 |
| 132-140 Stony Creek Overlook[4] | Surface Soil<br><br>Subsurface Soil | 0.074-0.32 ppm<br><br>0.072-0.63 ppm | 0.085-0.38 ppm<br><br>0.078-0.96 ppm | Child: $2x10^{-7}$ – $1x10^{-6}$<br><br>Adult: $2x10^{-9}$ – $2x10^{-8}$ | 0.01 – 0.06<br><br>0.003– 0.04 | ENVIRON, 2009 |
| 106-130 Stony Creek Overlook[4] | Surface Soil<br><br>Subsurface Soil | 0.02-1.9 ppm<br><br>0.02-5.5 ppm | 0.2-2.6 ppm<br><br>0.02-6.9 ppm | Child: $5x10^{-8}$ – $7x10^{-6}$<br><br>Adult: $4x10^{-10}$ – $1x10^{-7}$ | 0.003- 0.4<br><br>0.0007-0.3 | ENVIRON, 2009 |

[1] Concentrations in parts per million (ppm); one ppm is equivalent to 1 milligram per liter of water (mg/l) or 1 milligram per kilogram soil (mg/kg). The 'average' is a simple arithmetic average of the data available.

[2] Not Reported.

[3] 95% UCL: 95% upper confidence limit on the mean concentration, calculated using bias-corrected accelerated (BCA) bootstrap method with 10,000 iterations. The 95% UCL, as a means to guide a risk based decision, is more conservative than the arithmetic average of the data. This is because it represents a concentration at which 95% of the time the actual concentration is below. Using the 95% UCL provides a wide margin of safety which takes into consideration the many variables and unknowns associated with environmental sampling and analysis.

[4] Concentrations and risks based on post-excavation conditions; ranges reflect conditions across all properties within the neighborhood assessed, not individual properties.

[5] Based on the National Contingency Plan (NCP), EPA's regulations for the evaluation of risk at Superfund sites, the cancer risk range is from 10-4 (one in ten thousand) to 10-6 (one in a million excess risk of developing cancer). In other words, EPA's regulations state that an acceptable range for the chance of developing an additional incident of cancer from the contamination alone is 1-in-10,000 to 1-in-1 million. EPA's preference is to select remedies that are at the more protective risk range. As shown above, multiple risk assessments for the soils around Stony Creek demonstrate the area is well within the risk range by multiple orders of magnitude.

[6] HQ: Hazard quotient=the ratio of an exposure level by a contaminant (e.g., maximum concentration) to a screening value selected for the risk assessment for that substance. The HQ is a means to measure the safety of contaminants which are noncancerous but could cause other health or environmental problems. For contaminants which are cancerous, it is simply another means by which to express risk. If the exposure level is higher than the toxicity value, then there is the potential for risk to the receptor. An HQ>1 indicates harmful effects are likely due to the contaminant in question.

Below, findings from ecological risk assessments are presented first, followed by findings from human health risk assessments. Although this SB focuses only on the floodplains of Stony Creek, risks posed by PCBs in Stony Creek sediment and biota are also discussed in this section, in order to provide the full context for this interconnected system and ensure public concerns and questions are adequately addressed.

*Ecological*

Stony Creek Aquatic Ecological Risk Assessment

Dames & Moore (1994) conducted an ecological risk assessment (ERA) as an addendum to the RFI Phase II report. An ecological risk assessment is the process through which scientists evaluate the likelihood that adverse ecological effects might occur, or are occurring, due to exposure to one or more stressors, such as contamination. This ERA focused exclusively on aquatic habitats within Wilson Ditch and Stony Creek, based on the assumption that aquatic habitats are likely the most sensitive and their receptors most highly exposed, compared to terrestrial habitats. It was assumed that if no adverse ecological effects were observed or predicted for aquatic habitats, then other local habitats and receptors also would not be adversely affected. Ecological risks associated with terrestrial habitats (i.e., the Stony Creek floodplain) were subsequently evaluated by ENVIRON (2010), as summarized below.

As described in 1994, the great blue heron (*Ardea herodias*), representing piscivorous birds, was selected as the principal receptor of concern for the ERA. Dietary exposure was assumed to be the dominant exposure pathway for great blue herons. As described below, for PCB contamination, it was determined that aquatic ecological risk was within the acceptable range.

The maximum concentration of PCBs in fish tissue at the time the ERA was prepared, 7.7 ppm, was used as a conservative representation of the great blue heron's dietary exposure. Based on the broader and more recent fish tissue data now available, this concentration is clearly representative of the data set and conservative for the risk assessment. The toxicity quotient resulting from the 1994 ERA was 0.5, which is well below the acceptable benchmark of 1, indicating that piscivorous birds are unlikely to be adversely affected.

Terrestrial Ecological Risk Assessment for the Stony Creek Floodplain

ENVIRON (2010) prepared the Baseline Ecological Risk Assessment (BERA) for the undeveloped floodplain of Stony Creek between the confluence with Wilson Ditch and Allisonville Road. A BERA is a comprehensive and thorough process through which to determine if the known ecological receptors are being adversely impacted by the presence of a particular stressor, or stressors, such as contamination. The objective of this BERA was to evaluate potential ecological risks from exposure to PCBs in floodplain soil and terrestrial prey (see Figures 4 and 5). In particular, the BERA evaluated whether PCBs in soil and terrestrial prey are likely to adversely affect birds and mammals that may forage within the floodplain. Although the ENVIRON (2010) BERA focused on the undeveloped floodplain of Stony Creek, it is also protective of ecological exposures within the residentially developed floodplain. The wildlife habitat provided by the undeveloped floodplain is far more extensive and high quality than that provided by the residentially developed floodplain. Consequently, birds and mammals

are likely to forage to a far greater extent in the undeveloped floodplain than in the residentially developed floodplain. Thus, findings for the undeveloped floodplain also serve as conservative estimates for the residentially developed floodplain.

The average and 95% UCL concentrations of PCBs in Stony Creek floodplain surface soils, terrestrial invertebrates, and small mammals were measured and are summarized below. That data was then used to estimate the potential exposure of invertivorous and carnivorous bird populations and invertivorous and carnivorous mammal populations foraging in the floodplain of Stony Creek to the current concentrations of PCBs. Upon comparison of the species-specific toxicity data (expressed as doses) derived from the scientific literature to the respective average and 95% UCL concentrations, EPA concluded that wildlife populations foraging in the Stony Creek floodplain—both undeveloped and residentially developed portions—are unlikely to be adversely affected by current concentrations of PCBs ingested via soil or diet.

Environmental media relevant to the ENVIRON (2010) BERA for which analytical data were available include floodplain soil, terrestrial invertebrates, and small mammals. Average and 95% UCL concentrations of PCBs in floodplain surface soil are 2.5 ppm and 5.5 ppm, respectively. Average and 95% UCL concentrations of PCBs in invertebrates are 0.44 ppm and 0.70 ppm, respectively. Average and 95% UCL concentrations of PCBs in small mammals are 0.35 ppm and 0.81 ppm, respectively. Average and 95% UCL concentrations are used to characterize the most likely and high end exposures, respectively.

The following assessment and measurement endpoints were evaluated in the BERA:

1. Survival and reproduction of invertivorous and carnivorous bird populations foraging in the floodplain of Stony Creek: Comparison of estimated PCB doses for American robins (*Turdus migratorius*) and American kestrels (*Falco sparverius*) to species-specific toxicity data (expressed as doses) derived from the scientific literature.

2. Survival and reproduction of insectivorous and carnivorous mammal populations foraging in the floodplain of Stony Creek: a) comparison of estimated PCB doses for short-tailed shrew, red fox (*Vulpes vulpes*), mink (*Mustela vison*), and Indiana bat (*Myotis sodalis*) to toxicity data (expressed as doses) derived from the scientific literature; b) comparison of estimated PCB body burdens in mink to toxicity data (expressed as tissue concentrations) derived from the scientific literature.

Based on the overall weight-of-evidence presented in the ENVIRON (2010) BERA, wildlife populations foraging in the Stony Creek floodplain—both undeveloped and residentially developed portions—are unlikely to be adversely affected by current concentrations of PCBs in soil or diet. The results of the BERA support a conclusion that, other than continued monitoring of fish in Stony Creek (as stipulated in the 2001 AOC), no further investigation or remedial action is warranted.

*Human Health*

Stony Creek Sediment Human Health Risk Assessment

ChemRisk (1996) prepared a human health risk assessment (HHRA) in support of the 1998 CMS (CELS 1998). Of the numerous on-site and off-site exposure scenarios evaluated in the 1996 HHRA, one is pertinent to Stony Creek: recreational contact by children with Stony Creek sediment.

Based on the assumptions discussed in the 1996 HHRA, ChemRisk (1996) reported an estimated cancer risk of $2 \times 10^{-7}$ for Stony Creek recreators. This value is well below the lower bound of EPA's range of acceptable cancer risks ($1 \times 10^{-6}$ to $1 \times 10^{-4}$), as well as the Indiana Department of Environmental Management's (IDEM's) benchmark of $1 \times 10^{-5}$, indicating that cancer risks associated with recreational activity in Stony Creek were acceptable. The non-cancer hazard quotient (HQ) of 0.06, is also well below EPA's and IDEM's benchmark of acceptable non-cancer hazard (i.e., 1), indicating that non-cancer hazards also were acceptable. Given the 10-fold decrease in concentrations of PCBs in sediment since this HHRA was issued, current risks are significantly lower than those predicted by ChemRisk (1996). The sediments of Stony Creek do not pose an unacceptable risk to human health from PCB contamination.

Human Health Risk Assessment for the Undeveloped Floodplain Soils of Stony Creek

ENVIRON (2009a) prepared a human health risk assessment (HHRA) for the undeveloped floodplain of Stony Creek between the confluence with Wilson Ditch and Allisonville Road. The objective of the HHRA was to evaluate potential human health risks from exposure to soil in the undeveloped floodplain of Stony Creek. Soil concentrations were compared to risk-based closure levels calculated based on long-term recreational exposure to surface soil. Based on factors discussed in the 2009 HHRA, the recreational risk based concentration (RBC) for surface soil is 34 ppm. Factors which influenced this value include the land use of the area. Under a conservation easement for wetland mitigation purposes, the expected land use and potential exposure is far less than would be expected in other areas. In other words, a recreational scenario as used for this assessment is conservative provided the area is restricted.

Potential human health risks are evaluated by comparing measured exposure point concentrations (EPCs) for soil to the recreational risk-based closure level. The 95% UCL concentration for surface soil in the undeveloped floodplain is 5.2 ppm, well below the recreational risk-based closure level. This concentration was calculated at the upper end of the acceptable cancer risk range in order to ensure maximum conservatism. Provided the 95% UCL offers a wide margin of safety by representing a concentration at which 95% of the time the actual concentration of the floodplain's soil is below, the undeveloped floodplain soils do not pose an unacceptable risk. As stated above, there are strict land-use restrictions associated with the conservation easement tied to this land creating an unlikely exposure scenario.

Given that the EPC of 5.2 ppm for surface soil is well below the recreational RBC of 34 ppm, predicted cancer risks, $1 \times 10^{-6}$, are below the IDEM Risk Integrated System of Closure (RISC) program's default acceptable cancer risk level of 1 in 100,000 ($1 \times 10^{-5}$) (IDEM 2006). Non-cancer hazards, 0.2, are also below IDEM's acceptable HQ of 1. Thus, conditions in the

undeveloped floodplain of Stony Creek do not pose unacceptable risks or hazards based on IDEM criteria.

Cancer risks are also within the acceptable incremental cancer risk range of $1 \times 10^{-6}$ to $1 \times 10^{-4}$, defined by EPA in the Superfund National Contingency Plan for the selection of remedial actions that protect human health and the environment. EPA (1991) has stated that remediation generally is not warranted for a contaminated property if the cumulative cancer risk is less than $1 \times 10^{-4}$. Non-cancer hazards are below EPA's acceptable HQ of 1 in the study area. Thus, conditions in the study area do not pose unacceptable risks or hazards based on EPA criteria. Based on these findings, soil in the undeveloped floodplain of Stony Creek poses no unacceptable risk for reasonably foreseeable land uses under either IDEM or EPA criteria.

Human Health Risk Assessments for Residential Properties along Stony Creek

ENVIRON prepared four human health risk assessments (HHRAs) for the residential properties along Stony Creek (ENVIRON 2008a, 2009b,c,d). The HHRAs evaluated potential human health risks from exposure to soil in four groups of residential parcels along Stony Creek: James Place (Monticello Court and Overland Court), Audubon Court and Stony Creek Circle, 132–140 Stony Creek Overlook, and 106-130 Stony Creek Overlook. In total, 29 residential properties were evaluated in the HHRAs. Soil concentrations were compared to risk-based closure levels. This means that an EPA human health risk assessor and toxicologist calculated a safe soil concentration for the surface and subsurface soils which took into account land use and potential exposure. The values where calculated using the IDEM RISC program's default acceptable cancer risk level of 1 in 100,000. Through a conservative risk assessment process, risk based concentrations (RBCs) where developed to guide the cleanup. The residential RBC for surface soil is 3.8 ppm, and the construction worker RBC for all soil depths is 27 ppm.

Potential human health risks were evaluated by comparing measured soil concentrations (the EPC) to the residential and construction worker risk-based closure levels. In most cases the EPC was calculated as the 95% UCL concentration of PCBs in surface soil (0 to 6 inches) and subsurface soil (all depths). *Prior* to cleanup, all properties met the subsurface risk based cleanup value and 25 of the 29 properties met the surface soil risk based cleanup value. After the cleanup, subsurface soil concentrations where further reduced below the already acceptable risk based value and all properties had surface soil values which met the risk based value.

Depending on the property, the pre-excavation 95% UCLs in residential surface soil ranged from 0.52 ppm to 6.8 ppm, while the 95% UCLs in soils from all depths ranged from 0.65 ppm to 19.6 ppm. While the 95% UCL concentrations of PCBs in soils from all depths were all below the construction worker RBC (i.e. 27 ppm), 4 residential properties had pre-excavation EPCs of PCBs in surface soil above the residential risk-based closure level (i.e., 3.8 ppm). Following soil excavation, backfilling, and re-vegetation, 95% UCL concentrations of PCBs in surface soil at all properties were below the applicable risk-based closure level. In addition, non-cancer HQs were below 1 at all properties. Thus, surface and subsurface soils at the residential properties along Stony Creek do not pose unacceptable risks for reasonably foreseeable land uses, including all residential land uses.

In summary, potential risks to human health and the environment have been evaluated for Stony Creek and its residentially developed and undeveloped floodplains:

Summary of potential ecological risks

-Stony Creek Sediment: Dames and Moore (1994) evaluated potential risks to piscivorous birds, while ENVIRON (2010) evaluated potential risks to piscivorous mammals as part of the BERA, and the Corrective Measures Proposal (CMP) evaluates potential risks to benthic invertebrates and fish. All assessments indicate that the measures instituted pursuant to the 2001 AOC are protective of ecological receptors foraging within Stony Creek.

-Floodplain Soils (undeveloped and residentially developed): The BERA indicates that wildlife populations foraging in the Stony Creek floodplain are unlikely to be adversely affected by current concentrations of PCBs in soil or diet.

Summary of potential human health risks

-Stony Creek Sediments: ChemRisk (1996) evaluated potential risks to human health from direct contact with sediment. Predicted cancer risks and non-cancer hazards were well below levels considered unacceptable by EPA and the Indiana Department of Environmental Management (IDEM). Exposure via fish consumption was not evaluated, due to the fish consumption advisory for Stony Creek.

-Undeveloped floodplain soil: ENVIRON (2009a) evaluated potential risks to human health within the undeveloped floodplain based on long-term recreational exposure to surface soil. Predicted cancer risks and non-cancer hazards were well below levels considered unacceptable by EPA and IDEM.

-Residentially developed floodplain soil: ENVIRON (2008a, 2009b,c,d) evaluated potential human health risks at residential properties along Stony Creek, based on long-term residential exposures to surface soil and short-term construction/excavation exposures to surface and subsurface soil. Soil concentrations at 25 of the 29 properties evaluated were below the risk-based closure levels for surface and subsurface soil, while conditions at 4 properties exceeded the surface soil risk-based closure level. Following soil excavation, backfilling, and re-vegetation, cancer risks and non-cancer hazards at all properties were well below those determined to be unacceptable by the EPA and IDEM; EPA issued letters stating this finding. Concentrations of PCBs in soil samples collected from residences along Wilson Ditch did not exceed risk-based closure levels, and thus, does not warrant further evaluation.

SCOPE OF CORRECTIVE ACTION

Under the 1990 AOC, Firestone was required to: a) sample all residential, public, and industrial wells within 0.25 mile of the facility boundary and submit results to EPA; b) implement tasks named in a preliminary RFI work plan and submit a final RFI report upon completion; and c) submit and implement a CMS work plan. Firestone tested all residential, public, and industrial wells in accordance with the AOC and found detectable concentrations of volatile organic compounds in both on-site supply wells and residential wells near the facility. Firestone supplied affected residents with bottled water and later installed an extension to the municipal water supply system for the affected residents (CELS 1998). In addition, a

groundwater treatment system was installed to remediate groundwater at the facility (Dames & Moore 1992). Firestone submitted the RFI Phase II Report to EPA in 1993 (Dames & Moore 1993) and the CMS (CELS 1998) in 1998. EPA selected corrective measures in 2000, following a public review and comment period.

In March 2001, Firestone and EPA executed a second AOC (EPA 2001). Under the 2001 AOC, Firestone was obligated to implement the following corrective measures: a) private well sampling; b) groundwater extraction and treatment; c) source isolation; d) enhanced infiltration pilot study; e) *in-situ* source reduction; f) institutional controls; g) fish and sediment monitoring in Stony Creek; h) relocation and excavation of on-site portions of Wilson Ditch; and i) excavation and lining of off-site portions of Wilson Ditch. The Stony Creek fish and sediment monitoring program, as well as groundwater extraction, treatment, and sampling, are ongoing. Corrective measures for Wilson Ditch were completed in 2005, as documented in the Construction Completion Report that Firestone submitted to EPA in 2006 (MCMS 2006).

Firestone voluntarily implemented the Stony Creek floodplain investigation, following collection of residential floodplain soil samples in 2006 that indicated the presence of PCBs at concentrations exceeding 1 ppm (Round 1; CEC 2007). A comprehensive residential soil sampling program was conducted in 2006 and 2007 (Rounds 2 and 3, respectively), in which approximately 20 properties were identified with PCB concentrations greater than 1 ppm in surface soil (CEC 2007). Round 4 of the Stony Creek investigation was conducted in 2008 for purposes of refining the spatial delineation of PCBs in surface and subsurface soils at residential properties.

EPA opened an informal public participation period in 2008 and: a. distributed the draft interim measure soil removal work plan to the affected community and City of Noblesville, b. held an availability session to further discuss the proposed interim measure and solicit comments, c. received public comments on the draft work plan and responded to them through a Response to Comments document; and, d. revised the interim measure work plan to reflect changes elicited by public comments.

In 2008 and 2009, Firestone implemented interim measures (focused soil excavation, backfilling with clean soil, planting vegetative cover) at 26 residential properties adjacent to Stony Creek. Firestone also investigated PCB concentrations in soil and biota in the undeveloped floodplain in 2008 to support a human health risk assessment (HHRA) and a baseline ecological risk assessment (BERA) for that area.

In 2009, Firestone conducted a similar soil investigation at residential properties along the lower reach of Wilson Ditch. Analysis of soil samples obtained from low spots along the ditch indicated that concentrations of PCBs in soil samples were either not detected or were very low (Premier 2009a). PCB concentrations did not exceed risk-based cleanup concentrations. This investigation demonstrated that the remedy prescribed in the 2000 Record of Decision and the 2005 remedial action were effective and that no further investigation of this area is warranted.

Firestone has also collected sediment samples from Stony Creek itself during five different sampling events in 2003, 2005, 2006, 2007, and 2009. The sediment sampling conducted in 2003, 2005, and 2007 followed methods outlined in the 2001 Quality Assurance Project Plan (Firestone 2001). During these three sampling events, composite sediment samples

were collected from three locations in Stony Creek: the confluence of Wilson Ditch and Stony Creek, the confluence of Stony Creek and the West Fork of the White River, and a station midway between the two other stations. Sediment samples were also collected from Stony Creek in 2006 following a different sampling design than that used in 2003, 2005, and 2007 (Firestone 2006). In 2006, 144 surface sediment samples were collected along the entire length of Stony Creek between the confluence with Wilson Ditch and the West Fork of the White River.

In 2009, Firestone submitted an enhanced sediment sampling design for Stony Creek (ENVIRON 2009e) to ensure repeatability and definitiveness. The enhanced sediment sampling design included twenty-four transects established approximately every 200 ft along the length of Stony Creek. Sediment samples were collected from 0-6" and 6-12" at each of these transects. The results demonstrated that the PCB concentrations within the shallow and deep sediment are below 1 ppm. The average PCB concentration (95% UCL) from 0-6" is 0.69 ppm and from 6-12" is 0.74 ppm. The concentration of PCBs in Stony Creek sediment has consistently decreased since the 2005 source removal cleanup of Wilson Ditch.

In accordance with the 2001 AOC, to evaluate the impact of PCBs in sediment on the environment, Firestone has collected fish tissue samples from Stony Creek in 2001, 2003, 2005, 2006, 2007, and 2009. Although the Indiana State Board of Health apparently collected fish tissue samples from Stony Creek as early as 1984, information is not available on sampling locations, methods, analytical methods, and quality control. Even for the fish tissue sampling events conducted since 2001, fish species, sample matrices (i.e., fillet or whole body), size class, and PCB analytical methods (i.e., Aroclors or congeners) have not been consistent. Thus, based on data collected prior to 2009, it is difficult to discern trends in concentrations over time, or across species or locations. Samples were analyzed for PCB Aroclors in 2001, 2003, 2005, 2007 and 2009, while samples collected in 2006 were analyzed for PCB congeners. ENVIRON (2009e) details the methods and results of the pre-2009 sampling events. Given the inconsistencies in fish monitoring methods across sampling events, an enhanced sampling program was proposed for the 2009 monitoring event (ENVIRON 2009e) and approved by EPA. Thus, the following discussion focuses on the 2009 sampling event.

The 2009 fish monitoring event targeted three trophic levels, as represented by three species: green sunfish (*Lepomis cyanellus*, a forage fish species), northern hog sucker (*Hypentelium nigricans*, a benthivorous fish species), and rock bass (*Ambloplites rupestris*, a piscivorous fish species). Green sunfish and rock bass were collected for analysis of skin-on fillet concentrations and reconstructed whole body concentrations; northern hog sucker was collected for analysis of whole body concentrations. Recognizing that fish are mobile, the fish tissue monitoring program did not differentiate among sampling stations for fish. Rather, fish were collected from the entire length of Stony Creek from the confluence with Wilson Ditch to the confluence with the West Fork of the White River. Fish samples were homogenized in the laboratory, and the composite tissue samples were analyzed for PCB Aroclors, lipid content, and percent moisture.

All samples had detectable concentrations of PCBs. Concentrations of PCBs in fillet samples were consistently lower than in whole body samples. For example, mean whole body total PCB concentrations ranged from 2.4 ppm (for northern hog sucker) to 4.8 ppm (for green sunfish), while mean fillet concentrations ranged from 0.35 ppm (for rock bass) to 0.64 ppm (for green sunfish). Firestone will continue to monitor Stony Creek fish in accordance with the 2001

Order. In addition, it is anticipated that the State will maintain the fish consumption advisory for Stony Creek.

The following corrective measures have already been implemented within the Stony Creek system: a) institution of fish consumption advisory in 1984 by the Indiana State Department of Health[3]; b) Wilson Ditch and Stony Creek confluence source control in 2005; c) Stony Creek monitored natural recovery since 2001; d) residential risk-based soil removal in 2008 and 2009.

The next sections will summarize and evaluate the proposed remedies for the undeveloped and residentially developed floodplains. Essentially, the past interim measures; excavation, backfilling and vegetation, within the residentially developed floodplain was the chosen remedy by EPA with community input. That work is again summarized and evaluated in this document, below.

SUMMARY OF ALTERNATIVES FOR UNDEVELOPED FLOODPLAIN SOIL

The corrective measures alternatives considered for the undeveloped floodplain (UF) of Stony Creek are identified below:

UF-1: No Action

"No action" is the baseline case against which all other corrective measures are compared. For the undeveloped floodplain of Stony Creek, "no action" would have involved *no* institutional or engineered remedial actions, including the 2005 source control action at Wilson Ditch, and *no* additional study or monitoring. "No action" would have meant leaving all floodplain soils in place and taking no measures to reduce exposures to that soil or to enhance the existing habitat. Existing access restrictions would remain in place, however, at the discretion of current land owners and consistent with the existing conservation easement.

UF-2: Monitored Natural Recovery

Under MNR, floodplain soil would remain in place and existing natural processes would be allowed to contain, destroy, alter, or otherwise reduce the bioavailability and toxicity of chemicals in floodplain soil. In particular, the accumulation and degradation of leaf litter within the floodplain enriches surface soil with organic carbon; the high affinity of PCBs for organic carbon reduces the bioavailability of PCBs. In addition, the frequent (i.e., at least annual) flooding of Stony Creek results in deposition of silt on the floodplain soil. MNR is only an option, and is most successful, when the source of the pollution has been removed or controlled. As a result of the 2005 source removal action in Wilson Ditch, sediment and suspended solids in Stony Creek have generally low concentrations of PCBs (below 1ppm). When those materials are deposited on floodplain soil during flooding, concentrations of PCBs in the most accessible soils (i.e., surface soils) are reduced. MNR would include long-term monitoring of soils or biota to verify that conditions within the undeveloped floodplain are continuing to improve.

3) http://www.in.gov/isdh/23650.htm

UF-3: Area-Wide Habitat Enhancement with Focused Vegetative Stabilization

Habitat enhancement involves two actions that would enhance the habitat property-wide while reducing potential chemical exposure in the two areas of higher PCB concentration at the site (see Figure 4).

In general, this corrective measure option would include: planting native groundcover in the two locations within the floodplain where PCBs are elevated, 28ppm and 41ppm; erecting approximately 50 bat houses within canopy gaps in the forested portion of the undeveloped floodplain; and planting approximately 100 seedlings of shagbark hickory, shellbark hickory, and/or eastern cottonwood. This option would require Firestone to develop a detailed habitat enhancement plan in collaboration with the City of Noblesville, the Central Indiana Land Trust and the landowners of the island area.

At the two areas of higher concentrations (28ppm and 41ppm), appropriate vegetation would be selected and planted with the purpose of stabilizing soils in the areas to limit erosion and provide a vegetative barrier for humans, as well as wildlife. In addition, this alternative would include activities that will improve habitat for valued wildlife species, while avoiding any increase in their contact with PCBs. This option would focus on habitat enhancement for valued species expected to forage within the undeveloped floodplain—bats, including the federally protected Indiana bat. The BERA (ENVIRON 2010) demonstrated that the Indiana bat, despite its endangered status, is not currently at risk of adverse effects from the PCBs in prey within the undeveloped floodplain of Stony Creek, even when highly conservative assumptions regarding PCB concentrations and area use factors are employed. Although there are no records of Indiana bats present in the undeveloped floodplain of Stony Creek, this area lies within the Indiana bat's range and provides suitable foraging and roosting habitat. However, in the likely event that Indiana bats never roost within the undeveloped floodplain of Stony Creek, this corrective measure option would also benefit other mammalian (particularly bat), avian, and plant species that are known to inhabit the area.

Portions of the undeveloped floodplain offer suitable bat habitat because many of the mature trees in the area provide the required roosting structure for breeding females (i.e., loose-barked trees, such as hickory and sycamore). In addition, the area is consistent with the characteristics of essential summer habitat due to the availability of permanent surface water within 0.3 miles of suitable roosting trees (e.g., the White River and Stony Creek) (Evans et al. 1998). Habitat enhancement actions would focus on a summer habitat for bats, which may already be present in the area. In particular, Firestone would erect artificial roosting sites (i.e., bat houses) and plant seedlings of tree species favored as summer roosts by bats. Bat houses would serve as short-term roosting habitat, while seedlings of loose-barked tree species (e.g., shagbark hickory (*Carya ovata*), shellbark hickory (*Carya laciniosa*), and eastern cottonwood (*Populus deltoides*) would eventually provide long-term roosting habitat, once they mature.

UF-4: Capping

This corrective measure option would involve placement of a physical barrier, such as soil or an engineered control, over the most highly PCB-impacted soil (i.e., areas immediately surrounding sampling stations UFP-41 and UFP-24) to reduce the potential for human or ecological receptor exposure to that soil. Specific design details would be dictated by site

conditions, which could significantly affect cost and recovery potential. Access to the locations, as well as the capping itself, would require potentially significant tree removal. Also, cap thickness and permeability inevitably influence drainage within the floodplain forest; because micro-topography within floodplain forest is critical to the hydrologic regime, these design considerations would affect achievement of several corrective measure objectives.

UF-5: Focused Excavation

Focused excavation in the undeveloped floodplain would involve removal of the upper 12 inches of soil from areas immediately surrounding sampling stations UFP-41 and UFP-24, backfilling the excavated areas with clean soil, and planting vegetative cover. Focused excavation is typically conducted within areas with high exposure potential and/or where there is a concern that soil is not stable and is at risk of being mobilized by natural events (e.g., erosion) or anthropogenic activities (e.g., lawn care). Soil excavation would be conducted mechanically and would require designation of staging areas, construction of access roads or paths for equipment, and tree felling. For example, it is estimated that at least 12 mature trees (including two 30-inch diameter sycamores) in the immediate vicinities of UFP-41 and UFP-24 would require removal prior to initiating any excavation activities. This estimate does not include the trees that also would require removal for construction of access roads or paths.

EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES: UNDEVELOPED FLOODPLAIN SOIL

The proposed remedy for the undeveloped floodplain is UF-3, Area-Wide Habitat Enhancement with Focused Vegetative Stabilization. This section profiles the performance of the proposed remedy, compared to the other potential remedies, against the four general standards and the five remedy decision factors.

1. Protection of Human Health and the Environment: As discussed in the "Summary of Facility Risks" section, concentrations of PCBs in the soils of the undeveloped floodplain did not pose a risk to either human health or the environment. Therefore, all of the options above, including 'No Action' would satisfy this criterion.

2. Attainment of Media Cleanup Standards: All remedial options would attain cleanup standards as the current conditions within the undeveloped floodplain do not exceed the exposure point concentrations for human health or the environment. The proposed remedy, UF-3, will further reduce the already acceptable risk at two sampling locations where the PCB concentrations were above the exposure point concentration (although the 95%UCL of the floodplain as a whole is well below the cleanup standard). The proposed remedy will also benefit the habitat and ecosystem as a whole.

   The proposed remedy is preferable to the other options because it addresses the two sampling locations mentioned above with far less short and long-term negative effects on the quality of the habitat. Capping (UF-4) and focused excavation (UF-5) would require potentially substantial tree removal both in the areas of concern and also for access roads which would have to be constructed in order to reach the areas of concern. As stated in the Stony Creek Watershed Management Plan, areas such as this

stretch of Stony Creek should be preserved and protected for the health of the entire watershed.

Other corrective measures objectives for the undeveloped floodplain will be achieved through the proposed remedy. These include: preserving and enhancing the habitat quality within the floodplain, aligning the remedy with the goals of the conservation easement and wetlands lease already placed upon the floodplain, ensuring the character of the neighborhood is maintained through minimal tree loss, enhancing the habitat for the federally protected Indiana bat and utilizing EPA Green Remediation concepts by reducing the demands placed upon the environment by the remedy.

3. Controlling the Source of Releases: Assuming that the 'No Action' baseline would have involved no institutional or engineered remedial actions, including the 2005 Wilson Ditch remedy, UF-1, would not have controlled the sources of PCBs to Stony Creek or its floodplains. Excavation of Wilson Ditch and portions of Stony Creek sediment took place in 2005, so source control has already been implemented and therefore would be attained by all the other remedial options, UF-2 – UF-5.

4. Compliance with Waste Management Standards: Waste management standards were adhered to for disposal of PCB-impacted sediment following source control excavation within Wilson Ditch and at the confluence with Stony Creek (2005). TSCA disposal was complied with for sediment containing PCB concentrations at or above 50ppm and all necessary permits were obtained. PCBs have not been detected in the undeveloped floodplain at or above 50ppm; therefore, if any soil is excavated, soils would be disposed of at a Subtitle D landfill. With the exception of UF-1, all proposed remedies would meet this criterion.

5. Long-term Reliability and Effectiveness: UF-2 – UF-4 have high levels of certainty for long-term reliability and effectiveness. UF-1, 'no action', would not have involved source control and, therefore, would have represented possible mobilization of contamination and low certainty for effectiveness. UF-5, 'focused excavation', has a small degree of uncertainty associated with the long-term reliability of restoring the floodplain. Although excavation of the two sampling locations with elevated PCBs would reliably remove contamination, it is unknown if restoration attempts would be sustainable or if extensive erosion would compromise the floodplain integrity (this considers the extensive tree removal which would be necessary to excavate). UF-3, in concert with the source control already completed, has a high level of certainty in obtaining this criterion. Furthermore, the long-term reliability of the habitat enhancements, including the bat houses and trees planted represents a high level of certainty that this ecosystem will benefit from the proposed remedy for years to come.

6. Reduction of Toxicity, Mobility or Volume of Wastes: As baseline conditions with the existing source control do not pose unacceptable risk to human health or the environment, UF-3 would attain this criterion. UF-1 would not attain this criterion, UF-2 would not reduce the volume of waste but may reduce mobility, UF-4 would reduce the mobility

and UF-5 would reduce the volume, but may temporarily (despite Best Management Practices) increase mobility during soil disturbance.

7. Short-term Effectiveness: Provided the baseline conditions do not pose human health or environmental risk, all proposed remedies attain this criterion. With respect to worker risk, appropriate personal protective equipment would be used with any work conducted in the undeveloped floodplain. Some additional short-term risks may apply to UF-4 and UF-5 given larger equipment and tree felling that would be involved.

8. Implementability: UF-2 would be readily implementable. UF-3 – UF-5 would require access; however, this is easily obtained and implementable. UF-4 and UF-5 may require additional levels of permission in regards to the conservation easement as substantial tree removal that would be necessary. Further, the implementability of the restoration that would be required under UF-4 and UF-5 is uncertain. UF-3 appears readily implementable.

9. Cost: The source control component for this site has already been conducted and cost more than $1,000,000 (this does not include the other corrective action activities on-site or the residential floodplain interim measure). This included the excavation of Wilson Ditch and the confluence with Stony Creek, completed in 2005. The proposed remedy, UF-3, has an estimated cost of $50,000 - $100,000 with a moderate degree of uncertainty associated with the estimate. UF-2 has an estimated cost of $100,000 - $500,000 and a low degree of uncertainty associated with the estimate. UF-4 has a cost estimate of $500,000 - $1,000,000 and a moderate degree of uncertainty associated with the estimate. UF-5 has a cost estimate of greater than $1,000,000 and a high degree of uncertainty associated with the estimate.

SUMMARY OF ALTERNATIVES FOR RESIDENTIAL FLOODPLAIN SOIL

The corrective measures alternatives considered for the residentially developed floodplain (RF) of Stony Creek are identified below:

RF-1: Risk-based removal action with homeowner input, property-specific landscape enhancements and post-excavation monitoring

This remedy was implemented in 2008 and 2009, remediating 26 parcels. Excavation plans were developed based on comparison of 95% UCL concentrations to risk-based closure levels, combined with homeowner input. Excavated areas were backfilled, re-vegetated, landscaped and will be monitored for three growing seasons to verify the success of the restoration activities. Prior to selecting this interim measure, EPA held a public comment period and received many helpful comments which facilitated the cleanup effort.

RF-2: Excavation to 1 ppm

This corrective measure would have involved removal of all soil at residences with grid sample results above 1 ppm. Excavated areas would have been backfilled, re-vegetated, and monitored for three growing seasons. This option was available to all affected homeowners.

Since RF-1 was the remedy implemented as an interim measure during 2008-2009, the only other remaining option today is 'excavation to 1 ppm.' However, during the public comment period of 2008 at least one other option was discussed, 'Risk-based Removal Action.' For the purpose of transparency, this remedial option will be briefly discussed here. This option would have relied solely on property PCB concentrations compared to the risk-based cleanup levels as a basis for excavation. Under this option, no more than 4 properties would have been remediated because these were the only properties where PCB concentrations were above the risk-based cleanup levels in surface soils. EPA recognized during the public comment period that homeowner input was critical to the success of an area-wide cleanup and did not choose this remedial option. Many homeowners, whose property 95% UCL was below the cleanup levels, expressed a desire to have certain 'grids' with elevated concentrations removed in order to lower the property's overall concentrations. Furthermore, although the only other option presented in this document is 'excavation to 1 ppm', it is important to note that each homeowner was provided this option during the remedy implementation. For a variety of reasons, such as: tree removal, creek bank stability and overall risk, most homeowners did not choose to excavate their property to 1 ppm. The removal of certain 'grids' often resulted in a property-wide 95% UCL at or below 1 ppm while preserving the integrity of the property.

EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES: RESIDENTIALLY DEVELOPED FLOODPLAIN SOIL

The proposed remedy for the residentially developed floodplain, implemented as an interim measure during 2008-2009, is RF-1, risk-based removal action with homeowner input, property-specific landscape enhancements and post-excavation monitoring.

1. Protection of Human Health and the Environment: With the exception of four properties, baseline conditions did not pose unacceptable risks. These four properties were remediated to risk-based cleanup levels and an additional 22 properties were remediated to further reduce the already acceptable risk. RF-1 achieved this criterion. For those homeowners who choose RF-2, this criterion was also achieved.

2. Attainment of Media Cleanup Standards: RF-1 achieved this criterion at the four properties where the 95% UCL concentrations were greater than the cleanup levels. This option also further reduced the already acceptable risk at 22 properties by further lowering the 95% UCL. Most properties have a post-excavation 95% UCL at or below 1 ppm. For those homeowners who chose RF-2, this criterion was also achieved.

   Site specific corrective measures objectives were also met through implementation of RF-1. These included: informing and engaging the affected property owners, local residents and the City of Noblesville through a meaningful participation process; minimizing the disruption and disturbance of the community; maintaining the character of the neighborhood and integrity of the properties, and; utilizing EPA Green Remediation concepts to reduce the demand placed on the environment by the corrective measure.

3. Controlling the Source of Releases: Source control was completed in 2005 and is a component of RF-1 and RF-2. This criterion has already been achieved.

4. Compliance with Waste Management Standards: This criterion has been achieved as waste management standards were adhered to for disposal during the implementation of the interim measure. TSCA disposal was used for soils at or above 50 ppm while other excavated soils were disposed of at a Subtitle D landfill. All necessary permits were obtained during the implementation of RF-1.

5. Long-term Reliability and Effectiveness: In concert with source control, RF-1 is expected to have long-term reliability and effectiveness. Post-excavation monitoring will verify the reliability and effectiveness of the remedy and restoration activities.

6. Reduction of Toxicity, Mobility or Volume of Wastes: This criterion was achieved through RF-1 to a greater extent than necessary to mitigate potential risks. The volume and toxicity of PCB contamination was greatly reduced.

7. Short-term Effectiveness: RF-1 achieved this criterion with the rapid removal of contaminated grids and the immediate (24-hour) backfilling activities. Short-term risks to workers were mitigated through appropriate protective equipment. Further, on-going air monitoring ensured the short-term effectiveness of the remediation activities.

8. Implementability: RF-1 was implemented during 2008-2009.

9. Cost: RF-1 cost more than $1,000,000, in addition to the 2005 source control activities which also cost more than $1,000,000. Had the 'Risk-based Removal' option been implemented and only four properties remediated, the cost would have been an estimated $500,000 - $1,000,000.

## PUBLIC PARTICIPATION

EPA solicits input from the community on the cleanup methods proposed under each of the previous alternatives. EPA has set a public comment period from July 1, 2010-July 30, 2010, to encourage public participation in the selection process. Previous public participation opportunities regarding the Stony Creek area included: 2001 public comment period; 2008 public meeting and public comment period on the interim measure work plan; 2009 availability session and response to comments on the interim measure work plan; and 2010 post-interim measure implementation fact sheet. EPA will host a public meeting in Noblesville on July 14th at City Hall for this Statement of Basis. We encourage community members to attend the meeting and submit any comments regarding these proposed remedies in writing by July 30, 2010.

The administrative record[4] is available at the following locations (please call for hours):

Noblesville Public Library
1 Library Plaza
Noblesville, IN 46060
(317) 773-1384

4) Attached to this Statement of Basis is the Index to the Administrative Record that can be found at the Noblesville Library.

EPA, Region 5
7th Floor Record Center
77 W. Jackson Blvd.
Chicago, IL 60604
(312) 886-4253

Comments will be summarized and responses provided in the Response to Comments. The Response to Comments will be drafted at the conclusion of the public comment period and incorporated into the administrative record. To send written comments or obtain further information, contact:

Michelle Kaysen (LU-9J)
77 W. Jackson Blvd
Chicago, IL 60604
(312) 886-4253
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**Definitions**

Baseline Ecological Risk Assessment (BERA): A comprehensive and thorough process through which to determine if the known ecological receptors are being adversely impacted by the presence of a particular stressor, or stressors, such as contamination.

Carnivore: Animals that eat other animals.

Ecological Risk Assessment (ERA): The process through which scientists evaluate the likelihood that adverse ecological effects might occur, or are occurring, due to exposure to one or more stressors, such as contamination.

Invertebrates: Animals without backbones: e.g. insects, spiders, crayfish, worms, snails, mussels, clams, etc.

Invertivore: A plant or animal which feeds on invertebrates.

Part per million (ppm): A relative proportion of one part per million parts measured; therefore, 1 ppm of PCBs measured in soil means 1 part PCB per million parts soil.

PCBs/Polychlorinated Biphenyls: A type of organic chemical with chlorine atoms that was extensively used in industry for a variety of purposes, but is now banned.

Piscivore: A fish-eating animal (bird, mammal, reptile, amphibian, or other fish).

95% UCL: A conservative way to calculate the representative concentration of any given contaminant within an area. The 95% UCL represents a concentration at which 95% of the time the actual, or "real world", concentration is below; therefore, the 95% UCL is an overestimate which provides a wide margin of safety.