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RECORD OF DECISION

Little Mississinewa River Site
Union City, Indiana

July 2004

SUPERFUND RECORD OF DECISION (ROD)
Little Mississinewa River Site

Union City, Indiana

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APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order by Consent
ARAR	Applicable or relevant and appropriate requirement
ASL	Abandoned sewer line
BAF	Bioaccumulation Factor
bgs	below ground surface
BRA	Baseline Risk Assessment
BSAF	Biota Sediment Accumulation Factor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CFR	Code of Federal Regulations
CUG	Cleanup Goal
cy	cubic yard
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
FS	Feasibility Study
HI	hazard index
HQ	hazard quotient
IDEM	Indiana Department of Environmental Management
IRA	Interim Removal Action
LMR	Little Mississinewa River
LOAEC	Lowest Observed Adverse Effects Concentration
LOAEL	Lowest Observed Adverse Effects Level
MNR	monitored natural recovery
NCP	National Contingency Plan
NHPA	National Historic Preservation Act
NOAEC	No Observed Adverse Effects Concentration
NOAEL	No Observed Adverse Effects Level
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
ppm	parts per million
PRP	potentially responsible party
RAL	Remedial Action Level
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
STP	Sewage Treatment Plant
TBC	to be considered
TOC	Total Organic Carbon
TRV	toxicity reference values
TSCA	Toxic Substances Control Act
UTC	United Technologies Corporation
USC	United States Code
WQS	Water Quality Standard

EXECUTIVE SUMMARY
Record of Decision (ROD) for Little Mississinewa River Site

The Little Mississinewa River Site includes an approximately 7-mile stretch of the Little Mississinewa River (referred to herein as "the LMR"). The Site extends from the Division Street bridge in Union City, Indiana to the confluence with the Mississinewa River. A removal action was conducted under EPA oversight in 2001-2002 from the former outfall areas of the former Sheller-Globe facility and the former Westinghouse facility to the Division Street bridge in Union City, Indiana. This Record of Decision (ROD) covers the remainder of the LMR. The selected remedy outlined in this ROD addresses the human health and ecological risks posed to people and ecological receptors associated with polychlorinated biphenyls (PCBs) that have been released at the Site. Presently these PCBs reside in the sediments and the flood plain areas of the LMR, and this ROD outlines a remedial plan to address these PCB-contaminated sediments and soils.

PCBs in sediments can enter the aquatic food chain, thus contaminating aquatic organisms, including fish, and ultimately placing humans and wildlife at risk of adverse health effects from the consumption of these organisms. Acknowledging the human health risk posed by exposure to PCBs at many contaminated sites, some state health and environmental agencies (such as those in Indiana) have issued fish and wildlife consumption advisories to caution sport fishers and hunters and their families against eating the fish or wildlife from these sites.

This ROD is intended to be the first and only ROD for the LMR Site. This ROD completes the remedial decision making process for the entire Site. Public comments on the Proposed Plan for the Site were considered.

For several decades, the former Sheller-Globe facility and former Westinghouse facility manufactured small engines and used PCB oils in this process. The PCBs were released to the LMR directly via outfalls for the facilities and indirectly after processing at the Union City sewage treatment plant, which is located approximately one mile downstream from the former outfalls. PCBs have a tendency to adhere to sediment and soil, and they have contaminated the LMR channel sediments and flood plain soils.

Presently, it is estimated that the LMR contains approximately 4800 pounds of PCBs in 200,000 cubic yards (cy) of sediment and soils. This ROD provides for the removal by excavating approximately 57,000 cy of contaminated sediments containing approximately 3500 pounds of PCBs from the LMR and its flood plain areas; 90% of the PCB mass in contaminated sediments and 63% of the PCB mass in contaminated flood plain soils will be removed.

The PCB-contaminated sediments and soils will be "dry-excavated" (isolated, dewatered, and excavated with standard earth-moving equipment) and taken to a landfill for permanent disposal. This ROD establishes an "action level" of 4 parts per million (ppm) PCBs for river sediments in the top 12 inches and 5 parts ppm for sediments below the top 12 inches, a residential flood plain soil action level of 5 ppm, and a recreational flood plain soil action level of 20 ppm for this cleanup effort. Implementation of the cleanup using these action levels will achieve the cleanup goals for the Site of 1 ppm average for river sediments in the top 12 inches, 5 ppm for sediments below the top 12 inches, 1.2 ppm average for residential flood plain areas, and 20 ppm for recreational flood plain areas. Reducing the concentration of PCBs in the LMR channel sediments and flood plain soils to these levels will dramatically reduce the risks to human health and ecological receptors. Following the remedial implementation, biomonitoring of the LMR will take place. This monitoring will cover sampling of aquatic organisms to gage the reductions of PCB concentrations in the ecological receptors. Monitored Natural Recovery

(MNR) will be implemented in a portion of the LMR channel that does not require excavation but contains PCB contamination levels above 1 ppm. MNR includes the monitoring of processes such as degradation, dispersion and burial of contaminant concentrations to the point where the contaminants are no longer of concern. Monitoring would continue until acceptable levels of PCBs are reached in sediments, surface water and fish tissue.

The estimated cost for the remedial action for the LMR is $27 million.

Declaration for the Record of Decision (ROD) for Little Mississinewa River Site Union City, Randolph County, Indiana
June 2004

Part 1: Declaration for the Record of Decision

The Little Mississinewa River Site ("the Site") includes an approximately 7-mile section of the Little Mississinewa River (referred to herein as the "LMR"), from the Division Street bridge in Union City, Indiana to the confluence with the Mississinewa River.

This Record of Decision ("this ROD") addresses the risks to people and ecological receptors associated with polychlorinated biphenyls (PCBs) in the LMR channel sediments and flood plain areas. PCBs, the primary risk driver at this Site, are contained in sediment deposits and flood plain areas located along approximately 3 ½ miles of the LMR, from the Division Street bridge to New Lisbon. The implementation of the remedy selected in this ROD will result in reduced risks to humans and ecological receptors living in and near the Site.

With the exception of continuing releases of PCBs from contaminated sediments, it is believed that the original PCB sources are now controlled. PCBs in the LMR were from historical discharges from the former Sheller-Globe facility and former Westinghouse facility in Union City, Indiana.

The Indiana Department of Environmental Management (IDEM) has reviewed the selected remedy and does not concur. IDEM has indicated that EPA's identification of the Indiana Water Quality Criteria for PCBs as To Be Considereds (TBCs) rather than applicable or relevant and appropriate standards (ARARs) for the LMR surface water post-remediation is the reason for their nonconcurrence. A copy of IDEM's letter has been added to the Administrative Record for the Site.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for the Site and was written in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. This decision is based on information contained in the Administrative Record for this Site. This ROD is consistent with applicable United States Environmental Protection Agency (EPA) guidance and policy.

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health, welfare, or the environment from an imminent and substantial endangerment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The objectives of the response actions for this Site are to protect public health, safety and welfare and the environment and to comply with applicable federal and state laws. The selected remedy specifies response actions that will address PCB-contaminated sediment in the LMR and its flood plain areas. EPA believes the remedial actions outlined in this ROD, if properly implemented, will protect human health, safety and welfare and the environment to the extent practicable. Among the goals for the selected remedy are the removal of a fish consumption advisory and the protection of the fish and wildlife that use the LMR.

The major components of the selected remedy include:

- Removal of an estimated 57,000 cubic yards (cy) of contaminated sediment containing approximately 3500 pounds of PCBs from the LMR and its flood plain using "dry excavation" techniques that minimize adverse environmental impacts. The selected remedy calls for disposal of the excavated sediments and soils at an off-site licensed disposal facility. The LMR will be restored as closely as possible to its pre-excavation condition.

- Monitored Natural Recovery (MNR) of the residual PCB contamination remaining in excavated areas and undisturbed areas until the concentrations of PCBs in fish tissue are reduced to an acceptable level. The fish consumption advisories will remain in place until acceptable PCB levels are achieved.

- A long-term monitoring program covering various media (e.g., water, tissue, and sediment) throughout the LMR to determine the effectiveness of the remedy. A final long-term monitoring plan will be developed as part of the remedial design phase.

- Use of existing land use controls administered by the Randolph County Drainage Board. To the extent that PCB-contaminated soils and sediments are left in place above protective levels, EPA will identify and seek additional land use and/or other institutional controls to protect the engineered remedy and ensure that unacceptable levels of PCBs are not released to the environment in the future.

STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 United States Code (USC) § 9621. It is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements, and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. It does not satisfy the statutory preference for treatment as a principal element of the remedy, because PCB-contaminated sediment and soils will not be treated prior to disposal.

Because the selected remedy will result in hazardous substances remaining on the Site above levels that allow unlimited use and unrestricted exposure, a statutory review will be conducted every 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Once all Remedial Action Objectives have been met, a 5-year review will no longer be needed.

DATA CERTIFICATION CHECKLIST

The following information is in the Decision Summary section of this ROD. Additional information is in the Administrative Record file for this Site.

- Chemicals of concern and their respective concentrations – Sections 2 and 5

- Baseline risk presented by the chemicals of concern – Section 6

- Cleanup levels established for the chemical of concern and the basis for these levels – Section 7
- Surface water and land use assumptions used in the baseline risk assessments and ROD – Section 6
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy – Section 9
- Estimated total present-worth costs; and the time to implement each of the various remedial alternatives – Section 8
- Key factors that led to selecting the remedy (i.e., best balance of trade-offs with respect to the balancing and modifying criteria) – Section 8

7/20/04

Date

for Richard C. Karl, Acting Director
Superfund Division
U.S. EPA – Region 5

Declaration for the Record of Decision (ROD) for Little Mississinewa River Site Union City, Randolph County, Indiana

June 2004

Part 2: Superfund Record of Decision

1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

1.1 Site Name and Location

The Little Mississinewa River (LMR or river) Site (the Site) is located in Randolph County near the eastern border of Indiana (Figure 1). The Site includes portions of Township 18N, Range 1W, Sections: 11, 12, 13, 23, 24, and 26 and Township 21N, Range 15E Sections: 10, 15, 22, and 27. For the purposes of the Remedial Investigation (RI), the Site was divided up into five primary areas including: 1) the four RI LMR channel and bank areas beginning at the Division Street Bridge in Union City, Indiana and extending generally north and downstream to the confluence of the LMR and Mississinewa River, approximately 7.5 miles (Figure 2); 2) the identified portions of the RI LMR floodplains that lie within the "active transfer zone" (the area outside of a stream channel that has active sediment transfer during flood events) beginning at the Division Street Bridge extending generally north to the confluence of the LMR and Mississinewa River (Figure 3); 3) the RI portion of the Abandoned Union City Sanitary Sewer Line soil/backfill materials extending from Division Street to the Union City Sewage Treatment Plan (STP) (Figure 4); 4) representative RI agricultural floodplain sampling areas that lie outside and adjacent to the "active transfer zone" (Figure 5); and 5) Area E, the floodplain area identified for investigation (but not actually investigated) as part of the 2001 LMR Removal Action (Figure 6).

1.2 Brief Description

1.2.1 Land Use

The surrounding areas are utilized predominantly for agricultural purposes. However, portions are utilized for a mixture of recreational, industrial, residential, and municipal purposes (to the extent permitted under existing floodplain regulations). Approximately 15 residences are located along the LMR in the Site. The LMR and land located within 75 feet of the LMR are also designated as a regulated drain under Indiana law (IC-36-9-27) and are subject to the jurisdiction of the local drainage board.

1.2.2 Regional Soils and Geology

The Site is located in the northeastern portion of Randolph County, Indiana. A general soil map of Randolph County, produced by Indiana Department of Natural Resources, Soil and Water Conservation Committee in conjunction with the United States Department of Agriculture, Soil Conservation Service and Purdue University, was reviewed to determine the soil characteristics in the vicinity of the Site (Figure 7). According to the Soil Survey documentation, soils located in the vicinity of the Site are classified as either Glynwood-Pewamo-Morley association or Eel-Sloan-Fox association. Glynwood-Pewamo-Morley association soils are characterized by gently sloping (nearly level), deep, moderately well drained soils in till plains and moraines. Eel-Sloan-Fox association soils are characterized by gently sloping (nearly level), deep to moderately deep, poorly to well-drained soils that formed over sand and gravel in alluvium and outwash located on floodplains and stream terraces.

The Site is situated on the Tipton Till Plain, which is characterized by gently rolling terrain. This lithologic unit consists of unconsolidated glacial drift in excess of 100 feet thick, and is primarily composed of till (poorly sorted clay, silt and sand) that was likely deposited during the Kansan, Illinoian and Wisconsinan glaciation events. Interbedded within the till are thin, laterally discontinuous, stratified sand and gravel deposits which may act locally as perched water bearing zones. Recessional moraine deposits of the Union City Moraine are present at the southern portion of the Site. The morainal deposits are generally more complex than the till consisting of complexly interbedded sands, silt, clay and gravel (1973).

Bedrock underlying the till consists of Silurian aged limestone, dolomite and shale that dip slightly to the southwest. The formation directly underlying the glacial drift consists of weathered and fractured limestone and dolomite. Results of previous field investigations indicate that the bedrock surface beneath the region dips toward the west into a northwest trending shallow bedrock valley reportedly formed as a tributary of the ancestral Teays River Valley System (1973).

1.2.3 Regional Hydrogeology

Based on available lithologic data, two distinct hydrogeologic units were identified as containing potential water bearing intervals within the Site area. These potential water-bearing hydrogeologic units consist of the following: 1) the unconsolidated sediments that extend from land surface to the underlying bedrock; and, 2) the upper portion of the underlying permeable consolidated bedrock. The unconsolidated sediment unit consists of interbedded and laterally discontinuous, sand and gravel lenses within a laterally extensive glacial till. The permeable consolidated bedrock unit consists of limestone, dolomite and shale.

1.2.4 Unconsolidated Hydrogeologic Unit

A shallow transmissive zone within the unconsolidated sediments may occur beneath the Site within the first 40 feet of subsurface glacial materials. This potential transmissive zone, referred to herein as the Shallow Zone, consists of laterally discontinuous and typically isolated, thin, shallow, highly variable silty-sand and gravel lenses within a laterally extensive glacial till. By definition this Shallow Zone is not an aquifer (as the groundwater yields are too low to supply usable quantities of water). When encountered, the groundwater in this Shallow Zone is typically perched or present under unconfined conditions (water table) or semi-confined conditions, although at some locations the groundwater is confined by surficial silts and/or clays. Groundwater associated with this Shallow Zone has been encountered in borings advanced at locations in the general vicinity of the Site from depths ranging between approximately 5 feet below ground surface (bgs) to approximately of 25 feet bgs.

The uppermost aquifer in the vicinity of the Site is present within unconsolidated sediments at depths of approximately 40 to 50 feet bgs. This aquifer, comprised of the deeper, relatively thick sand and gravel deposits is referred to herein as the Deep Zone. The sediments that comprise this Deep Zone aquifer are generally less than 20 feet thick, and are present over a broader lateral extent and exhibit a reported estimated average hydraulic conductivity of 433 feet per day. The sand and gravel deposit of this Deep Zone is reportedly classified as an aquifer, at least on a local scale, and is utilized as a partial source of potable water for the region.

1.2.5 Consolidated Bedrock Hydrogeologic Unit

The uppermost bedrock aquifer in the vicinity of the Site is generally considered to occur within the upper 100 to 150 foot interval of weathered and fractured limestone and dolomite. This bedrock aquifer reportedly exhibits a transmissivity of approximately 1,340 ft^2 per day (1981). Much of the permeability of the bedrock aquifer is associated with secondary porosity features, which may or may not penetrate to greater depths. Assuming a 100-foot thickness, an average hydraulic conductivity of approximately 13.4 feet per day has been estimated (1981). Both the unconsolidated Deep Zone sand and gravel aquifer and the underlying bedrock aquifer are utilized for municipal and private water supplies within the region.

1.2.6 Regional Groundwater Flow

The general regional groundwater flow in Randolph County for the deep unconsolidated zone and bedrock aquifers is toward the north-northeast (1981). However, localized variations in groundwater flow direction may occur due to the influences of groundwater extraction, proximity of surface water bodies and seasonal fluctuations in groundwater elevations.

1.2.7 Surface Water Hydrology

The LMR, a portion of which comprises part of the Site, is located within the southeastern portion of the Upper Wabash River Basin, a water management basin located in north central Indiana. The drainage system of the LMR flows northward into the Mississinewa River near the Randolph-Jay County line. The Mississinewa River flows westerly across the county with an average gradient of 3 feet of drop per mile; and is part of the Wabash River drainage system, which eventually flows into the Ohio River.

The flow of the LMR had been recorded at a gauging station (recording operations were terminated in 1997) approximately 2500 feet upstream of the Site. Based on review of flow data from September 1982 to September 1997, the average monthly flow rates range from a low of approximately 3 cubic feet per second (cfs) in August to a high of approximately 18 cfs in April. The peak daily flow recorded during this period was 480 cfs, with an instantaneous maximum of 625 cfs and a corresponding elevation of 1,083.7 above mean sea level. The average elevation of surface water at the Site ranges from 1,073 to 1,076-feet above mean sea level during base flow conditions (1999). No other data were available for the LMR within the limits of the Site.

1.3 Lead Agency

The U.S. Environmental Protection Agency (EPA) is the lead agency for this project. The Indiana Department of Environmental Management (IDEM), the support agency, has worked with EPA in the review of the RI, Baseline Risk Assessment (BRA), and Feasibility Study (FS) for the Site, but does not concur with this Record of Decision. EPA has funded IDEM through a cooperative agreement to review the RI/BRA/FS and ROD for the Site.

2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Site History

2.1.1 Sources of Contamination

The PCB contamination in the Little Mississinewa River (LMR) originated from releases of PCBs from two industries that were adjacent to and on opposite sides of the river. The first, Sheller Globe, was located on the East side of the river, and was a plating facility that also manufactured small motors. The second, Westinghouse, was located across the river from Sheller-Globe and manufactured small motors. Both of these facilities released PCBs, specifically Aroclors 1248 and 1254, into the river over several decades. As detailed below, both of these facilities have been remediated within the last 10 years, and the source areas have been cleaned up. The Sheller-Globe facility has been razed, and the former Westinghouse facility is now used as a lumber processing facility.

2.1.2 Previous Investigations

LMR Channel and Floodplain Investigation activities have been conducted adjacent to and/or within the Site by IDEM, EPA, and the Potentially Responsible Parties (PRPs). These investigations originally focused primarily on the portions of the LMR in and around Union City, Indiana. However, several previous investigations have incorporated other downstream portions of the LMR. Those previous investigation activities were typically limited in areal extent and sample density within both the LMR Channel and/or Floodplain, and served primarily to support an evaluation of the need for more thorough investigative activities and/or remediation. A summary of these investigation activities is presented below.

- In 1984, sludge from the Union City sewage treatment plant (STP) was found to be contaminated with PCBs. Subsequent investigations conducted by Union City and IDEM identified several possible sources for the contaminant, including manufacturing facilities operated by Sheller-Globe Corporation, Westinghouse Electric Corporation (Westinghouse), and the Union City Body Company (Gove Associates, Inc., 1985). The actual source of the contamination was never officially determined and/or announced by Union City.

- As a follow-up to the discovery of PCBs in the Union City STP sludge, IDEM collected LMR Channel Sediment and fish specimens (from locations immediately upstream of the Site) to further assess the potential presence of PCB contamination. Results of this follow-up sampling indicated the presence of PCBs at concentration up to 40 ppm in the Channel Sediment, and fish tissue PCB concentrations up to 11.9 ppm. IDEM conducted additional investigation activities including fish tissue sampling in 1988, 1993, 1998, and 2001. Results of the 1988, 1993 and 1998 sampling activities indicated that PCBs in fish tissue ranged from 4.1 ppm to 23 ppm. Results of available fish tissue sampling data are included in Table 1. A fish consumption advisory was put into effect in 1990.

The LMR is currently listed as a Group 5 Waterway by the State of Indiana, which means that humans should not consume any fish caught in the LMR.

- In 1986, IDEM conducted a Preliminary Assessment of the property in Union City formerly owned by Westinghouse. At that time, a No Further Remedial Action Planned Priority was assigned in light of Westinghouse's remediation activities.

- In 1990 IDEM conducted a Screening Site Inspection of the former Westinghouse property. This inspection included sampling of the plant property and the LMR Channel. As part of the Screening Site Inspection, samples were analyzed for routine and non-routine metals, PCBs, phenols, cyanide and semi-volatile organic compounds. Based on the results of these analyses IDEM concluded that all metals were found to be within normal limits that can be found throughout the State. No phenols, cyanides or semi-volatile organic compounds were detected with floodplain soil or channel sediment samples. Private drinking water wells were sampled, and no contaminants were detected at or near levels of concern. Based on these data, it was determined that PCBs represented the sole constituent of concern.

- In 1997, ground water samples were collected during a Screening Site Inspection conducted at the Sheller-Globe facility. No contaminants were detected at or near levels of concern in these samples.

2.1.3 Source Removal Activities

The following presents a summary of removal activities (i.e., excavation) undertaken in the vicinity of the Site in follow up to the above described investigation activates. These removal activities have addressed all known PCB source areas, including surface drains and sewer lines, that could have impacted the Site.

- In 1989, ATEC Environmental Consultants, on behalf of Westinghouse, conducted remediation of a retention basin which received stormwater runoff on the Westinghouse property and then discharged through a drainage ditch to the LMR. The former retention basin was located at the western end of the storm water drainage ditch that trended eastward to, and discharged into, the LMR. The project included: (i) excavation and off-site disposal of PCB-impacted sediment and soil from within the retention basin; (ii) confirmatory sampling; (iii) backfilling with clean fill, (iv) dismantling, decontamination and off-site disposal of a concrete oil skimmer support wall; and (v) decontamination of a concrete sump associated with the retention basin.

- In December 1998, an Interim Removal Action (IRA) was performed by the Respondent United Technologies Corporation (UTC) upstream of the Site in the primary LMR PCB source area referred to as the "Outfall Area". The Outfall Area is a small segment of the LMR where storm water was discharged to the LMR by Westinghouse, Sheller-Globe (a former subsidiary of UTC), and others. The purpose of the IRA was to eliminate a significant mass of PCBs from the LMR Channel on an expedited basis.

- Between 1998 and 2001, the companies initiated several additional activities, including source removal excavations at their respective former facilities, to eliminate the potential for contaminated media to enter the LMR via storm water or process water discharges. In particular, the following actions were undertaken:

  1. Between October 1999 and July 2001, UTC conducted several voluntary remedial actions designed to address potential PCB source areas associated with the former Union City plant (since demolished) of its former subsidiary, Sheller-Globe Corporation. These activities included the permanent abandonment and/or removal of storm water sewer lines and associated catch basins, wastewater treatment discharge lines associated with the former facility that discharged to the LMR at the Outfall Area, and the installation of new and re-routed storm water sewer lines to facilitate storm water conveyance that completely bypass the former plant. These activities served to physically isolate the former facility from any potential discharges to the LMR. UTC performed these voluntary remedial activities as operational controls to ensure that future storm water discharge will not adversely affect the LMR. UTC also remediated a primary source of PCBs at the former plant under the direction of the EPA Toxic Substances Control Act program. This remediation involved the excavation and off-site disposal of PCB impacted soil.

  2. In the spring of 2001 Viacom performed a voluntary remedial action designed to address residual soils and sediments at the former Westinghouse facility in the retention basin and associated discharge ditch that exhibited PCB concentrations greater than or equal to 10 ppm. Additionally, Viacom installed a new storm water sewer line and catch basins along the eastern side of the former facility. All connections and old catch basins along the existing storm sewer line were sealed, and roof drains were reconnected to the new storm sewer. In addition, a new sediment retention basin and hard piping along a portion of the storm water drainage ditch were installed. As part of the remedial action, Viacom also removed soil and sediment from five shallow areas located along the storm water drainage ditch. Following removal of the PCB impacted soils and sediments, Viacom completed installation of the hard piping along the storm water drainage ditch to the LMR. A minimum 2-ft cap of clean clay was placed over the new hard pipe in the ditch and in all excavated areas and brought to grade to eliminate storm water surface runoff to the LMR through the area of the former drainage ditch. Viacom performed these voluntary remedial action activities as operational controls to ensure that future storm water discharges, including surface runoff, would not adversely affect the LMR.

- Between August 1 and December 31, 2001 a Removal Action was performed under the direction of EPA Region V, Emergency Response Branch immediately upstream of the Site. The purpose of the Removal Action was to remove PCB contamination within LMR Channel Sediments and Floodplain Soils extending from the "Outfall Area" to Division Street (i.e., principally within Harter Park and the Union City Cemetery). Removal Action activities resulted in the removal of significant amounts of Channel Sediments and Floodplain Soils. Activities and results associated with the Removal Action are presented in the Final Removal Action Report, Little Mississinewa River, Union City, Indiana, (Revision 1), dated January 24, 2003. Under this removal action, PCB-contaminated sediments exceeding approximately 1.0 ppm (subject to depth limitations) and PCB-contaminated flood plain soils exceeding 10 ppm (subject to depth limitations) were excavated and disposed off-site, resulting in the removal of 35,970 cy of PCB-contaminated sediments and soils from the LMR and its flood plain.

2.1.4 Constituents of Concern and Analytical Reporting

Based on previous investigation data, PCBs were identified as the sole constituent of concern for the Site.

As noted above, several investigations and removal actions have been undertaken either immediately upgradient of the Site, or within the Site since 1984. These activities generated considerable analytical data concerning the occurrence and distribution of PCBs associated with the LMR Channel and Floodplain. Before congener-specific PCB analyses became available, PCB concentration data were historically reported as an Aroclor mixture, or as a sum of the Aroclor mixtures (i.e., Total PCBs). Therefore, to maximize the comparability of this historical data with the RI-generated data, it was determined that all RI-related PCB analyses would be reported as Aroclors or Total PCBs, not as individual PCB congeners.

2.2 Enforcement Activities

The 2001 removal action described above on the portion of the LMR between the outfall area to Division Street was conducted from August 1 to December 31, 2001, under an Administrative Order By Consent (Docket No. V-W-01-C-636), that was entered into by UTA, Viacom and EPA. Under its terms, UTA and Viacom funded and managed the project in 2001 with oversight from EPA.

The RI/BRA/FS was conducted by UTA and Viacom under an Administrative Order by Consent (AOC) (Docket No. V-W-02-C-694). Under its terms, UTA and Viacom conducted and funded the RI/BRA/FS in 2002-2003 with oversight from EPA.

3 COMMUNITY PARTICIPATION

3.1 Public Participation

The community/public participation activities to support selection of the remedy were conducted in accordance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) § 117 and the National Contingency Plan (NCP) § 300.430(f)(3).

EPA has met individually between November 2001 and 2004 with several residents whose yards are adjacent to the LMR on separate occasions to discuss various issues that the residents have with the characterization and cleanup of the Site and the ultimate restoration of the properties that will require remediation.

A public availability session was held by EPA on January 24, 2002 to provide an update on the removal action and announce the beginning of the RI/FS for the Site. Residents, elected officials, and other interested individuals from the affected community discussed their concerns with the activities and potential short-term effects from the collection of data for the RI.

EPA met with the PRPs and the Randolph County Commissioners on March 31-April 1, 2002 to discuss access issues and the utility of the 75-foot easement that Randolph County has on either side of the LMR. The Randolph County Commissioners clarified that the PRPs would need to seek access from each individual homeowner on whose property sampling was proposed for the RI.

On June 18, 2002, EPA representatives attended a meeting hosted by the PRPs and attended by local residents to discuss access requirements for the RI and encourage the residents to allow access for the sampling proposed in the RI Work Plan. EPA also provided copies of the draft RI/FS Work Plan to local residents and the County Commissioners to solicit their input before the RI/FS Work Plan was finalized.

On April 3, 2003, EPA held a public availability session to discuss the preliminary results of the RI/FS. Residents, elected officials, and other interested parties were provided with information regarding the extent of contamination in the LMR channel, flood plain areas, agricultural areas, and the abandoned sanitary sewer line, a list of the preliminary remedial alternatives being developed, and the estimated costs associated with those alternatives.

In early February 2004, the Proposed Plan for the Site was released to the public and ads were placed in local newspapers announcing the start of the 30-day public comment period for the Proposed Plan and the date of the Proposed Plan public meeting. The Administrative Record for the Site, including the Proposed Plan and the Final RI/BRA/FS, was made available at the Site Repository at the Union City Public Library. In order to allow the public additional time to review the voluminous Final RI/BRA/FS Report and to resolve administrative issues, EPA postponed the public meeting and rescheduled it for April 6, 2004. The rescheduled public meeting was announced in the local papers, and the 30-day public comment period commenced on April 6, 2004. The written transcript of the public meeting is available in the information repository and the administrative record. The comment period closed on May 6, 2004. Five public comments were received regarding the Site Proposed Plan. EPA responses to the public comments are included in the Responsiveness Summary, which is included in the ROD as Appendix A.

An administrative record containing detailed information upon which the selection of the cleanup plan was based is available at the Union City Public Library, 408 North Columbia Street, Union City and at the EPA Records Center, 7th Floor, 77 W. Jackson Blvd., Chicago, IL. A copy of the Administrative Record Index is included in this ROD as Appendix B.

4 SCOPE AND ROLE OF RESPONSE ACTION

This Record of Decision is the first, and is intended to be the only, ROD for the Little Mississinewa River Site. Previous removal and other voluntary actions removed all of the source materials at the two facilities that released PCBs to the LMR, the former Sheller-Globe facility and former Westinghouse facility. The PRPs conducted a removal action in 2000 under EPA oversight in the LMR from the source area discharge points to the Division Street Bridge. This removal action addressed PCB levels as high as 2300 parts per million (ppm) that could act as a continuing source of contaminated sediment movement within the river channel and to the flood plain areas downstream. This ROD addresses the remaining areas of the LMR and its flood plain downstream from the Division Street Bridge.

5 SITE CHARACTERISTICS

5.1 Conceptual Site Model

The conceptual site model for the Site is included in the document as Figure 8. The conceptual site model indicates the pathways of exposure to humans and ecological receptors and was used as a basis for RI sampling and the Baseline Risk Assessment for the Site.

5.2 Results of the Remedial Investigation

5.2.1 Site Characterization Activities

For the purposes of the Remedial Investigation, the LMR Site was broken into four river channel areas, Areas A through D, and nine flood plain areas, Areas E through M (See Figures 2 and 3). All samples were analyzed for PCBs. The investigation was performed in two phases, the sampling that was performed in accordance with the original RI/FS Work Plan, and the sampling that was performed in accordance with the Work Plan for Additional Sampling Areas. The additional sampling was designed to address data gaps, both horizontally and vertically, that existed after the results became available from the first phase of RI sampling. Collectively, over 3000 samples were analyzed for the RI.

5.2.2 Summary of Sampling Results

This section presents a summary of results associated with the RI conducted at the Site between August and December 2002. A full description of the RI activities and sampling results is contained in the RI Report.

5.2.2.1 LMR Channel Sediment

The LMR channel was divided into four segments (Areas A through D), which are depicted on Figure 2. In each channel segment, composite Sediment samples were collected at transect locations for PCB analyses at an off-site laboratory using EPA Method 8082. The distance between transects associated with each of the four LMR Channel segments was increased from Division Street toward the confluence of the LMR and MR. Specifically, sample collection transects were spaced at 50-foot intervals from Division Street to the Union City STP (Area A); 100-foot intervals from the STP to County Road 400 N (Area B); 250-foot intervals from County Road 400 N to New Lisbon

(Area C); and 500-foot intervals from New Lisbon to the confluence of the LMR and the MR (Area D).

RI Area A

RI Area A was comprised of the LMR reach extending from Division Street, downstream to the southern property boundary of the Union City Sewage Treatment Plant (STP) (Figure 2). The Area A reach encompassed approximately 4,136 lineal feet, and included a total of 79 sediment sampling transects (A1 through A79) that were located at approximately 50 foot intervals.

Shallow, Intermediate, and river channel sediment samples were collected at each of the 79 transect locations for potential laboratory analyses of PCBs and moisture content. Deep sediment samples were collected at 78 of the 79 transects. Channel Bottom samples were collected from 68 transects. A total of 383 sediment samples were analyzed in association with RI Area A.

The average total PCB concentration associated with Area A Shallow, Intermediate, and Deep depth interval sample detections above the laboratory reporting limit were 14.42 ppm, 17.45 ppm, and 23.72 ppm, respectively. A total of 18 samples exceeded 50 ppm PCBs, and the maximum PCB concentration in Area A was 460 ppm.

The average total PCB concentration associated with Area A Channel Bottom depth interval sample detections, above the laboratory reporting limit, was 1.24 ppm. The average total PCB concentration associated with Area A Shallow depth interval sub-composite river channel sample detections, above the laboratory reporting limit, was 11.3 ppm.

RI Area A total PCB concentrations are depicted on Figure 9.

RI Area B

RI Area B was comprised of the LMR reach extending from the southern property boundary of the Union City STP to County Road 400 N (St. Mary's Cemetery; Figure 2). The Area B reach encompassed approximately 5,675 lineal feet, and included a total of 64 sediment sampling transects (B1 through B64) that were located at approximately 100 foot intervals.

Shallow, Intermediate, and river channel sediment samples were collected at each of the 64 transect locations for potential laboratory analyses of PCBs and moisture content. Deep sediment samples were collected at 59 of the 64 transects. Channel Bottom samples were collected from 46 transects. A total of 294 sediment samples were analyzed in association with RI Area B.

The average total PCB concentration associated with Area B Shallow, Intermediate, and Deep depth interval sample detections, above the laboratory reporting limit, were 6.25 ppm, 5.55 ppm, and 7.50 ppm, respectively. The maximum PCB concentration in any Area B sample was 49 ppm.

The average total PCB concentration associated with Area B Channel Bottom depth interval sample detections, above the laboratory reporting limit, was 0.42 ppm. The average total PCB concentration associated with Area B Shallow depth interval sub-composite river channel sample detections, above the laboratory reporting limit, was 1.91 ppm.

RI Area B total PCB concentrations are depicted on Figure 10.

RI Area C

RI Area C was comprised of the LMR reach extending from County Road 400 N (St. Mary's Cemetery) downstream to New Lisbon (Figure 2). The Area C reach encompassed approximately 9,650 lineal feet, and included a total of 44 sediment sampling transects (C1 through C44) that were located at approximately 250 foot intervals.

Shallow, Intermediate, Deep, and river channel sediment samples were collected at each of the 44 transect locations for potential laboratory analyses of PCBs and moisture content. Channel Bottom samples were collected from 14 transects. A total of 140 sediment samples were analyzed in association with RI Area C.

The average total PCB concentration associated with Area C Shallow, Intermediate, and Deep depth interval sample detections, above the laboratory reporting limit, were 3.76 ppm, 4.15 ppm, and 6.35 ppm, respectively. The maximum PCB concentration in any Area C sample was 97 ppm; the remainder of the samples were all 25 ppm or below.

The average total PCB concentration associated with Area C Channel Bottom depth interval sample detections, above the laboratory reporting limit, was 0.03 ppm. The average total PCB concentration associated with Area C Shallow depth interval sub-composite river channel sample detections, above the laboratory reporting limit, was 3.89 ppm.

RI Area C total PCB concentrations are depicted on Figure 11.

RI Area D

RI Area D was comprised of the LMR reach extending from New Lisbon downstream to the confluence of the LMR and the MR (Figure 2). The Area D reach encompassed approximately 20,125 lineal feet, and included a total of 41 sediment sampling transects (D1 through D41) that were located at approximately 500 foot intervals.

Shallow, Intermediate, Deep, and Risk sediment samples were collected at each of the 41 transect locations for potential laboratory analyses of PCBs and moisture content. Channel Bottom samples were collected from 2 transects. A total of 63 sediment samples were analyzed in association with RI Area D.

The average total PCB concentration associated with Area D Shallow, Intermediate, and Deep depth interval sample detections, above the laboratory reporting limit, were 0.87 ppm, 1.91 ppm, and 1.87 ppm, respectively. The maximum PCB concentration in any Area D sample was 4.5 ppm.

The average total PCB concentration associated with Area D Channel Bottom depth interval sample detections, above the laboratory reporting limit, was 0.03 ppm. The average total PCB concentration associated with Shallow depth interval sub-composite river channel sample detections, above the laboratory reporting limit, was 0.32 ppm.

RI Area D total PCB concentrations are depicted on Figure 12.

5.2.2.2 LMR Floodplain Soil

During the years that the industries were discharging PCBs to the LMR, flooding caused PCB-contaminated sediments to be deposited on the LMR Floodplain downstream of the industrial facilities. As a result, there are certain areas in the floodplain where the PCBs in the soil need to be remediated to reduce risks to humans and wildlife. The LMR Floodplain was divided into eight active transfer zone areas (those portions of the LMR Channel, Bank, and associated Floodplain areas that exhibit a high potential for erosion and/or sediment deposition associated with LMR high flow stages), which included three mixed land-use areas (Areas F, G, and J) and five non-residential land-use areas (Areas H, I, K, L, and M) based on current and expected future land-use. Also included in the LMR Floodplain investigation was Floodplain Investigation Area E, which was not characterized as an active transfer zone area. Floodplain Areas F, G, H, I, J, K, L, and M represent portions of the Site where the active transfer zone exhibits a potential to extend beyond the confines of the LMR Channel and Banks. The floodplain investigation activities associated with these RI areas were designed to systematically undertake the investigation utilizing a Grid and Band sampling strategy.

Area E

RI Area E represents the LMR Floodplain area identified for investigation (but not actually investigated) as part of the 2001 LMR Removal Action. Area E is located immediately adjacent to Division Street in the southern (upstream) portion of the Site (Figure 3). Area E extends from Division Street for approximately 600 feet to the north (downstream), and occupies approximately 171,300 ft^2. Area E consisted of 11 Bands, which were subdivided into a total of 35 Grids, each measuring approximately 50 feet by 100 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 17 Band and 36 Grid soil samples were analyzed in association with RI Area E.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area E Shallow, Intermediate, and Deep depth Band samples, were 5.60 ppm, 10.63 ppm, and 2.60 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above laboratory reporting limit associated with Area E Shallow, Intermediate, and Deep depth interval Grid samples, were 17.98 ppm, 10.08 ppm, and 2.57 ppm, respectively. Two samples exceeded 50 ppm PCBs, and the maximum concentration of PCBs in Area E samples was 190 ppm.

RI Area E total PCB concentrations are depicted on Figure 13.

Area F

RI Area F is located immediately adjacent and north of Area E, extending to the Union City STP (Figure 3). Area F is comprised of approximately 104,562 ft^2 and consists of 30 Bands, which were sub-divided into a total of 84 "High-Density" Grids, each measuring approximately 25 feet by 50 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 88 Band and 240 Grid soil samples were analyzed in association with RI Area F.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area F Shallow, Intermediate, and Deep depth interval Band samples were 20.67 ppm, 55.59 ppm, and 64.91 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area F Shallow, Intermediate, and Deep depth interval Grid samples were 39.12 ppm, 55.08 ppm, and 46.80 ppm, respectively. A total of 83 samples exceeded 50 ppm PCBs, and the maximum PCB concentration in Area F was 450 ppm.

RI Area F total PCB concentrations are depicted on Figure 14.

Area G

RI Area G is located north of Area F, beginning at Route 28 and extending approximately 800 feet to the north (Figure 3). Area G is comprised of approximately 54,263 ft^2 and consists of 13 Bands, which were sub-divided into 42 "High-Density" Grids, each measuring approximately 25 feet by 50 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 36 Band and 112 Grid soil samples were analyzed in association with RI Area G.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area G Shallow, Intermediate, and Deep depth interval Band samples were 15.39 ppm, 12.19 ppm, and 10.37 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area G Shallow, Intermediate, and Deep depth interval Grid samples were 21.03 ppm, 12.93 ppm, and 10.38 ppm, respectively. A total of 4 samples exceeded 50 ppm PCBs, and the maximum PCB concentration in Area G was 140 ppm.

RI Area G total PCB concentrations are depicted on Figure 15.

Area H

RI Area H is located north of Area G, on the east and west sides of the LMR, beginning approximately 900 feet south of County Road 400N and extending approximately 1500 feet to the north of County Road 400N (Figure 3). Area H is comprised of approximately

232,819 ft^2 that consists of 41 Bands, which were sub-divided into 60 "Low-Density" Grids, each measuring approximately 75 feet by 100 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 118 Band and 164 Grid soil samples were analyzed in association with RI Area H .

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area H Shallow, Intermediate, and Deep depth interval Band samples were 5.51 ppm, 6.37 ppm, and 9.64 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area H Shallow, Intermediate, and Deep depth interval Grid samples were 6.82 ppm, 10.11 ppm, and 9.75 ppm, respectively. A total of 2 samples exceeded 50 ppm PCBs, and the maximum PCB concentration in Area H was 78 ppm.

RI Area H total PCB concentrations are depicted on Figure 16.

Area I

RI Area I is located north of Area H beginning approximately 200 feet south of County Road 500N and extending approximately 1300 feet to the north of County Road 500N (Figure 3). Area I is comprised of approximately 201,796 ft^2 and consists of 16 Bands, which were sub-divided into 24 "Low-Density" Grids, each measuring approximately 75 feet by 100 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 39 Band and 46 Grid soil sample were analyzed in association with RI Area I.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area I Shallow, Intermediate, and Deep depth Band samples were 3.15 ppm, 2.14 ppm, and 6.99 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area I Shallow, Intermediate, and Deep depth interval Grid samples were 2.35 ppm, 6.46 ppm, and 11.24 ppm, respectively. The maximum PCB concentration in Area I samples was 16 ppm.

RI Area I total PCB concentrations are depicted on Figure 17.

Area J

RI Area J is located north of Area I, beginning at the intersection of Jackson Pike Road and the LMR in New Lisbon and extending approximately 1100 feet to the north (Figure 3). Area J is comprised of approximately 68,329 ft^2 and consists of 14 Bands, which were sub-divided into 54 "High-Density" Grids, each measuring approximately 25 feet by 50 feet.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 39 Band and 128 Grid soil samples were analyzed in association with RI Area J.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area J Shallow, Intermediate, and Deep depth interval Band samples were 4.11 ppm, 2.61 ppm, and 2.46, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area J Shallow, Intermediate, and Deep depth interval Grid samples were 2.52 ppm, 7.24 ppm, and 4.39 ppm, respectively. One sample exceeded 50 ppm PCBs (52 ppm).

RI Area J total PCB concentrations are depicted on Figure 18.

Area K

RI Area K is located south of Area I, approximately 150 feet south of CR500 (Figure 3). Area K is comprised of approximately 102,397 ft^2 and consists of 9 Bands, which were sub-divided into 12 "Low-Density" Grids that measured approximately 75 feet by 100 feet.

Shallow, Intermediate, and Deep soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 21 Band and 22 Grid soil samples were analyzed in association with RI Area K.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area K Shallow, Intermediate, and Deep depth interval Band samples were 5.94 ppm, 1.83 ppm, and 0.87 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area K Shallow, Intermediate, and Deep depth interval Grid samples were 9.28 ppm, 3.13 ppm, and 1.04 ppm, respectively. The maximum PCB concentration in Area I samples was 17 ppm.

RI Area K total PCB concentrations are depicted on Figure 19.

Area L

RI Area L is located north of Area J, approximately 4000 feet north of the intersection of Jackson Pike Road and the LMR, and adjacent to Area D transect D25 (Figure 3). Area L is comprised of approximately 16,227 ft^2 and consists of 2 Bands, which were sub-divided into 4 "Low-Density" Grids, each measuring approximately 75 feet by 100 feet.

Shallow, Intermediate, and Deep soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 6 Band and 12 Grid soil sample were analyzed in association with RI Area L.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area L Shallow, Intermediate, and Deep depth interval Band samples were 3.30 ppm, 8.60 ppm, and 7.90 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area L Shallow, Intermediate, and Deep depth interval Grid samples were 3.25 ppm, 8.28 ppm, and 12.20 ppm, respectively. The maximum PCB concentration in Area L samples was 23 ppm.

RI Area L total PCB concentrations are depicted on Figure 20.

Area M

RI Area M is located north of Area J, approximately 2000 feet south of CR850N, and adjacent to Area D transects D6, D7 and D8 (Figure 3). Area M is comprised of approximately 50,734 ft^2 and consists of 3 Bands, which were sub-divided into 6 "Low-Density" Grids, each measuring approximately 75 feet by 100 feet.

Shallow, Intermediate, and Deep interval soil samples were collected in association with the Band and Grid configuration for potential laboratory analyses of PCBs and moisture content. A total of 3 Band and 0 Grid soil samples were analyzed in association with RI Area M.

Total PCBs, at concentrations above the laboratory reporting limit, were detected in all of the 3 Area M Band samples analyzed. Total PCB concentrations associated with Area M Shallow depth interval Band samples ranged between 0.44 ppm and 0.8 ppm (Area M Bands MEBA2-S and MEBA1-S, respectively). Because all three shallow Band samples from Area M exhibited PCB concentrations below 1 ppm, no additional Band or Grid samples were analyzed.

RI Area M total PCB concentrations are depicted on Figure 21.

5.2.2.3 LMR Floodplain Soil - Supplemental Sampling Areas

A total of 110 Supplemental Sampling Areas were identified during the RI process to require further assessment of the potential horizontal and vertical extent of PCB contamination. These Supplemental Sampling Areas were located within and/or immediately adjacent to existing floodplain sampling Areas F, G, H, I, and J.

Area F Horizontal Assessment

A total of 30 Sample Areas were identified in association within the Area F Sampling Area horizontal assessment. These Sample Areas encompassed approximately 507,000 ft^2.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Area F Sample Area horizontal assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 47 horizontal Sample Area and 12 Sample Area sub-composite soil samples were analyzed in association with the Area F Sampling Area horizontal assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area F horizontal Sample Area Shallow, Intermediate, and Deep depth interval samples were 11.57 ppm, 3.82 ppm, and 3.23

ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area F horizontal Sample Area sub-composite Shallow and Intermediate depth interval samples were 24.08 ppm and 12.50 ppm, respectively. Three samples in the Area F horizontal assessment exceeded 50 ppm PCBs. The maximum concentration was 66 ppm PCBs.

Area F horizontal Sample Area PCB concentrations are depicted on Figure 22.

Area G Horizontal Assessment

A total of 14 Sample Areas were identified in association within the Area G Sampling Area horizontal assessment. These Sample Areas encompassed approximately 234,500 ft^2.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Area G Sample Area horizontal assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 21 Area G horizontal Sample Area and 8 Sample Area sub-composite soil samples were analyzed in association with the Area G Sampling Area horizontal assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area G horizontal Sample Area Shallow, Intermediate, and Deep depth interval samples were 5.37 ppm, 3.86 ppm, and 12.95, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area G horizontal Sample Area sub-composite Shallow, Intermediate, and Deep depth interval samples were 15.73 ppm, 17.00 ppm, and 26.00 ppm, respectively. The maximum concentration of PCBs in the Area G horizontal assessment was 40 ppm.

Area G horizontal Sampling Area PCB concentrations are depicted on Figure 23.

Area H Horizontal Assessment

A total of 17 Sample Areas were identified in association within the Area H Sampling Area horizontal assessment. These Sampling Areas encompassed approximately 374,500 ft^2.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Area H Sample Area horizontal assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 33 horizontal Sample Area and 8 sub-composite soil samples were analyzed in association with the Area H Sampling Area horizontal assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area H horizontal Sample Area Shallow, Intermediate, and Deep depth interval samples were 8.69 ppm, 18.56 ppm, and 6.01 ppm, respectively. The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area H horizontal Sample Area sub-composite Shallow, Intermediate, and Deep depth interval samples were 30.00 ppm, 18.67 ppm, and 14.00 ppm, respectively. Two samples exceeded 50 ppm PCBs; both were 54 ppm.

Area H horizontal Sample Area PCB concentrations are depicted on Figure 24.

Area I Horizontal Assessment

A total of 6 Sample Areas were identified in association within the Area I Sampling Area horizontal assessment. These Sampling Areas encompassed approximately 114,000 ft^2.

Shallow, Intermediate, and Deep soil samples were collected in association with the Area I Sampling Area horizontal assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 7 horizontal Sample Area and no sub-composite soil samples were analyzed in association with the Area I Sampling Area horizontal assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area I horizontal Sample Area Shallow and Intermediate depth interval samples were 3.77 ppm and 1.60 ppm, respectively. The maximum PCB concentration for samples taken during the Area I horizontal sampling was 9 pm.

Area I horizontal Sample Area PCB concentrations are depicted on Figure 25.

Area J Horizontal Assessment

A total of 8 Sample Areas were identified in association within the Area J Sampling Area horizontal assessment. These Sample Areas encompassed approximately 144,000 ft^2.

Shallow, Intermediate, and Deep depth interval soil samples were collected in association with the Area J Sample Area horizontal assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 8 horizontal Sample Area and no Sample Area sub-composite soil samples were analyzed in association with the Area J Sampling Area horizontal assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area J horizontal Sample Area Shallow depth interval samples was 0.94 ppm. Area J horizontal Sample Area analytical results did not indicate the presence of PCB concentrations above 5 ppm. Therefore, no Sample Area sub-composite samples were analyzed.

Area J horizontal Sample Area PCB concentrations are depicted on Figure 26.

Area F Vertical Assessment

A total of 25 Sample Areas were identified in association with the Area F Sampling Area vertical assessment. These Sampling Areas encompassed approximately 91,000 ft^2.

D1, D2, and D3 depth interval soil samples were collected in association with the Area F Sample Area vertical assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 60 vertical Sample Area soil samples were analyzed in association with the Area F Sampling Area vertical assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area F vertical Sample Area D3, D2, and D1 samples were 12.15 ppm, 1.58 ppm, and 3.39 ppm, respectively. Two samples exceeded 50 ppm PCBs in the Area F vertical sampling. The maximum concentration was 120 ppm.

Area F vertical Sample Area PCB concentrations are depicted on Figure 22.

Area G Vertical Assessment

A total of 8 Sample Areas were identified in association with the Area G Sampling Area vertical assessment. These Sampling Areas encompassed approximately 35,200 ft^2.

D1, D2, and D3 depth interval soil samples were collected in association with the Area G Sample Area vertical assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 18 vertical Sample Area soil samples were analyzed in association with the Area G Sampling Area vertical assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area G vertical Sample Area D3, D2, and D1 depth interval samples were 5.58 ppm, 2.16 ppm, and 5.94, ppm respectively. The maximum PCB concentration in the Area G vertical sampling was 25 ppm.

Area G vertical Sample Area PCB concentrations are depicted on Figure 23.

Area I Vertical Assessment

A total of 3 Sample Areas were identified in association with the Area I Sampling Area vertical assessment. These Sampling Areas encompassed approximately 39,000 ft^2.

D1, D2, and D3 depth interval soil samples were collected in association with the Area I Sampling Area vertical assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 8 vertical soil samples were analyzed in association with the Area I Sampling Area vertical assessment.

The average total PCB concentrations for samples exhibiting detections above the laboratory reporting limit associated with Area I vertical Sample Area I D3, D2, and D1 depth interval samples were 0.60 ppm, 3.68 ppm, and 0.91 ppm, respectively. The maximum PCB concentration in the Area vertical samples was 10 ppm.

Area I vertical Sample Area PCB concentrations are depicted on Figure 25.

Area J Vertical Assessment

A total of 1 Sample Area was identified in association with the Area J Sampling Area vertical assessment. This Sampling Area encompassed approximately 4,700 ft^2.

D1, D2, and D3 depth interval soil samples were collected in association with the Area J Sampling Area vertical assessment configuration for potential laboratory analyses of PCBs and moisture content. A total of 3 vertical Sample Area soil samples were analyzed in association with the Area J Sampling Area vertical assessment.

All 3 of the vertical Sample Area soil samples (excluding QA/QC samples) were analyzed in association with the Area J vertical Sample Area. Total PCB concentrations associated with the D3, D2, and D1 depth intervals were 0.11 ppm, 0.35 ppm, and 0.53, respectively (Area J Sample Area sample JEVSA1).

Area J vertical Sample Area PCB concentrations are depicted on Figure 26.

5.2.2.4 Representative Agricultural Areas

Representative Agricultural Area RI sampling occurred within agricultural land-use areas located outside of, and adjacent to the LMR active transfer zone to confirm the absence of PCBs outside of the active transfer zone. As outlined in the Statement of Work for the AOC, eight Representative Agricultural Area locations were identified (with the concurrence and approval of EPA) and sampled for PCB analyses. The Representative Agricultural Areas were located between Division Street and the confluence of the LMR with the Mississinewa River, and consisted of two sample collection locations within each of the RI LMR Channel Areas (i.e., Areas A, B, C and D).

Total PCBs were detected above the laboratory analytical reporting limit in 6 of the 8 samples. One sample collected from RI Area B (west side of the LMR Channel) exhibited total PCB concentrations above 1 ppm (BAGW1-S, 4.4 ppm). Based on the additional sample collection area assessment, it was determined (with EPA concurrence) that Representative Agricultural Area sample BAGW1-S was located within the active transfer zone (situated within the area that was later incorporated into Supplemental Horizontal Sampling Areas HWHSA11 and HWHSA13). Therefore, to address this situation, 3 additional Representative Agricultural Area samples were collected in an arc adjacent to sample BAGW1-S.

Total PCBs were not detected above the laboratory reporting limit in any of the 3 additional Representative Agricultural Area samples (BAGW2-S, BAGW3-S, BAGW4-S) collected adjacent to sample BAGW1-S.

Representative Agricultural Area PCB concentrations are depicted on Figure 27.

5.2.2.5 Abandoned Sanitary Sewer Line

Field Activities

The abandoned sewer line investigation activities were conducted between October 14 and 16, 2002, to assess the potential existence of PCB contamination within the backfill/soil surrounding the abandoned sewer line and residual sediment within the interior of the abandoned sewer line (ASL). Discrete investigation soil boring and interior inspection locations were identified and approved by EPA along the length of the ASL, from Division Street to the Union City STP. Soil samples were collected from borings advanced immediately adjacent to the ASL at a depth equal to the base of the sewer line, and at a depth approximately two feet beyond the depth of the sewer. These activities consisted of the advancement of five Geoprobe borings, the collection of soil/backfill samples, the excavation and accessing of the ASL interior. The following sections present the ASL activities.

Analytical Results

A total of 10 soil samples were collected and analyzed for total PCBs and moisture content. Total PCBs at concentrations above the laboratory reporting limit were detected in 2 of the 10 ASL samples. Total PCB concentrations for samples exhibiting detections above the laboratory reporting limit were 0.27 ppm and 0.065 ppm [ASL sample ABS1A (10-11 feet bgs) and ABS1B (12.5-13.5 feet bgs)], respectively.

One duplicate and one rinsate sample were collected during the ASL investigation activities, and analyzed for total PCBs. Duplicate sample Dup-79 corresponded to ASL sample ABS-2A. Analyses results indicated that the duplicate sample was in agreement with the corresponding soil sample; PCBs were not detected above laboratory analytical detection limits in either the ABS-2A sample or the duplicate.

ASL analytical results are presented in Figure 28.

5.3 Nature of Contamination

5.3.1 Contaminant of Concern

Based upon the previous investigations conducted at the Little Mississinewa River Site, it was determined that PCBs were the primary contaminant of concern and risk driver. PCBs consist of a group of 209 distinct chemical compounds, known as congeners, that contain one to ten chlorine atoms attached to a biphenyl molecule, with the generic formula of $C12H_{(10-x)}Cl_x$, where x is an integer from one to ten. PCBs are grouped based on the number of chlorine atoms present (homologous groups). For example, monochlorobiphenyls contain one chlorine atom, dichlorobiphenyls contain two chlorine atoms, and trichlorobiphenyls contain three chlorine atoms.

Commercially manufactured PCBs consisted of complex mixtures of congeners, known under various trade names. These PCBs were marketed under the general trade name "Aroclors." About 140 to 150 different congeners have been identified in the various commercial Aroclors, with about 60 to 90 different congeners present in each individual Aroclor.

The PCBs used in the production processes at the former Sheller-Globe and Westinghouse facilities were Aroclors "1248" and "1254". Since both facilities primarily used these two Aroclors and there was no real use in sorting out the sampling data into aroclors, the RI samples were analyzed for total PCBs.

5.3.2 Contaminated Media

5.3.2.1 Sediments

Much of the mass of PCBs discharged into the LMR in the past has already been transported throughout the Site and is now concentrated in sediments and the flood plain within specific areas. In general, the vast majority of PCB contamination in the river sediments is located between the Division Street Bridge and New Lisbon, with the highest concentrations located in River Area A. After New Lisbon, the PCB sediment concentrations decrease sharply, with no results exceeding 1.0 ppm for the last two miles of the LMR before the confluence with the Mississinewa River.

5.3.2.2 Flood Plain Areas

As with the sediments, the vast majority of PCB contamination in the LMR flood plain occurs between the Division Street Bridge and New Lisbon. Flood Plain Area F contains over 90% of the flood plain samples that exceeded 50 ppm PCBs. After Area F, the PCB concentrations steadily decrease, with no appreciable PCB contamination between New Lisbon and the confluence with the Mississinewa River.

5.3.2.3 Agricultural Areas

The sampling conducted in the RI indicated that no significant PCB contamination exists in agricultural land adjacent to the LMR.

5.3.2.4 Abandoned Sanitary Sewer Line

The sampling conducted in the RI indicated that no significant PCB contamination exists in the abandoned sanitary sewer line and in soils adjacent to the sewer.

6 SUMMARY OF SITE RISKS

Baseline human health and ecological risk assessments were conducted to evaluate the potential for current and future impacts of site-related contaminants on receptors visiting, utilizing, or inhabiting the LMR in the Baseline Risk Assessment (BRA). The risk management goals defined in the RI/FS relate to providing safe levels of PCBs in sediment for ecological receptors and for fish consumption and safe levels in soil for human and ecological receptors.

The monitoring of the "effects endpoints", as identified in the risk assessments, is included as a component of the preferred alternative. Periodic monitoring of biological receptors (fish, etc) will be performed as part of the remedy, both during construction, and implementation and in conjunction with the required five-year reviews. This monitoring will indicate the extent to which the cleanup actions are achieving the stated remediation goals for biota.

6.1 Human Health

As part of the BRA, potential human health risks and exposure pathways associated with the Site were identified, and a quantitative human health risk assessment was performed. EPA's risk guidance identifies a target cancer risk range of 1.0×10^{-4} to 1.0×10^{-6} (1 in 10,000 to 1 in a million) excess cancer risk for Superfund sites. In essence, if site contamination poses a risk of less than 1×10^{-6}, there is generally no need for action. Cancer risks greater than 1.0×10^{-4} require action to reduce and/or abate the risk, and cancer risks between 1.0×10^{-4} and 1×10^{-6} present a potential cause for remedial action. EPA's guidance also indicates that a non-cancer hazard index (HI) exceeding 1.0 is generally a cause for action to reduce and/or abate the potential non-cancer risks associated with site contamination.

A summary of the calculated human health cancer risks for the Site is presented below.

	Total Cancer Risk		
Receptors	Highest Exposure Area	Central Tendency (Overall)	Reasonable Maximum Exposure (LMR Channel-edge)
Child Resident	F – north	7.2×10^{-6}	Not Applicable
Adolescent Resident	F – south	5.2×10^{-6}	**1.4×10^{-5}**
Adult Resident	F – south	2.0×10^{-6}	7.7×10^{-6}
Lifetime (Combined) Resident	F – north	**1.4×10^{-5}**	**2.2×10^{-5}**
Adolescent Recreational Visitor	F – middle	4.9×10^{-7}	7.4×10^{-7}
Adult Recreational Visitor	F – middle	3.6×10^{-7}	5.6×10^{-7}
Lifetime (Combined) Recreational Visitor	F – middle	8.5×10^{-7}	1.3×10^{-6}
Adult Construction Worker	F	1.2×10^{-7}	5.8×10^{-7}
Adult Utility Worker	F	3.2×10^{-7}	5.5×10^{-7}

-Bold type indicates risk levels that exceeds the threshold of 1 X 10^{-6} excess cancer risk

A summary of the human health non-cancer risks calculated for the Site is shown below.

	Total Non-cancer Hazards		
Receptors	Highest Exposure Area	Central Tendency (Overall)	Reasonable Maximum Exposure (LMR Channel-edge)
Child Resident	F – north	**2.1**	Not Applicable
Adolescent Resident	F – south	0.83	**2.3**
Adult Resident	F – south	0.27	0.71
Adolescent Recreational Visitor	F– middle	0.077	0.12
Adult Recreational Visitor	F– middle	0.033	0.051
Adult Construction Worker	F	0.21	**1.0**
Adult Utility Worker	F	0.023	0.038

-Bold type indicates a value that exceeds the threshold of 1.0 for non-cancer risks

There are also potential human health impacts associated with PCBs in river sediments that can be redistributed into the residential flood plain areas as a result of flooding of the LMR. Livestock impacts were considered to be minimal since livestock is not present in the highly-contaminated portions of the LMR flood plain and has limited access to the LMR channel, except in the portions of the LMR channel that have minimal PCB concentrations. The PCB contamination in the LMR and its flood plain has led to the placement of use restrictions on some properties, and the remedy contemplated for the LMR will result in the removal of such restrictions and, thus, the encumbrance on some landowners presented by the LMR in its present condition. The State of Indiana has placed a Level 5 fish advisory on the LMR due to the potential health impacts from ingestion of PCB-contaminated fish in the river.

6.2 Ecological

6.2.1 Baseline Ecological Risk Assessment

All samples used in this risk assessment were collected in the LMR at the 0-6 inch depth as the likely predictor of potential exposure to PCBs in sediment by ecological resources (i.e., the bioturbation zone).

Ecological receptors considered in this assessment include primary food producers (e.g., aquatic plants), primary consumers (e.g., muskrat), omnivores (e.g., raccoon, mallard duck), piscivores (e.g., great blue heron), and predators (e.g., coyote and mink). Aquatic invertebrates and fish were also evaluated, because these organisms are a food source for other receptors at the LMR channel sediment Site. The potential exposure routes of concern for ecological receptors at the LMR channel sediment Site are:

- direct contact with sediment: ingestion and/or uptake (bioaccumulation into biological tissues) by the selected receptors of PCBs in sediment; and
- transfer via food chain: ingestion by the selected receptors of plant and animal forage organisms exposed to chemicals in sediment with subsequent transfer through the food chain.

The assessment endpoints selected for the receptors at the LMR channel sediment Site focus on the protection and maintenance (e.g., growth, reproduction, survival) of the ecological populations using the available habitats at the LMR channel sediment Site and include:

- Protection of plant communities which provide habitat (i.e., source of food and potential nesting/breeding sites) for higher level consumers, and to ensure that PCB concentrations in plant tissues are low enough to minimize the risk of bioaccumulation and/or other negative toxic effects to higher trophic level organisms.
- Protection of benthic invertebrate communities to maintain species diversity and nutrient cycling (trophic structure), to provide a food source for higher level consumers, and to ensure that PCB concentrations in benthic invertebrate tissues are low enough to minimize the risk of bioaccumulation and/or other negative toxic effects in higher trophic level organisms.
- Protection of fish communities to ensure that exposure to and ingestion of PCBs by fish does not have a negative impact on growth, survival, and reproductive success.
- Protection of piscivorous (i.e., fish-eating) birds and other aquatic birds to ensure that ingestion of PCBs in forage species (i.e., fish, plants, invertebrates) does not have a negative impact on growth, survival, and reproductive success.
- Protection of carnivorous mammals to ensure that ingestion of PCBs in prey does not have a negative impact on growth, survival, and reproductive success.
- Protection of omnivorous mammals to ensure that ingestion of PCBs in forage does not have a negative impact on growth, survival, and reproductive success.
- Protection of herbivorous mammals to ensure that ingestion of PCBs in forage does not have a negative impact on growth, survival, and reproductive success, to provide a food source for higher level consumers, and to ensure that PCB concentrations in herbivore

tissues are low enough to minimize the risk of bioaccumulation and/or other negative toxic effects in higher trophic levels.

Exposure point concentrations (EPCs) for PCBs were determined by calculating the area-weighted average PCB concentration in sediment, specific to the forage area of the receptor species evaluated. The area-weighted average PCB concentrations were used to characterize exposures, because the samples were collected at different spatial frequency in each segment of the LMR (A through D). Information regarding dietary composition and general exposure parameters was obtained from the literature for the selected receptor species. PCB concentrations in forage food items were modeled using a conservative uptake factor from the literature, because site-specific data characterizing PCB concentrations within food items (e.g., aquatic plants, aquatic invertebrates, small mammals, and fish) were not available. For the uptake of PCBs into fish, PCB concentrations in fish tissue were estimated by using the uptake model recommended by EPA. Although some fish tissue data were available for the LMR, a river-specific biota sediment accumulation factor (BSAF) could not be calculated with confidence because PCB concentrations in sediment were not available for the same time period where fish were caught. In the absence of a site-specific BSAF for PCBs, EPA recommends a BSAF of 1.85 to estimate the uptake of PCBs into fish tissue (EPA/823-R-97-006). The fish data did provide site-specific information regarding the lipid levels in fish caught in the LMR, and site-specific information regarding total organic carbon (TOC) content in sediment were also available. These LMR-specific data were used to estimate PCB levels in fish tissue.

The toxicity reference values (TRVs) for PCBs used in this assessment were drawn from studies that considered reproductive and developmental effects from dietary exposures to Aroclor 1254. Although several Aroclors were detected in LMR channel sediment (Aroclor 1242, 1248, 1254, and 1260) and Aroclor 1248 was predominant, Aroclor 1254 was conservatively chosen to derive the mammalian and avian TRVs because it is the most chlorinated of the PCB formulations that are widely studied and is considered the most toxic. In addition to TRVs, no-effect tissue residue concentrations for Aroclor 1242, 1248, 1254, and 1260 were also used to evaluate potential impacts to fish and Aroclors 1242 and 1248 for aquatic invertebrates. A range of toxicity benchmarks was also used to evaluate potential impacts to plants associated with direct contact with PCBs in sediment.

Risks due to PCBs in river channel sediments were assessed for a variety of potential ecological receptors, including aquatic plants, invertebrates, fish, muskrat, raccoon, mallard duck, great blue heron, coyote, and mink. Assessment endpoints focused on the protection and maintenance (e.g. growth, reproduction, survival) of the ecological populations. Exposure areas were developed for each receptor based on their foraging range. The average PCB concentration within each exposure area was calculated using an area-weighted approach because of the change in sample spacing over the length of the river. Risks were estimated for exposure to surface sediments from 0 to 6 inches depth. Risk estimates found the great blue heron and the mink to be the most sensitive receptors. Both species had hazard indices exceeding the target Hazard Index of one. Where target risks are exceeded, EPA recommends calculation of a range of concentrations "that bound the threshold for estimated adverse ecological effects". For mink, this range is approximately 0.44 to 1.0 ppm, and for great blue heron, this range is approximately 0.94 to 1.2 ppm. From these ranges, the risk assessment selected 1 ppm as the cleanup goal (CUG). As described above, a remedial action level (RAL) for sediments was calculated that would result in a residual average concentration consistent with the CUG. RALs were calculated, using the area-weighted approach, for an exposure area corresponding to each one mile reach. The resulting RAL range was 4.2 to 4.4 ppm for the one mile exposure areas; therefore, an RAL of 4 ppm was selected for application to the entire river channel. In other words, to achieve a cleanup goal of 1 ppm for PCBs in sediment, remediation of sediment with PCB concentrations greater than 4 ppm would be required. Removal of PCB-contaminated sediments exceeding 4 ppm in the LMR would not only protect for mink and heron, but would also result in average and maximum PCB concentrations remaining in the LMR channel sediment that would not likely be associated with adverse impacts to the fish communities and plants.

6.2.2 EPA Recreational Flood Plain Qualitative Ecological Risk Assessement

EPA recognized the need for an ecological risk assessment for the recreational (agricultural) flood plain areas after receipt of the RI data. EPA authored a stand-alone document that addresses the qualitative ecological risks associated with exposure to PCBs in the recreational flood plain areas (Sheboygan River and Harbor Floodplain Terrestrial Ecological Risk Assessment, November 15, 1999, prepared by James Chapman, USEPA Ecologist, for USEPA Region 5). Only the portions of the Sheboygan risk assessment directly related to the soil PCB clean up goals are summarized below.

The Sheboygan River and Harbor Superfund site, Wisconsin, includes about 14 river miles from above Sheboygan Falls Dam to the harbor at Lake Michigan. Elevated PCB concentrations were detected in floodplain soils along the Sheboygan River, deposited in portions of the floodplain by episodes of flooding. Discrete sampling revealed a pattern of elevated soil PCB concentrations within approximately 100 ft of the nearest river bank, and much diminished levels at greater distances, along about a 2-mile section of the river. The riparian habitat includes a mix of deciduous woods, scrub-shrub, and grassy fields.

The assessment endpoint for the risk assessment was reproductive performance in terrestrial animals that feed on earthworms and insects, as represented by robins, the measurement endpoint. Reproductive effects were assessed by modeled uptake of PCBs (both congener-specific and total PCBs) in robin eggs, which were compared to the results of egg injection studies or to feeding studies in which egg concentrations were measured. The results of the risk assessment were translated to soil ecologically-protective preliminary clean up goals by use of site-specific soil-earthworm bioaccumulation factors (BAFs) determined from co-located soil and earthworm samples.

PCB dietary exposure to robins feeding in the contaminated floodplain was calculated for consumption of three broad categories of prey: earthworms, hard-bodied invertebrates (beetles), and soft-bodied invertebrates (other than earthworms).

PCB concentrations in soils and earthworms were directly measured, and the concentrations in hard- and soft-bodied invertebrates were modeled from the earthworm data based on field studies of the relative accumulation of dioxin in the respective groups.

PCB concentrations in robin eggs were modeled from the dietary concentrations by applying diet-to-egg biomagnification factors for total PCBs and key dioxin-like PCB congeners reported in field studies of herring gulls and Forster's terns (since the values varied somewhat between species, two sets of congener-specific calculations were run).

Risk to robins was evaluated by calculating hazard quotients (HQs):

HQ = Modeled egg concentration / TRV

where TRV is the toxicity reference value for PCB or dioxin-like PCB congener concentrations in eggs.

The procedure for calculating ecologically protective soil cleanup goals began with the TRVs corresponding to the no observed adverse effect concentration (NOAEC) and lowest observed adverse effect concentration (LOAEC) in eggs. Ecologically protective robin dietary concentrations were calculated by dividing an egg TRV by the corresponding diet-to-egg biomagnification factor. Ecologically protective earthworm concentrations were calculated from the protective robin dietary concentration, and then ecologically protective soil cleanup goals were calculated by dividing the protective earthworm concentration by the site-specific soil-earthworm bioaccumulation factor. This was done for both total PCBs and for specific dioxin-like PCB congeners. Congener-specific soil cleanup goals were converted to a total PCB basis by dividing by the site-specific ratio of that congener to the total PCB concentration in soil.

The calculated soil PCB cleanup goals are shown below. The central values (shown in bold--NOAEC-based goal of 1.5 ppm, and LOAEC-based goal of 4 ppm) were selected as best representing the soil cleanup goal for Sheboygan. The central values were the basis for additional calculations to account for site-specific area use at Sheboygan (foraging over both heavily contaminated areas bordering the river and less contaminated land farther from the river), which served a similar purpose as the remedial action level (RAL) calculations at LMR.

Table- Ecologically Protective Soil Clean Up Goals, Sheboygan River Floodplain, WI.

Toxicity Basis	NOAEC-based CUG	LOAEC-based CUG
	(ppm total PCBs)	
Total PCBs	1	**4**
Congener-specific	**1.5**	3
Congener-specific	2	5

Several studies of robin foraging and territory size were considered. For the Sheboygan ERA, Weatherhead and McRae (1990) was selected because it provided information on foraging and not just territory, showed changes in foraging areas as development of young progresses, and showed the geometry of the areas. The foraging range of robins varies according to the life stage. Parental robins forage over a smaller area while feeding nestlings (1472 m^2) than while caring for fledglings (8080 m^2) (mean values).. Converted to feet, the nestling and fledgling foraging ranges are 15,845 and 86,972 ft^2, respectively. For square ranges, this is equivalent to 126 x 126 ft for a nestling-stage range, and 295 x 295 ft for a fledgling-stage range.

Since the robin foraging areas extend beyond the 100-foot wide strip of elevated floodplain soil PCB contamination along the Sheboygan River, the soil cleanup goals were adjusted to account for foraging in areas of low contamination (for both nestling and fledgling stages). The results of these calculations were not applied to the LMR site because they depend on the specific pattern of deposition at the site. Instead, soil remedial action levels were calculated for LMR based on the distribution of soil PCB measured in the recreational lands at LMR, assuming the same initial cleanup goals and robin foraging areas as in the Sheboygan risk assessment.

The effectiveness of different RAL selections in reducing terrestrial ecological risk in the recreational use LMR floodplain is summarized in the table below. The first column under the LOAEL-based CUG shows the number of fledgling-stage areas that would exceed the CUG after remedial action at different RALs (including no action). The second column shows the percentage of the areas formerly at risk that would no longer represent a potential risk following remedial action, and the third column shows the percentage not at risk out of the total number of fledgling-stage foraging areas considered (53 areas total). The same information is given under the NOAEL-based CUG.

Table 1. Summary of the Effectiveness of Alternative Remedial Action Levels on Reduction of Risk in Robin Fledgling-stage Foraging Areas in Recreational Use Floodplains Along the Little Mississinewa River, Randolf County, IN

RAL (ppm)	LOAEL-based CUG (4 ppm)			NOAEL-based CUG (1.5 ppm)		
	Post-action Number of Fledgling Areas >CUG	% Fledgling Areas at Risk Addressed by Action	Post-action % of Total Fledgling Areas < CUG	Post-action Number of Fledgling Areas > CUG	% Fledgling Areas at Risk Addressed by Action	Post-action % of Total Fledgling Areas < CUG
no action	13	0	75	33	0	38
50	9	31	83	31	6	42
40	8	38	85	31	6	42
30	5	62	91	29	12	45
20	3	77	94	26	21	51
10	0	100	100	12	64	77
5				0	100	100

CUG - clean up goal
LOAEL - lowest observed adverse effect level
NOAEL - no observed adverse effect level
RAL - remedial action level

The data show that a RAL of 10 ppm is required to reduce potential risk to less than LOAEL levels in all of the areas under consideration, and a RAL of 5 ppm is necessary to reduce potential risk to NOAEL levels in all areas. Generally, EPA does not base remedial decisions on achievement of NOAEL levels, but this information provides a basis for comparison of the various alternatives. Other RAL options are shown to assist in selection of an appropriate RAL that satisfies the nine criteria for remedy selection.

6.3 Basis for Action

The excess cancer risk and noncancer health hazards associated with human contact and ingestion of PCB-contaminated sediments and soils and consumption of fish, as well as the ecological risks associated with ingestion of fish and other aquatic organisms by birds and mammals are above acceptable levels under baseline conditions. EPA approved the BRA as providing an adequate basis for determining that unacceptable risks are present at the Site and for developing and screening remedial alternatives. Additionally, a non-quantitative risk analysis indicated that PCB levels in recreational flood plain areas could pose unacceptable risks to birds (i.e. robins) that consume worms living in the PCB-contaminated soils. The response action selected in this ROD is necessary to protect the public health or welfare and the environment from actual releases of hazardous substances into the environment.

7 REMEDIAL ACTION OBJECTIVES AND ARARs

7.1 Remedial Action Objectives

Consistent with the NCP and RI/FS Guidance, remedial action objectives (RAOs) were developed in the FS for the protection of human health and the environment. The RAOs specify the contaminants and media of concern, exposure routes and potential receptors, and an acceptable concentration limit or range for each contaminant for each of the various media, exposure routes, and receptors. RAOs address the protection of human health and protection of the environment. No numeric cleanup standards have been promulgated by the federal government or the State of Indiana for PCB-contaminated sediment. Therefore, site-specific RAOs to protect human and ecological health were developed based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to be considered non-promulgated guidelines (TBC), and risk-based levels established using the human and ecological risk assessments.

The following six RAOs have been established for the Little Mississinewa River Site:

- Protect humans from exposure to PCBs at levels that could pose a health risk in residential flood plain areas;
- Protect humans who consume fish from exposure to PCBs that exceed protective levels;
- Protect ecological receptors from PCBs in the river channel and recreational flood plain areas that exceed protective levels;

- Protect the LMR and its flood plains from recontamination from PCBs at depth in river sediments and flood plain areas during and after the implementation of the remedy;

- Remove the encumbrances on local residents resulting from long-term contamination of their properties with PCBs; and

- Achieve, to the extent practicable, surface water quality criteria throughout the LMR.

RAOs were then used to establish specific risk-based Cleanup Goals (CUGs). Remedial Action Levels (RALs) for the Site were then established for the Site based on the RAOs and CUGs and after review of both the preliminary chemical-specific ARARs and risk-based concentrations. The difference between a CUG and an RAL is as follows: the CUG is the area-wide average concentration of PCBs that must be achieved to achieve the RAOs. The RAL can be derived based on the CUG, which is risk-based, i.e. the cleanup level throughout a given area that must be achieved to meet the CUG, which is an average concentration, or it can be a not-to-exceed level that is not risk-based. For example, the RAL for the top 12 inches of contaminated river sediments is derived from the CUG of 1.0 ppm PCBs. To achieve this 1.0 ppm average, all PCB-contaminated sediments in the top 12 inches of river sediment that exceed 4.0 ppm must be removed The RAL will always be greater than or equal to the CUG. For the river sediments below 12 inches, the RAL is 5 ppm; this is the not-to-exceed concentration that will ensure recontamination of the river sediments and flood plain soils from floods, human disturbance, etc with unacceptable levels of PCBs will not occur. For the Site, the RAL for the river sediments was calculated based on a one-mile average, per the ecological BRA. The RAL for the residential flood plain areas was calculated based on averaging over the areas used to delineate sampling zones during the RI, also consistent with the BRA. For the residential flood plain areas, the CUGs were 1.2 ppm PCBs within the LMR channel-edge exposure areas and 1.3 ppm on average (over the area sampled during the RI, which includes the channel edge). The RAL for the residential flood plain areas is 5 ppm PCBs. In other words, all PCB-contaminated soils with concentrations in excess of 5 ppm must be removed (RAL) to achieve the CUGs of 1.2 ppm PCBs at the river channel edge and 1.3 ppm PCBs on average. For the recreational flood plain areas and the river channel sediments below the top 12 inches, the RALs are not-to-exceed cleanup levels because no CUG can be calculated below a one-foot depth as discussed above. A not-to-exceed cleanup level means that all PCB-contaminated soils and/or sediments with concentrations that exceed the chosen cleanup level will be removed. The reason for using not-to-exceed levels for the recreational flood plain areas was that a quantitative risk assessment was not performed for these areas; thus, a risk-based CUG could not be calculated and a range of not-to-exceed RALs was developed and evaluated for the recreational flood plain areas. For the river sediments below a depth of 12 inches, the cleanup level is not-to-exceed because the area in the river sediments where exposure routinely occurs is the top six to 12 inches; thus, a risk-based CUG cannot be calculated for river sediments below a 12-inch depth and a range of not-to-exceed RALs was developed and evaluated for the river sediments below 12 inches.

Regarding the RAL for the recreational flood plain areas, the cost differential between implementation of a 30 ppm RAL and a 20 ppm RAL is approximately $800,000, and the cost differential between implementation of a 20 ppm RAL and a 10 ppm RAL is approximately $3,700,000. EPA selected an RAL of 20 ppm for recreational flood plain areas as representing the best balance of the nine criteria used to evaluate remedial alternatives.

The CUGs and RALs served to focus the development of alternatives or remedial technologies that can achieve the RAOs.

7.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. In addition to applicable requirements, the ARARs analysis that was conducted considered criteria, and relevant and appropriate standards and guidelines that were useful in evaluating remedial alternatives. These non-promulgated guidelines and criteria are known as To Be Considered (TBCs). In contrast to ARARs, which are promulgated cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations, TBCs are guidelines and other criteria that have not been promulgated or promulgated standards that have not been applied consistently.

Location-specific ARARs establish restrictions on dredging and grading activities and the management of waste or hazardous substances in specific protected locations, such as riverbeds, wetlands, floodplains, and sensitive habitats.

Action-specific ARARs are technology-based or activity-based requirements or limitations on actions taken with respect to remediation. These requirements are triggered by particular remedial activities that are selected to accomplish the remedial objectives. The action-specific ARARs indicate the way in which the selected alternative must be implemented as well as specify levels for discharge.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies that establish concentration or discharge limits, or a basis for calculating such limits, for particular substances, pollutants or contaminants.

Sediments removed from the LMR may contain PCBs equal to or greater than 50 ppm. PCB sediment with concentrations less than 50 ppm will be managed as a solid waste in accordance with statutes and rules governing the disposal of solid waste in Indiana. PCB sediment with concentrations equal to or greater than 50 ppm will be managed in accordance with the Toxic Substances Control Act (TSCA) of 1976.

A list of all of the ARARs and TBCs for the Site is included in Tables 2.1, 2.2, and 2.3.

8 DESCRIPTION OF ALTERNATIVES AND COMPARATIVE ANALYSIS

Following development of the RAOs, a screening and evaluation of remedial alternatives was conducted in accordance with CERCLA and the NCP. First, a wide range of potentially applicable remedial technologies or process options for addressing PCB-contaminated sediments were identified and screened (evaluated) based on effectiveness and technical implementability at the Site. Those technologies which were retained after the first screening of potential remedial technologies were then evaluated in a second screening based on effectiveness, implementability, and cost. After the second screening, the following three technologies were retained for consideration in the analysis of remedial alternatives: (1) no action, evaluation of which is required by the NCP; (2) engineered covers/caps with institutional controls; and (3) source removal and off-site disposal of contaminated sediments and soils in landfills. The capping and source removal alternatives included monitored natural recovery in selected areas of the LMR channel and biomonitoring to gage the extent to which and rate at which the alternatives achieved the RAOs. One factor which resulted in several potential alternatives being screened out is the relatively small size of the LMR and the ease with which dry excavation can be accomplished via diversion of the river flow.

For excavation and capping alternatives, the following action levels were evaluated for the LMR sediments: 5 ppm for the capping alternative, 4 ppm RAL (to achieve 1 ppm averaged over a length of one river mile), 1 ppm RAL (i.e. not-to-exceed), 5 ppm RAL, 10 ppm RAL, 20 ppm RAL, and no action. For LMR flood plain areas, the following action levels were evaluated: for residential, 10 ppm for the capping alternative, 5 ppm RAL (to achieve 1.2 CUG at LMR channel-edge areas and 1.3 ppm CUG overall average), 10 ppm RAL, 50 ppm RAL, and no action; for recreational, 10 ppm for the capping alternative, 60 ppm (to achieve a CUG of 13.5 ppm), 5 ppm RAL, 10 ppm RAL, 20 ppm RAL, 30 ppm RAL , 50 ppm RAL, and no action.

8.1 Description of Remedial Alternatives

The various alternatives are described below. See Table 3 for detailed cost estimates for each alternative.

Alternative 1 – No Action

A No Action alternative is included for the LMR. This alternative involves the performance of minimal monitoring activities. The PCB-contaminated sediments and soils would be left in place in the LMR and flood plain areas without any cleanup remedy. The No Action alternative is required by the National Contingency Plan, because it provides a basis for comparison with the alternatives for active remediation.

Estimated Cost: $305,000

Alternative 2 –Engineered Covers/Caps with Land Use Controls

This alternative involves covering contaminated sediments that exceed a PCB concentration of 5 ppm and contaminated soils that exceed a PCB concentration of 10 ppm with clean soil in selected portions of the LMR and flood plain areas. The intent of this action would be to prevent PCBs from moving to another location and direct contact by humans and wildlife with PCBs. Limited soil and sediment removal would be conducted to facilitate installation of the cap/cover and maintain adequate drainage away from the PCBs. Excavated soils and sediments would be disposed of at an EPA-approved off-site landfill. Existing land-use controls would be continued to reduce the chance of future disturbance of the barrier and PCBs. Alternative 2 and Alternatives 3a and 3c through 3h include the provision of Monitored Natural Recovery (MNR) for LMR sediments downstream of New Lisbon with PCB concentrations that exceed 1 ppm but do not require removal. Alternative 2 and the remaining alternatives require restoration of the LMR channel and flood plain areas to their pre-excavation condition and continued biomonitoring of the aquatic life in the LMR to gage progress in meeting RAOs.

Estimated Cost: $18.4 million

Alternative 3a – Source Removal to a Specific Levels with Potential Physical Barrier and Geotextile Fabric

This alternative includes excavation of PCB-contaminated material. Soils and sediments dug up would be disposed of at an EPA-approved off-site landfill. In this option contaminated soil and sediment would be excavated until the average amount of PCBS left is at the following levels:

- 1 ppm in river sediment
- *1.2 ppm in residential flood plain soils at river-edge areas*
- 1.3 ppm in overall residential flood plain soil areas
- 13.5 ppm in recreational soil areas.

This alternative includes 14 sub-options that require removal of contaminated soils and sediments to various depths ranging from 12-24 inches. This alternative includes placement of a barrier that would minimize erosion of sediments and soils. Existing land-use controls would be continued, and new land use controls would be evaluated and implemented to the extent necessary, to reduce the chance of future disturbance of the cover and PCBs.

Estimated Cost: $16.7 to $22.8 million (for the range of sub-options)

Alternative 3b-Contaminated Sediment and Soil Removal to 1 ppm with Potential Physical Barrier and/or Geotextile Fabric

This alternative includes excavating and removing PCB-contaminated soils and sediments that exceed 1 ppm (RAL of 1ppm for both soil and sediment) and disposing of the excavated materials at an EPA-approved off-site landfill. This alternative includes six sub-options that require removal of contaminated soils and sediments to various depths ranging from 2-3 feet. This alternative also includes placement of a barrier that would prevent erosion of sediments and soils. Existing land-use controls would be continued, and new land use controls would be evaluated and implemented to the extent necessary, to reduce the chance of future disturbance of the barrier and PCBs.

Estimated Cost: $54.5 to $62.9 million (for the range of sub-options)

Alternative 3c-Contaminated Sediment and Soil Removal to 5 ppm with Potential Physical Barrier and Geotextile Fabric

This alternative is like 3b except that all PCB-contaminated soils and sediments that exceed 5 ppm (RAL of 5 ppm for both soil and sediment) would be excavated.

Estimated Cost: $34.1 to $38.3 million (for the range of sub-options)

Alternative 3d-Contaminated Sediment Removal to 1 ppm and Soil Removal to 10 ppm with Potential for Physical Barrier and/or Geotextile Fabric

This alternative is like 3b and 3c except that all PCB-contaminated sediments at levels above 1 ppm (RAL for sediments) and all PCB-contaminated soils above 10 ppm (RAL for soils) would be excavated.

Estimated Cost: $34.5 to $36.4 million (for the range of sub-options)

Alternative 3e-Contaminated Sediment Removal to 5 ppm and Soil Removal to 50 ppm with Potential for Physical Barrier and/or Geotextile Fabric

This alternative is like 3b, 3c, and 3d except that all PCB-contaminated sediments at levels above 5 ppm (RAL for sediments) and all PCB-contaminated soils above 50 ppm (RAL for soils) would be excavated.

Estimated Cost: $21 to $22.2 million (for the range of sub-options)

"Feasibility Study Alternative 3f"-River Sediment Removal to an Average PCB Level of 1 ppm at the Surface and 5 ppm below 1 foot deep; Residential Flood Plain Soil Removal to an Average PCB Level of 1.3 ppm overall; and Recreational Soil Removal to a PCB Level of 10 ppm

This alternative includes excavation of contaminated river sediments to a depth of 12 inches until the average remaining level of PCBs is 1 ppm (CUG as averaged over 1 mile of river length). Additional sediment removal would go deeper than 12 inches where PCB contamination exceeds 5 ppm (RAL for deeper sediments). The depth of excavation in river sediments would be 3 feet or several inches into the clay layer at the channel bottom, whichever comes first. A physical barrier would be placed where PCB concentrations above 5 ppm remain at depths greater than 3 feet. Contaminated soils in the residential flood plain areas would be excavated to a depth of 1 foot until the average remaining level of PCBs is 1.2 ppm in river-edge areas and 1.3 ppm overall (CUG for residential flood plain soils). In heavily-vegetated areas, the maximum depth of excavation would be 1 foot and in open areas, excavation would extend to 2 feet where needed. Contaminated soils with PCB levels that exceed 10 ppm in the recreational flood plain areas (RAL for recreational flood plain soils) would be excavated to a depth of two feet in open areas and a maximum depth of 1 foot in heavily-vegetated areas. Post-excavation sampling would be conducted in the remediated flood plain areas to determine the need for a physical barrier. The maximum depth of 1 foot in heavily-vegetated areas is intended to protect and minimize the destruction of the flood plain woods and vegetation. Soils and sediments dug up under this alternative would be disposed of at an EPA-approved off-site landfill.

Estimated Cost: $31 million

"Proposed Plan Alternative 3f"-River Sediment Removal to an Average PCB Level of 1 ppm at the Surface and 5 ppm below 1 foot deep; Residential Flood Plain Soil Removal to an Average PCB Level of 1.3 ppm overall; and Recreational Soil Removal to a PCB Level of 20 ppm

Alternative 3f was modified for the purposes of the Proposed Plan to require an RAL of 20 ppm for the recreational flood plain soils (instead of 10 ppm), based on the results of EPA's supplement to the ecological risk assessment. Throughout the remainder of the ROD, "Alternative 3f" refers to the Proposed Plan Alternative 3f.

Estimated Cost: $27 million

Alternative 3g-River Sediment Removal to an Average PCB Level of 1 ppm at the Surface and 10 ppm below 1 foot deep; Residential Flood Plain Soil Removal to an Average PCB Level of 1.3 ppm overall; and Recreational Soil Removal to a PCB Level of 20 ppm

This alternative is like Alternative 3f except that the sediments below the top 12 inches with a PCB concentration in excess of 10 ppm (RAL) and the recreational flood plain soils exceeding 20 ppm PCBs (RAL) would be excavated under this alternative.

Estimated Cost: $25.2 million

Alternative 3h-River Sediment Removal to an Average PCB Level of 1 ppm at the Surface and 20 ppm below 1 foot deep; Residential Flood Plain Soil Removal to an Average PCB Level of 1.3 ppm overall; and Recreational Soil Removal to a PCB Level of 30 ppm

This alternative is like Alternatives 3f and 3g except that the sediments below the top 12 inches with a PCB concentration in excess of 20 ppm (RAL) and the recreational flood plain soils exceeding 30 ppm PCBs (RAL) would be excavated under this alternative.

Estimated Cost: $22.7 million

8.2 PREFFERED ALTERNATIVE

The preferred alternative outlined in the Proposed Plan for the Site was **Alternative 3f (with 20 ppm RAL for recreational flood plain areas)**. The estimated cost of the preferred alternative is **$27 million.**

8.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA § 121, 42 USC § 9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR § 300.430(e)(9), EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies*, OSWER Directive 9355.3-01, and EPA's *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, OSWER 9200.1-23.P. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria (two threshold, five primary balancing, and two modifying criteria) and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

Threshold Criteria

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway

are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. The selected remedy must meet this criterion.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet applicable or relevant and appropriate federal and state environmental laws and/or justifies a waiver from such requirements. The selected remedy must meet this criterion or a waiver of the ARAR must be attained.

Primary Balancing Criteria

3. **Long-Term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

5. **Short-Term Effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed, until cleanup levels are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital costs, annual operation and maintenance costs (assuming a 30-year time period), and net present value of capital and operation and maintenance costs, including long term monitoring.

Modifying Criteria

8. **Agency Acceptance** considers whether the support agency, IDEM in this instance, concurs with the lead agency's remedy selection and the analyses and recommendations of the RI/FS and the Proposed Plan.

9. **Community Acceptance** addresses the public's general response to the remedial alternatives and Proposed Plan. The ROD includes a responsiveness summary that presents public comments and the EPA responses to those comments. The level of community acceptance of the selected alternative is outlined in the Responsiveness Summary (see Appendix A).

8.3.1 Protection of Human Health and the Environment

The primary risk to human health associated with the contaminated sediment is consumption of fish. The primary risk to the environment in the river channel is the bioaccumulation of PCBs from the consumption of fish or, for invertebrates, the direct ingestion/consumption of sediment. The primary risk to human health associated with flood plain areas is direct contact and ingestion of PCB-contaminated soils in the residential flood plain. The primary risk to the environment in the flood plain areas is the bioaccumulation of PCBs from the consumption of worms and other earth-dwelling organisms.

The No Action Alternative (Alternative 1) is not protective of human health and the environment since unacceptable levels of PCBs would remain in the river sediments and the flood plain soils. The No Action Alternative is carried through the remainder of the nine criteria analysis as a point of comparison to the other alternatives.

Alternatives 2 and 3d and 3e would not provide adequate protection of human health and the environment in the short-term because each of these alternatives have components that do not achieve the CUGs/RALs for the Site. Alternatives 2 and 3d apply an RAL of 10 ppm for flood plain areas (the RAL established for the Site is 5 ppm for residential flood plain areas); Alternative 3e applies an RAL of 50 ppm for flood plain areas. Alternatives 3a and 3h would marginally achieve this criterion because Alternative 3h applies an RAL of 30 ppm for recreational flood plain areas (the RAL based on EPA's qualitative analysis is 20 ppm), and Alternative 3a would apply a CUG of 13.5 ppm, which would not meet EPA's RAL for all of the robin foraging areas.

Alternatives 3b, 3c, 3f, and 3g would provide adequate protection of human health and the environment since each of these alternatives achieves the CUGs/RALs for the Site. Alternative 3b substantially exceeds the CUGs/RALs, Alternative 3c meets the sediment CUG and meets or exceeds the soil CUG/RAL, and Alternatives 3f and 3g meet the sediment and soil CUGs/RALs. Alternative 3g provides less protection against recontamination from PCBs left in place since the deep sediment RAL is 10 ppm (versus 5 ppm for Alternative 3f).

8.3.2 Compliance with ARARs

Section 121 (d) of CERCLA and NCP §300.430(f)(1)(ii)(B) requires that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.

Alternative 1 would not achieve the ARARs identified for the Site because levels of PCBs exceeding 50 ppm would be allowed to remain in place with no action taken. Alternatives 2 and 3e would be expected to meet ARARs, but could present compliance problems if not implemented and/or maintained properly. Alternative 2 would allow high levels of PCBs to remain in place under a barrier, and a high degree of maintenance would be required to ensure the barrier is not breached. Alternative 3e applies an RAL of 50 ppm for flood plain areas, which is marginally compliant with the requirements of the Toxic Substances Control Act. If Alternative 3e were not implemented properly, it may not be compliant with ARARs.

Alternatives 3a, 3b, 3c, 3d, 3f, 3g, and 3h would all comply with the identified ARARs for the Site.

8.3.3 Long-Term Effectiveness and Permanence

Alternative 1 (No Action) would not provide long-term effectiveness and permanence because high concentrations of PCBs would be allowed to remain in place and continue to present unacceptable risks to human health and the environment.

Alternatives 2 and 3a through 3h would require institutional controls, including the fish consumption advisory and existing land use controls until remedial action objectives were met at a future date, but they are unlikely to require additional Site use restrictions after removal activities are completed. Fish consumption advisories and fishing restrictions will continue to provide some protection of human health until PCB concentrations in fish are reduced to the point where the fish consumption advisories and fishing restrictions can be relaxed or lifted. Alternatives 2 and 3a through 3h will also require some degree of monitoring. Monitoring programs will be developed, as appropriate, for all phases of the project. Alternatives 2 and 3a through 3h all use established technologies.

Alternatives 3a through 3h rely on engineering controls at the disposal facility. Properly designed and managed landfills provide proven, reliable controls for long-term disposal for these alternatives.

Alternatives 2 and 3d and 3e would not provide adequate long-term effectiveness and permanence because these alternatives leave unacceptable concentrations of PCBs in place.

Alternatives 3a, 3g, and 3h would provide marginal long-term effectiveness and permanence because they rely heavily on barriers to achieve CUGs/RALs. The success of these alternatives relies upon proper design, placement, and maintenance of the barriers in perpetuity for its effectiveness, continued performance, and reliability. A barrier monitoring and maintenance program would provide reasonable reliability, although there are inherent challenges in monitoring and maintaining barriers in a riverine environment, i.e., barriers are vulnerable to a catastrophic flow event, such as might be seen during a 500-year flood, and human activity in the river. The LMR floods frequently and significantly, leading to further uncertainty that these alternatives will provide long-term effectiveness and permanence.

The concerns expressed above also apply to Alternatives 3b, 3c, and 3f; however, Alternatives 3b, 3c, and 3f do not leave wastes in place at levels that exceed CUGs/RALs. Tables 4 and 5 illustrate the PCB mass removal and average area-weighted concentrations for Alternatives 3a, 3b, 3f, 3g, and 3h. Based on these tables and the nature of the LMR (very high flow fluctuations coupled with flow restrictions and, thus, a high potential for scour in portions of the LMR), EPA feels that only Alternatives 3b, 3c, and 3f provide an acceptable degree of certainty that recontamination of the river channel sediments and flood plain soils with unacceptable levels of PCBs will not occur. Thus, Alternatives 3b, 3c, and 3f are considered to provide adequate long-term effectiveness and permanence.

In general, Alternatives 3b, 3c, and 3f are the most reliable, as there is little or no long-term additional on-site maintenance associated with the remedial work. These alternatives permanently remove the greatest amount of contaminated sediment and PCBs from the LMR and achieve the greatest reduction of the potential scour-driven resuspension of PCB-contaminated sediments.

8.3.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

Reduction in toxicity, mobility, or volume of contaminants through treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment and the amount of contamination present.

Alternative 1 does not involve any containment or removal of contaminants and thus provides no reduction in toxicity, mobility, or volume.

None of the remaining alternatives reduce the toxicity of the PCBs. All of the remaining alternatives include the provision of barriers or caps/cover and thus reduce the mobility of the PCBs that are remediated to a roughly equivalent degree; however, the overall amount of reduction in mobility for the alternatives is directly related to the CUGs/RALs for the alternative; i.e., the greatest reduction of mobility is provided by Alternative 3b, which has the lowest RALs, and the least amount of reduction in mobility is provided by Alternative 3e, which has the highest RALs. This is also the case for the reduction in volume for Alternatives 3a through 3h; the lower the CUGs/RALs, the greater the reduction in volume through removal of PCBs from the ecosystem. Alternative 2 provides only limited removal of contaminated soils and sediments and therefore provides little reduction in volume of contaminated materials. In order of least to greatest, the degree of reduction of mobility and volume is: Alternative 3e, 3a, 3h, 3g, 3f, 3c, and 3b. Alternative 2 would provide a moderate degree of reduction of mobility but minimal reduction in volume. Monitored Natural Recovery would provide additional reduction in mobility and volume after the implementation of each alternative.

While Alternatives 3a through 3h would permanently remove moderate to large volumes of PCBs from the LMR (thereby reducing their mobility), they do not satisfy the statutory preference for treatment as a principal element of the remedy. Treatment of the excavated material prior to off-site disposal is not planned for any of the alternatives.

8.3.5 Short-Term Effectiveness

Short-term effectiveness relates to the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation up until the time that remediation levels are achieved.

Length of Time Needed to Implement the Remedy

The implementation times for the alternatives, with the exception of Alternative 1, are approximately 2 years (Alternative 3e and 3h) to 5 years (Alternative 3b). These time estimates give consideration to winter conditions, which will not allow for excavation or capping operations. This represents the estimated time required for mobilization, operation, and demobilization of the remedial work, but does not include the time required for long-term monitoring or operation and maintenance. Alternative 1 does not involve any active remediation and therefore requires no time to implement.

Protection of the Community and Workers During Remedial Action

No construction activities are associated with Alternative 1, so this alternative poses no threats to the community and workers. Implementation of the remaining alternatives creates the potential for direct contact with or ingestion and inhalation of PCBs from the soils, sediments, and to a much lesser degree, surface water. The degree of potential short-term impacts, from least to greatest, is Alternative 3e, 2, 3a, 3h, 3g, 3f, 3c, and 3b; however, it is anticipated that these potential impacts can be controlled and minimized for all of the alternatives.

Environmental Impacts of Remedy and Controls

Environmental impacts consist of PCB releases from removed sediment and soils into the water and air. Habitat impacts from all alternatives are expected to be minimal, as the benthic community should recover relatively quickly from excavation and restoration activities. Additionally, excavation can result in collateral benefits in the course of mitigation, including removal of other chemical contaminants, nuisance species, reintroduction of native species, aeration of compacted and anaerobic soils, and other enhancements of submerged habitats. As successfully shown during the removal action for the LMR, environmental releases can be minimized during remediation by: (1) diverting the river flow and performing dry excavation of sediments (and soils); (2) quick completion of excavation and restoration activities; (3) controlling storm water run-on and runoff from staging and work areas; (4) utilizing removal techniques that minimize losses; as well as through (5) the possible use of silt curtains where necessary to reduce the potential downstream transport of PCBs. Given the ability to minimize and control them, the short-term environmental impacts of all of the alternatives are roughly equivalent.

8.3.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility and coordination with other governmental entities are also considered.

All of the alternatives use proven technologies that are easily implemented, especially given the facts that 1) the removal action was successfully completed in the immediate upstream area in 2001 and 2) the river flow can be diverted so that dry excavation can be used for the river channel sediments. This eliminates the numerous concerns inherent with dredging, e.g., resuspension of contaminants and difficulty in precise removal of contaminated sediments.

The implementability of the alternatives would be similar, with the exception of Alternative 1, which would be the easiest to implement and Alternative 2, which would present the greatest challenge due to the large surface area that must be capped.

8.3.7 Cost

Cost includes estimated capital and annual operation and maintenance costs, as well as total capital cost. Present worth cost is the total capital cost and operation and maintenance costs of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent. (This is a standard assumption in accordance with EPA CERCLA guidance.)

The estimated costs of all remedial alternatives range from $305,000 for Alternative 1 (No Action) to $62.9 million for Alternative 3b with a 1 ppm RAL. A summary of the costs of each alternative is included below. The relative costs for most of the alternatives are similar, with the exception of Alternative 1 (much less costly), Alternative 2 (somewhat less costly), and Alternative 3b (much more costly).

	Present Worth Total Cost ($ Millions)
1 – No Action	0.3
B – Capping	18.4
3a – Source Removal and Off-Site Disposal	16.7-22.8
3b – Source Removal and Off-Site Disposal	54.5-62.9
3c – Source Removal and Off-Site Disposal	34.1-38.3
3d– Source Removal and Off-Site Disposal	34.5-36.4
3e – Source Removal and Off-Site Disposal	21-22.2
Modified 3f – Source Removal and Off-Site Disposal	27
3g – Source Removal and Off-Site Disposal	25.2
3h- Source Removal and Off-Site Disposal	22.7

8.3.8 State Agency Acceptance

The State of Indiana has been actively involved with the LMR Site since approximately 1984. These efforts have led to significant state knowledge and understanding of the LMR and of the contamination problems within those areas. IDEM was an integral part of the process of scoping and implementation of the RI/BRA/FS. IDEM performed oversight activities under a Management Assistance Grant from EPA. IDEM has reviewed the selected remedy and does not concur. IDEM has indicated that EPA's identification of the Indiana Water Quality Criteria for PCBs as To Be Considereds (TBCs) rather than applicable or relevant and appropriate standards (ARARs) for the LMR surface water post-remediation is the reason for their nonconcurrence. Further details in this regard are provided in the IDEM nonconcurrence letter, which is included in the ROD as Appendix C.

8.3.9 Community Acceptance

Community acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. Community acceptance of the Proposed Plan was evaluated based on comments received at the public meetings and during the public comment period. There were five written comments concerning the Proposed Plan. This ROD includes a Responsiveness Summary (see Appendix A). Two of the five comments were from local residents, and one was from the Randolph County Drainage Board. The discussion at the public meeting was centered around specific resident issues concerning access, removal and restoration activities to be performed on individual properties, as well as the timing of the cleanup activities. The community members did not express any criticism of the preferred alternative and seemed to be more concerned with when the actions can start and design issues relative to their respective properties. Based on the comments received and discussion at the public meeting on April 6, 2004, EPA has concluded that the community supports the preferred alternative and is looking forward to its implementation.

One final factor that favors the selection of Alternatives 3b, 3c, or 3f is that these alternatives are consistent with (Alternatives 3c and 3f) or exceed (Alternative 3b) the cleanup criteria used for the removal action performed on the upstream contaminated river areas in 2001.

9 THE SELECTED REMEDY

The following sections outline the selected remedy for the Little Mississinewa River Site.

9.1 Description of the Selected Remedy

Based on the above analysis of the nine criteria, the selected remedy is Alternative 3f-River Sediment Removal to an Average PCB Level (CUG) of 1 ppm at the Surface and an RAL of 5 ppm below one foot deep; Residential Flood Plain Soil Removal to an Average PCB Level (CUG) of 1.3 ppm overall and 1.2 ppm in River-edge Areas; and Recreational Flood Plain Soil Removal to a PCB level (RAL) of 20 ppm. This alternative represents the best balance of overall protectiveness, compliance with ARARs, long-term effectiveness and permanence, costs, and the other criteria, including State and community acceptance, for the Site.

The selected remedy will involve the diversion and dry excavation of the LMR channel to a risk-based Cleanup Goal (CUG) of 1 ppm PCBs (with a corresponding RAL of 4 ppm) in the top 12 inches and an RAL of 5 ppm below one foot deep. The excavation in the channel will continue until a depth of 3 feet or 3 to 6 inches into the clay channel bottom, whichever occurs first. Flexibility will be maintained to allow for deeper excavation where appropriate and where the benefits (e.g. full remediation and no need for deed restrictions) outweigh the costs. Additional sampling at depth during remedial design and/or confirmation sampling during remedial action activities will be conducted to help with the EPA determination of where additional excavation below 3 feet in the river channel may be warranted.

Under the selected remedy, residential flood plain soils contaminated with PCBs in excess of 5 ppm (RAL) will be removed in order to achieve the risk-based CUGs of 1.2 ppm average in the river-edge areas and a 1.3 ppm average in the overall sampling area used in the RI (See Figures 29 through 36). Recreational flood plain areas with PCBs concentrations exceeding 20 ppm (RAL) will be excavated. The vertical limits of excavation for the flood plain areas under the selected remedy are two feet for open areas and a maximum of one foot for heavily wooded areas. As with the river channel sediments, additional vertical sampling will be conducted during the remedial design and/or the remedial action to determine if deeper excavation is warranted in any open flood plain areas; whereas, the one foot maximum for the heavily wooded areas must be maintained to achieve one of the goals for the cleanup-to save the trees along the portions of the LMR where cleanup is necessary.

The excavated PCB-contaminated soils and sediments will be transported off-site for disposal in an EPA-approved off-site landfill(s). It is possible that the contaminated material may need to be disposed of in two separate landfills, one for TSCA waste (PCBs equal to or exceeding 50 ppm) and one for the PCB-contaminated soils and sediments that is less than 50 ppm. It is anticipated that the vast majority of all excavated materials will not require disposal in a TSCA landfill. Prior to backfilling/restoring the LMR channel and flood plain areas, physical barriers (e.g. orange snow fence, geotextile) will be placed over any areas where PCB contamination is left in place above the CUGs/RALs to clearly demarcate such areas. Excavated areas will be carefully restored to preserve the ecological value of the LMR, protect against erosion and scour of soils and sediments, and conform to the current contours of the LMR and its flood plain. Flexibility will be utilized in the implementation of the remedy and restoration of the LMR to address specific resident concerns and, to the extent practical, the concerns of residents and the Randolph County Drainage Board with respect to tile drains along the LMR that are currently partially or completely covered by river sediment. This consideration will only apply to the portions of the LMR that are actively remediated (i.e. will not apply to the portions of the LMR where Monitored Natural Recovery will be utilized, such as the area of the LMR downstream from New Lisbon). A general depiction of the areas of the LMR and its flood plain to be cleaned up under the selected remedy is shown on Figures 29 through 36.

Under the selected remedy, Monitored Natural Recovery will be implemented for the portion of the LMR that is downstream from New Lisbon. Biomonitoring will be conducted before, during, and after the implementation of the cleanup to gage the short-term impacts of the remedy and the extent to which remedial action objectives have been and/or are being achieved at the Site. EPA anticipates that the aquatic organisms in the LMR will be briefly impacted by the cleanup, will recover quickly, and that ultimately, implementation of the remedy will improve the health of the LMR ecosystem and allow for the eventual discontinuance of the Level 5 Fish Advisory that is in effect for the LMR. Post-remediation surface water monitoring will also be conducted to gage the achievement of the RAO for PCB levels in surface water, i.e. the PCB surface water quality criteria will be met to the extent practicable. The monitoring will be continued until RAOs have been achieved for the Site.

Institutional controls will be required for properties where PCB contamination is left in place in excess of the CUGs/RALs. During the RD/RA, an analysis will be conducted regarding the appropriateness of the existing land use controls (Randolph County Ordinance restricting construction and other activities within 75 feet of the LMR) and the need, if any, to supplement these existing controls. The expected instrument of any supplemental institutional controls would be deed restrictions. A fund will be established by the PRPs to address the proper handling and disposal of any PCB-contaminated wastes under the physical barriers that are disturbed in the future. This fund, to the extent necessary, will be administered by a local governmental entity, and the amount of funding required based on the amount of and extent to which PCB contamination is left in place above the applicable RALs. The level of restrictions required at the LMR Site will be relatively low since most areas of the LMR channel and flood plain will be cleaned to below the CUGs/RALs; however, it is clear that some properties will require institutional controls so that PCB-contaminated soils and sediments will not be excavated in the future, humans and wildlife will not be exposed to unacceptable levels of PCBs, and any PCBs that must be disturbed are properly excavated and disposed.

9.2 Cost and Time Required for Implementation of the Selected Remedy

The estimated cost of the selected remedy is $27 million. The construction of the remedy (excavation and restoration) is estimated to take 3 years to implement.

10 STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the remedies that are selected for Superfund sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

Implementation of the selected remedy will be protective of human health and the environment through the removal and off-site disposal of PCB-contaminated sediments and flood plain soils and the monitoring of the natural recovery of PCB-contaminated sediment that is left in place. The selected remedy will use a sediment PCB RAL of 4 ppm to achieve a CUG of 1 ppm in the first 12 inches of river sediment, averaged over a one mile river length; a 5 ppm not-to-exceed cleanup level for river sediments between 12 inches and three feet in depth; a 5 ppm RAL for residential flood plain areas to achieve a CUG of 1.2 ppm in river-edge areas and 1.3 ppm overall in the sampling areas used in the RI; and a 20 ppm not-to-exceed cleanup level for recreational flood plain soils. As indicated in Tables 4 and 5 the selected alternative will result in a protective cleanup of the LMR Site that will be effective in the long-term by removing PCBs in river sediments and flood plain soils that could present a potential future health risk in the event of an upset condition (flooding event, future river dredging or sewer line repair). Given the fact that significant flooding events occur regularly in the LMR, this is an important consideration to prevent recontamination of the river sediments and flood plain areas from scouring and resuspension of PCB contamination that is left in place. With the exception of PCB contamination in a limited number of deep sediment pockets, the selected remedy provides a "walk-away" remedy for the river sediments, resulting in a reduced need for use restrictions in the LMR.

The selected remedy is also expected to lead to the discontinuance of the Level 5 Fish Advisory that is currently in effect for the LMR. The biomonitoring that will be conducted as part of the selected remedy will allow the progress in meeting this goal to be charted. It is expected that the fish consumption advisory will remain in effect for at least several years after implementation of the selected remedy while the ecosystem recovers and the new equilibrium between the aquatic life and the clean sediments is established.

10.2 Compliance with ARARs

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. The selected remedy will comply with the ARARs listed in Table 2.

10.2.1 Potential Chemical-Specific ARARs

Toxic Substances Control Act (TSCA)

TSCA establishes requirements for the handling, storage, and disposal of PCB-containing materials equal to or greater than 50 ppm. TSCA is an ARAR at the Site with respect to any PCB-containing materials with PCB concentrations equal to or greater than 50 ppm that are removed from the Site.

Clean Water Act

Federal surface water quality standards are adopted under Section 304 of the Clean Water Act where a state has not adopted standards. These federal standards, if any, are ARARs for point discharges to the River. Any water generated during excavation must meet federal surface water quality standards before being discharged back to the LMR. Related to these standards are the federal ambient water quality criteria. These criteria are non-enforceable guidelines that identify chemical levels for surface waters and generally may be related to a variety of assumptions such as use of a surface water body as a water supply. While these criteria are not ARARs, they may be TBCs for this Site.

State Surface Water Quality Standards

The State of Indiana has promulgated water quality standards that are based on two components: (1) use designation for the water body; and (2) water quality criteria. These standards, designations, and criteria are set forth in 327 IAC 2-1-3 and 2-1-6. In the remediation context, surface water quality standards are applicable to point source discharges that may be part of the remedial action. Further, to the extent that the remedial work is conducted in or near a water body, such work is to be conducted so as to prevent or minimize an exceedance of a water quality criterion. For the LMR Site, the Indiana Water Quality Standards for PCBs are ARARs for any water that is generated from the remedial activities (such as dewatering of excavated soils and sediments) that is ultimately discharged back to the LMR.

Regarding application to the LMR after the remedial activities are completed, the NCP states that, in establishing RAOs, water quality criteria established under the Clean Water Act (Water Quality Standards-WQSs in Indiana), shall be attained where "relevant and appropriate under the circumstances of the release" (40 CFR 300.430(e)(2)(I)(E)). EPA has determined that WQSs, while relevant to sediment cleanup RAOs, are not appropriate for direct application at this time as the Indiana regulations provide no method to determine a site-specific sediment cleanup level. Thus, while relevant, the regulations are not appropriate or applicable. Calculating a site-specific sediment quality standard from a WQS using current scientific methods such as equilibrium partitioning is very uncertain. Since the regulations provide no guidance on determining cleanup targets, EPA used the 1990 Superfund PCB cleanup guidance which addresses sediment cleanup targets using water quality criteria. The guidance suggests using equilibrium partitioning to develop sediment criteria and then compare it to risk-based cleanup numbers for establishing an RAO. Using this approach, EPA determined that the proposed cleanup is protective and further believes that after the cleanup is completed, it will be protective of surface water quality throughout the LMR, and thus protective of human health and the environment. Therefore, WQSs are not ARARs and are not a threshold criteria for selecting an alternative for the Site; however, the regulations will be a TBC and the remedy will strive to comply with the standards set forth in the WQSs to the extent practicable.

Soil Cleanup Standards

There is no promulgated soil cleanup level for PCBs in sediments and soils. The cleanup goals and remedial action levels at the LMR Site were established based on quantitative and qualitative risk assessments conducted by the PRPs and EPA.

10.2.2 Potential Action- and Location-Specific ARARs

Floodplain and Wetland Regulations and Executive Orders 11988 and 11990

The requirements of 40 CFR § 264.18(b) and Executive Order 11988, Protection of Flood Plains, are relevant and appropriate to action on the Site. Executive Order 11990 (Protection of Wetlands) is an applicable requirement if there are any wetlands present in the areas to be remediated.

National Historic Preservation Action (NHPA), 16 USC 470 *et seq.*

The NHPA provides protections for historic properties (cultural resources) on or eligible for inclusion on the National Historic Register of Historic Places (see 36 CFR Part 800). In selecting a remedial alternative, adverse effects to such properties are to be avoided. If any portion of the Site is on or eligible for the National Historical Register, the NHPA requirements would be ARARs.

Endangered Species

Both state and federal law have statutory provisions that are intended to protect threatened or endangered species (i.e., the federal Endangered Species Act and s. 29.604, State Statutes). In general, these laws require a determination as to whether any such species (and its related habitat) reside within the area where an activity under review by governmental authority may take place. If the species is present and may be adversely affected by the selected activity, where the adverse effect cannot be prevented, the selected action may proceed. If threatened or endangered species exist in certain areas of the River and Bay, these laws may constitute an action-specific ARAR.

Management of PCBs and Products Containing PCBs

It is not expected that federal Resource Conservation and Recovery Act (RCRA) or state regulations governing hazardous waste management will be applicable at this Site. However, to the extent applicable, RCRA regulations could cover the storage, transportation, and disposal of the excavated material.

TSCA – Disposal Approval

TSCA regulations for the disposal of PCB remediation waste (40 CFR 761.61) are applicable to the selection of the cleanup alternative for remediation of PCBs in sediments at the Site, and to the disposal of removed sediments at a state-licensed landfill. These regulations provide cleanup and disposal options for PCB remediation waste. The three options include self-implementing, performance-based, and risk-based disposal approvals. The risk-based disposal approval option is allowed if it will not pose an unreasonable risk of injury to health and the environment.

The current situation in the LMR, as described in the BRA conducted as part of the RI/FS, is that PCB-contaminated sediment poses an unacceptable level of risk in the LMR channel and flood plain areas at this time. Remediation of PCB-contaminated sediment via the selected remedy will reduce risks to human health and the environment.

Sediments removed from the LMR channel and its flood plains may contain PCBs equal to or greater than 50 ppm. PCB sediment with concentrations less than 50 ppm will be managed as a solid waste in accordance with statutes and rules governing the disposal of solid waste in Indiana. PCB sediment with concentrations equal to or greater than 50 ppm will be managed in accordance with the Toxic Substances Control Act of 1976.

10.2.3 Additional To Be Considered Information

Section 303(d), Clean Water Act

Under Section 303(d) of the Federal Clean Water Act, states are required, on a periodic basis, to submit lists of "impaired waterways" to EPA. The LMR is included on the Indiana 303 (d) list due to its Level 5 Fish Consumption Advisory.

10.3 Cost-Effectiveness

EPA has determined that the selected remedy is cost effective. Section 300.430(f)(1)(ii)(D) of the NCP requires that all the alternatives that meet the threshold criteria (protection of human health and the environment and compliance with ARARs) must be evaluated by comparing their effectiveness to the three balancing criteria (long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, and short-term effectiveness). The selected remedy meets these criteria by achieving a permanent protection of human health and the environment at low risk to the public, and provides for overall effectiveness in proportion to its cost.

The Superfund program does not mandate the selection of the least costly cleanup alternative. The least costly effective remedy is not necessarily the remedy that provides the best balance of tradeoffs with respect to the remedy selection criteria nor is it necessarily the least costly alternative that is both protective of human health and the environment and is ARAR-compliant. Cost effectiveness is concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its costs compared to other available options.

The total net present worth of the selected remedy for is $27 million.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA believes that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the Site. The selected remedy does not pose excessive short-term risks. There are no special implementability issues that set the selected remedy apart from the other alternatives evaluated.

10.5 Preference for Treatment as a Principal Element

Based on current information, EPA believes that the selected remedy is protective of human health and the environment and utilizes permanent solutions to the maximum extent possible. The remedy, however, does not satisfy the statutory preference for treatment of the hazardous substances present at the Site as a principal element because such treatment was not found to be practical or cost effective.

10.6 Five-Year Review Requirements

The NCP, at 40 CFR § 300.430(f)(4)(ii), requires a 5-year review if the remedial action results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Because this remedy will result in hazardous contaminants remaining on-site above levels that allow for unlimited exposure, a statutory review will be conducted within 5 years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

11 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

To fulfill the requirements of CERCLA 117(b) and NCP (40 CFR § 300.430(f)(5)(iii)(B) and 300.430(f)(3)(ii)(A)), a ROD must document and discuss the reasons for any significant changes made to the Proposed Plan.

There were no significant changes made to the Proposed Plan. Alternative 3f was the preferred alternative in the Proposed Plan and is now the selected remedy. The Responsiveness Summary (Appendix A) documents and responds to public comments received during the public comment period for the Proposed Plan. The local residents were supportive of the proposed remedy for the Site and were mainly concerned with the timing of and potential impacts on their individual properties. The PRPs and IDEM also submitted written comments, which are addressed in the Responsiveness Summary.

REFERENCES

1973- Gooding, Ansel M., 1973, Characteristics of Late Wisconsonian Tills in Eastern Indiana. Department of Natural Resources Geological Survey Bulletin 49

1981- Laphman, Wayne W., Ground-Water Resources of the White River Basin, Randolph County, Indiana. United States Geological Survey, March 1981

1990- Weatherhead, P. and S. McRae, 1990, Brood Care in American Robins: Implications for Mixed Reproductive Strategies by Females. Anim Behav 39: 1179-1188

1999- SECOR, Engineering Evaluation/Cost Analysis (Little Mississinewa River, Union City, Indiana), SECOR International Incorporated and Hanna and Associates Incorporated-Integrated Risk Management, October 21, 1999

Table 1
Fish Tissue PCB Results
Little Mississinewa River
LMR Remedial Investigation
Randolph County, Indiana

Sample Collection Date	Fish Species	Total PCBs (mg/kg)
11/7/1984	Creek Chub	11.861
11/7/1984	Creek Chub	11.264
11/21/1988	Creek Chub	4.1
8/17/1993	Creek Chub	15
8/17/1993	Creek Chub	23
8/4/1998	Creek Chub	10
8/5/1998	White Sucker	12

Notes:
mg/kg = milligrams per kilogram

TABLE 2

ARARs

TABLE 2.1
Chemical-Specific ARARs and TBCs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
TSCA Standards Applicable to PCBs in Sediment and Soil (40 CFR 761.61).	ARAR	Federal regulation regarding PCB remediation ("Megarule"). Used as the basis for establishing remedial action levels for Sediment and Soil containing PCBs (typically, the site-specific risk-based approach is used for setting PCB cleanup levels in sediments and soils at Superfund sites).	Site must be properly characterized and remediated, as necessary, to eliminate unacceptable risks.
Clean Water Act (33 USC 1251, et seq.), including 33 U.S.C. 1313 and 1314	TBC	EPA's National Recommended Water Quality Criterion for total PCBs for chronic exposure of humans through drinking water and fish consumption is 0.00017 ug/L. The aquatic life criterion for total PCBs based on chronic exposure is 0.014 ug/L for fresh water.	Used to evaluate surface water quality following remediation and restoration.
Indiana Water Quality Standards (327 IAC 2-1-3 and 2-1-6)	TBC	Contains surface water use designation for the MR basin and surface water quality standards for protection of aquatic life (0.014 ug/L) and human health (0.00079 ug/L).	Used to evaluate surface water quality following remediation and restoration.
326 IAC 6-4-4	ARAR	Requires that any vehicle driven on any public right of way must not allow its contents to escape and form fugitive dust.	Transport vehicles will implement reasonable actions to minimize fugitive dust generation.
326 IAC 6-4-2(4)	ARAR	Requires that visible fugitive dust from the remediation not cross a property line.	Dust monitoring and as applicable dust suppression procedures will be implemented during remedial activities.
327 IAC 2-1-8	ARAR	Applies to analytical procedures used to determine chemical quality of waters outside the Great Lakes System.	Will be applied to all monitoring done prior to, during, and after remediation.
327 IAC 5	ARAR	Applies to discharges into waters of the State.	Discharged water will be treated to applicable standards prior to discharge.
329 IAC 4.1-4-1 and 329 IAC 4.1-5-1	ARAR	Applies to cleanup and disposal options for PCB remediation waste.	Will be applied to disposal of excavated sediments and soils.
IDEM Risk-Based Target Levels	TBC	IDEM-specific closure standard applied to Sediment and Soil.	Risk-based target levels may be used for screening assessments of Sediment and Soil.

TABLE 2.2
Action-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
TSCA Regulations for PCB Storage and Disposal (40 CFR 761.50 and 761.60)	ARAR	Applies to the cleanup and disposal of PCB remediation waste. Soil or sediment containing 50 mg/kg or greater released into the environment after April 1978 subject to remediation requirements in 40 CFR 761.61 (self-implementing, performance-based, or risk-based) and provides cleanup levels and other standards for cleaning up and disposing of PCB remediation waste.	Site must be properly characterized and remediated, as necessary, to eliminate unacceptable risks, with proper handling of removed waste materials.
329 IAC 4.1-1-1 Regulation of Wastes Containing PCBs	ARAR	Applies to the person who disposes of solid or liquid waste containing PCBs. Incorporates by reference all provisions in 40 CFR 264 and 40 CFR 761 that govern PCB spill cleanup policy, disposal of PCB waste, disposal facilities, disposal records and reports.	Site must be properly characterized and remediated, as necessary, to eliminate unacceptable risks, with proper handling of removed waste materials.
Clean Water Act (40 CFR 230,233 CFR 320-330, 340 CFR 122, 123, 125 and 40 CFR 403)	ARAR	Regulate permits and limitations for discharges of liquid effluent to surface waters, discharges of liquid effluent to publicly-owned treatment works (POTW), and discharge of dredged or fill materials to the waters of the United States.	Substantive requirements must be followed if pollutants or dredged fill material is discharged to any waters of the United States (unless waived).
Indiana Water Quality Standards (327 IAC 2-1.5-10)	ARAR	Identifies the analytical procedures used as methods of analysis to determine chemical quality of waters.	Must be followed if waste is discharged to any waters of the state.
RCRA Identification and Listing of Hazardous Wastes; Toxicity Characteristic (40 CFR 261.24)	ARAR	Identifies the maximum concentrations of constituents other than PCBs that would cause a waste to be labeled a characteristically hazardous waste.	Waste materials must be tested, as necessary, by Toxicity Characteristic Leaching Procedure (TCLP) to determine whether hazardous characteristics are present.

TABLE 2.2
Action-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
RCRA Standards Applicable to Generators of Hazardous Waste (40 CFR 262)	TBC	Indiana has been delegated the authority to administer these RCRA standards through the state's hazardous waste management regulations. Establishes standards for generators of hazardous waste.	Any hazardous wastes identified during remediation must be managed in accordance with the substantive requirements of these regulations. (PCB-contaminated wastes are not considered to be hazardous wastes; however, if mixed with a RCRA hazardous waste, these rules may be applicable.)
Indiana Hazardous Waste Management Rules (329 IAC 3)	TBC	Applies to all persons generating hazardous waste in the State of Indiana. Establishes a hazardous waste management program consistent with RCRA.	Standards for identifying a hazardous waste, as well as standards for hazardous waste management procedures, must be followed.
40 CFR 263	TBC	Standards applicable to transporters of hazardous waste. These standards apply to transporters of hazardous waste within the U.S. if the transportation requires a manifest.	Must be followed if engaging in off-site transportation of hazardous waste for treatment/ disposal.
49 CFR 172, 173	ARAR	Department of Transportation standards for transportation of hazardous materials. Identifies requirements for manifests, labeling, marking, placarding, and training for hazardous materials transportation.	Must be followed if engaging in off-site transport of hazardous waste, including investigation-derived waste.
IC–13-7-3.5	TBC	Indiana Hazardous Waste Law. Provides requirements for proper and safe transportation, treatment, storage, and disposal of any hazardous waste that is generated in or transported into the state.	Must be followed if engaging in off-site transport of hazardous waste, including investigation-derived waste.
IC-13-7-10.5 and 22	ARAR	Indiana Solid Waste Management Law. Includes requirements concerning solid waste management and operation of a landfill. Potentially applicable to off-site disposal of solid waste.	Must be followed if engaging in off-site land disposal of solid waste.
Clean Air Act (42 USC 7401)	TBC	Regulates MACT emissions standards for hazardous air pollutants from hazardous waste incinerators used at a	Not applicable unless a hazardous waste incinerator is used on the site.

TABLE 2.2
Action-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
		PCB site.	
Indiana Air Pollution Control Statutes (IAC 13-11-2-3, 2-4, 2-5)	TBC	Regulates potential air contamination sources.	Not applicable unless a hazardous waste incinerator is used on the site.
326 IAC 2-5.1-3(a)(1)(D)	ARAR	Requires permits for PCB air emissions from sources that have the potential to emit 10 tons per year or greater.	Site expected to be exempted due to emissions less than 10 tons per year.
326 IAC 2-5.1-2(a)(1)(A)	ARAR	Requires registration for PM10 air emission sources with the potential to emit 5 tons per year or greater.	Site expected to be exempted due to emissions less than 5 tons per year.

TABLE 2.3
Location-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Indiana Nongame and Endangered Species Act of 1973 (IC 14-22-33)	ARAR	State- and federally-designated threatened and endangered species are protected from taking.	Soil excavation and restoration activities must not adversely affect any threatened and endangered species that might be present in the area.
Endangered Species Act (16 USC 1531)	ARAR	Location of an action within an area where it may cause irreparable harm, loss or destruction of significant natural habitat.	Requires that authorized actions do not jeopardize the continued existence of endangered or threatened species and their habitats.
Indiana Drainage Law (IC 36-9-27)	ARAR	Provides for management of regulated drains.	Requires that authorized actions do not jeopardize the continued use and maintenance of regulated drain structures.
Clean Water Act (404 Executive Order, Floodplain Management E.O. 11988)	ARAR	Provides for protection of floodplains.	Requires that authorized actions avoid adverse effects or incompatible development in a floodplain.
Indiana Floodplain Laws (IC 14-28-1; IC 14-28-3; 312 IAC 10-1-1 et. seq.; and related Randolph County ordinances.	ARAR	Requires a state license before a county or municipality may authorize a structure, obstruction, deposit, or excavation within a floodway (or within a floodplain if no floodway/fringe delineation has been made). Also prohibits dumping of contaminants or solid waste within a floodway, as well as construction of a permanent structure for use as an abode or residence.	Must comply with substantive requirements. Requires obtaining a state and/or local license prior to completing remediation. Exempt from requirement to obtain permit per Section 121d of CERCLA.

TABLE 2.3
Location-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
National Historic Preservation Act (36 CFR 800, 63, and 60; 23 CFR 771; and Executive Order 11593)	TBC	Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks.	During remediation, any material that may be considered of historical or archaeological value must be reported.
Preservation of Historical and Archaeological Data (16 USC 469a; 36 CFR 66)	TBC	Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks.	Requires the preservation of historical or archaeological data from loss or destruction.
Protection of Wetlands (33 CFR 320; 23 CFR 777; Executive Order 11990)	ARAR	Provides for protection of wetlands.	Requires that action be taken to minimize the loss or degradation of wetlands.
Bald and Golden Eagle Protection Act of 1940 (16 USC 668)	TBC	Provides protection of bald eagles.	Prohibits the taking of bald eagles except under certain specific conditions.
Protection of Archeological Resources (43 CFR 7; 36 CFR 296; 32 CFR 229; and 18 CFR 1312)	TBC	Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks.	Requires a permit (unless waived) to excavate, remove, or otherwise alter any archaeological resources.
Preservation of American Antiquities (43 CFR 3)	TBC	Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks.	Requires a permit (unless waived) for the examination of ruins, excavation of archaeological sites, and gathering of objects of antiquity.
National Forest Management Act of 1976 (PL 94-588)	TBC	Provides for management of riparian forest.	Requires preparation of resource management plans that provide for multiple use and sustained yield of

TABLE 2.3
Location-Specific ARARs for PCBs
Feasibility Study
Little Mississinewa River
Randolph County, IN

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
			products and services.
Migratory Bird Treaty Act of 1918 (16 USC 703)	TBC	Provides for protection of migratory birds and nesting sites within the area of remediation.	Requires that precautions be taken to protect migratory birds, nests, and eggs from disturbance, damage, or movement from place to place.
Fish and Wildlife Coordination Act of 1958 (PL 85-654; 16 USC 661)	TBC	Provides for protection of wildlife resources in the area of remediation.	Requires measures for conservation, maintenance, and management of wildlife resources.
Fish and Wildlife Conservation Act of 1980 (PL 99-645)	TBC	Provides for conservation of nongame fish and wildlife.	Encourages states to develop conservation plans for nongame fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic, or scientific value. Requires determination of the effects of environmental changes and human activities on same.

TABLE 3

SUMMARY OF REMEDIAL ALTERNATIVE COST ESTIMATES
FEASIBILITY STUDY - LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

	LMR Channel Sediment	*Cost*		*LMR Floodplain Soil*	*Cost*	*Engineer Administration, Oversight & Reporting*	*Contractor Administration & Oversight*	*Inspection, Maintenance, Monitoring & Reporting*	*Range Of Costs for Alternatives w/o Contingency*	*Range Of Costs for Alternatives Including 10% Contingency*
Remedial Alternative 1 - No Action										
	No Action	$ -		No Action	$ -	$112,500	$0	$164,800	$277,300	$305,000
Remedial Alternative 2 - Engineered Cover/Caps with Land-Use Controls										
	Eng'rd Cover/Caps w/ Land-Use Controls	$ 6,214,500		Eng'rd Cover/Caps w/ Land-Use Controls	$ 827,100	$4,305,000	$4,696,700	$670,000	$16,713,300	$18,384,600
Remedial Alternative 3 - Excavation and Off-Site Disposal of Contaminated Sediment and Soils in Landfills										
Remedial Alternative 3a, Removal to Site Specific Risk Level (CUG) for Sediment and Soil										
Option 1(i)	Areas A, B, C & D - Remove 12 Inches Sediment & Install Clean Fill	$ 522,400	Option 1(i)	Residential Areas - Remove 12 Inches Soil & Install Clean Fill	$ 2,299,900	$2,390,000	$3,364,654	$670,000	$9,246,954	$10,171,600
Option 1(ii)	Areas A, B, C & D - Remove 12 Inches Sediment & Install DIB	$ 2,023,500	Option 1(ii)	Residential Areas - Remove 12 Inches Soil & Install DIB (Geotextile)	$ 2,327,600	$4,580,000	$4,863,200	$670,000	$15,190,000 to $20,747,000	$16,709,000 to $22,821,700
Option 1(iii)	Areas A, B, C & D - Remove 24 Inches Sediment & Install Clean Fill	$ 3,383,100	Option 1(iii)	Residential Areas - Remove 24 Inches Soil & Install DIB (Geotextile)	$ 4,411,700					
Option 1(iv)	Areas A, B, C & D - Remove 24 Inches Sediment & Instal DIB	$ 3,491,000								
Option 2(i)	Area A - Remove 36 Inches Sediment & Install DIB, Areas B, C & D - Remove 12 Inches Sediment & Install Clean Fill	$ 4,673,400	Option 2(i)	Recreational Areas - Remove 12 Inches Soil & Install Clean Fill	$ 753,400					
Option 2(ii)	Area A - Remove 36 Inches Sediment & Install DIB In Area A, Areas B, C & D - Remove 12 Inches Sediemnt & DIB	$ 4,676,300	Option 2(ii)	Recreational Areas - Remove 12 Inches Soil & Install DIB (Geotextile)	$ 762,300					
Option 2(iii)	Area A - Remove 36 Inches Sediment & Install DIB, Areas B, C & D - Remove 24 Inches Sediment & Install Clean Fill	$ 4,773,600	Option 2(iii)	Recreational Areas - Remove 24 Inches Soil & Install DIB (Geotextile)	$ 1,438,900					
Option 2(iv)	Area A - Remove 36 Inches Sediment & Install DIB, Areas B, C & D - Remove 24 Inches Sediment & Install DIB	$ 4,783,200								
Remedial Alternative 3b, Sediment and Soil Source Removal to 1 PPM with Potential For Designed Isolation Barrier										
Option 1	No Maximum Presecribed Depth Criteria	$ 12,707,800	Option 1	No Maximum Presecribed Depth Criteria	$ 26,043,000	$9,160,000	$8,628,200	$660,000	$49,516,700 to $57,199,000	$54,468,400 to $62,918,900
Option 2	Maximum Presecribed Depth Criteria of 3 Ft.	$ 12,619,000	Option 2	Maximum Presecribed Depth Criteria of 2 Ft.	$ 22,355,000					
Option 3	Maximum Presecribed Depth Criteria of 2 Ft.	$ 12,143,500	Option 3	Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas	$ 18,925,000					
Remedial Alternative 3c, Sediment and Soil Source Removal to 5 PPM with Potential For Designed Isolation Barrier										
Option 1	No Maximum Presecribed Depth Criteria	$ 7,513,700	Option 1	No Maximum Presecribed Depth Criteria	$ 14,202,000	$6,140,000	$6,257,500	$670,000	$31,004,800 to $34,783,200	$34,105,300 to $38,261,500
Option 2	Maximum Presecribed Depth Criteria of 3 Ft.	$ 7,457,100	Option 2	Maximum Presecribed Depth Cri' ria of 2 Ft.	$ 12,688,200					
Option 3	Maximum Presecribed Depth Criteria of 2 Ft.	$ 7,347,700	Option 3	Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas	$ 10,589,600					
Remedial Alternative 3d, Sediment Source Removal to 1 PPM and Soil Source Removal to 10 PPM with Potential For Designed Isolation Barrier										
Option 1	No Maximum Presecribed Depth Criteria	$ 12,707,800	Option 1	No Maximum Presecribed Depth Criteria	$ 7,324,200	$6,140,000	$6,227,100	$670,000	$31,345,800 to $33,069,100	$34,480,400 to $36,376,000
Option 2	Maximum Presecribed Depth Criteria of 3 Ft.	$ 12,619,000	Option 2	Maximum Presecribed Depth Criteria of 2 Ft.	$ 6,907,600					
Option 3	Maximum Presecribed Depth Criteria of 2 Ft.	$ 12,143,500	Option 3	Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas	$ 6,165,200					
Remedial Alternative 3e, Sediment Source Removal to 5 PPM and Soil Source Removal to 50 PPM with Potential For Designed Isolation Barrier										
Option 1	No Maximum Presecribed Depth Criteria	$ 7,513,700	Option 1	No Maximum Presecribed Depth Criteria	$ 2,747,500	$4,580,000	$4,696,700	$670,000	$19,122,700 to $20,207,900	$21,035,000 to $22,228,700
Option 2	Maximum Presecribed Depth Criteria of 3 Ft.	$ 7,457,100	Option 2	Maximum Presecribed Depth Criteria of 2 Ft.	$ 2,281,700					
Option 3	Maximum Presecribed Depth Criteria of 2 Ft.	$ 7,347,700	Option 3	Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas	$ 1,828,300					

TABLE 3

SUMMARY OF REMEDIAL ALTERNATIVE COST ESTIMATES
FEASIBILITY STUDY - LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

LMR Channel Sediment	*Cost*	*LMR Floodplain Soil*		*Cost*	*Engineer Administration, Oversight & Reporting*	*Contractor Administration & Oversight*	*Inspection, Maintenance, Monitoring & Reporting*	*Range Of Costs for Alternatives w/o Contingency*	*Range Of Costs for Alternatives Including 10% Contingency*
Remedial Alternative 3f, Sediment Source Removal to 4 ppm Surface and 5 ppm at Depth, Residential Soil Source Removal to 5 ppm, and Recreational Soil Source Removal to 10 ppm									
Sediment removal to 1-foot depth to achieve the area weighted average surface concentration of 1 ppm (i.e. , CUG) based on 1 mile reaches, and additional excavation to remove deep sediments above 5-ppm.	$ 7,659,700	Residential	Soil removal to 5 ppm to achieve BRA-established Residential CUGs; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 3,263,600	$5,772,500	$5,421,600	$680,000	$28,199,200	$31,019,100
		Recreational	Soil removal to 10 ppm to exceed BRA established Recreational CUGs (i.e., 50 ppm) and minimize Risk Management issues; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 5,401,800					
Remedial Alternative 3g, Sediment Source Removal to 4 ppm Surface and 10 ppm at Depth, Residential Soil Source Removal to 5 ppm, and Recreational Soil Source Removal to 20 ppm									
Sediment removal to 1-foot depth to achieve the area weighted average surface concentration of 1 ppm (i.e., CUG) based on 1 mile reaches, and additional excavation to remove deep sediments above 10-ppm.	$ 6,030,400	Residential	Soil removal to 5 ppm to achieve BRA-established Residential CUGs; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 3,263,600	$4,940,000	$5,027,100	$680,000	$22,905,200	$25,195,700
		Recreational	Soil removal to 20 ppm to exceed BRA established Recreational CUGs (i.e., 50 ppm) and minimize Risk Management issues; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 2,964,100					
Remedial Alternative 3h, Sediment Source Removal to 4 ppm Surface and 20 ppm at Depth, Residential Soil Source Removal to 5 ppm, and Recreational Soil Source Removal to 30 ppm									
Sediment removal to 1-foot depth to achieve the area weighted average surface concentration of 1 ppm (i.e., CUG) based on 1 mile reaches, and additional excavation to remove deep sediments above 20-ppm.	$ 5,008,500	Residential	Soil removal to 5 ppm to achieve BRA-established Residential CUGs; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 3,263,600	$4,652,000	$4,653,200	$670,000	$20,628,300	$22,691,100
		Recreational	Soil removal to 30 ppm to exceed BRA established Recreational CUGs (i.e., 50 ppm) and minimize Risk Management issues; Maximum Prescribed Depth Criteria of 2 Ft. Depth In Open Areas & 1 Ft Depth In Wooded Areas.	$ 2,381,000					

Table 4
Little Mississinewa River Channel Sediment
Summary of Estimated PCB Mass Present/Removed/Residual
Remedial Alternatives 3a, 3b, 3f, 3g and 3h
Little Mississinewa River
Randolph County, IN

Estimated PCB Mass Removed from LMR Channel Sediment (Surface and Depth)

Remedial Alternative	Depth Interval Below Channel Base(1)	Estimated PCB Mass In-Place (lbs)	Estimated PCB Mass Removed (lbs)	Estimated PCB Mass Remaining (lbs)	Estimated % of Total PCB Mass Removed	Estimated Project Cost (LMR Sediment)
3a	0 to 1 ft	722	160	562	22%	
3a*	1 ft to CB	436	0	436	0%	$ 1,882,744
3a TOTAL		1,158	160	998	14%	
3b	0 to 1 ft	722	681	41	94%	
3b	1 ft to CB	436	429	7	98%	$ 20,633,401
3b TOTAL		1,158	1,110	48	96%	
3f	0 to 1 ft	722	645	78	89%	
3f	1 ft to CB	436	398	38	91%	$ 14,554,101
3f TOTAL		1,224	1,042	116	90%	
3g	0 to 1 ft	722	591	131	82%	
3g	1 ft to CB	436	301	135	69%	$ 12,395,092
3g TOTAL		1,158	893	266	77%	
3h	0 to 1 ft	722	586	137	81%	
3h	1 ft to CB	436	221	215	51%	$ 10,668,118
3h TOTAL		1,158	807	352	70%	

(1) Channel bottom typically occurs at 2 feet below current riverbed, however, volume/mass calculations for the 1 foot to channel bottom interval include transects where channel bottom depths exceeded 2 feet

CB = Channel Bottom

* Remedial Alternative 3a had a excavation depth constraint of one foot, therefore, no PCBs were removed in the 1foot to CB interval

Estimated Post-Remedial Residual Sediment Concentration (Calculated by Exposure Area)

Mile Reach	Post-Remedial Area Weighted Average Residual Concentration (ppm)									
	Remedial Alternative 3a		Remedial Alternative 3b		Remedial Alternative 3f		Remedial Alternative 3g		Remedial Alternative 3h	
	0 to 1 ft	0 ft to CB	0 to 1 ft	0 ft to CB	0 to 1 ft	0 ft to CB	0 to 1 ft	0 ft to CB	0 to 1 ft	0 ft to CB
1	8.49	9.10	0.04	0.07	0.34	0.54	0.47	1.41	0.54	2.38
2	5.69	4.69	0.02	0.04	0.42	0.73	0.44	1.42	0.50	2.25
3	3.73	2.62	0.14	0.10	0.87	0.74	0.87	0.74	0.87	1.45
4	1.52	0.95	0.20	0.24	0.57	0.58	0.57	0.74	0.57	0.74
5	NA	NA	0.24	0.12	NA	NA	NA	NA	NA	NA
6	NA	NA	0.20	0.10	NA	NA	NA	NA	NA	NA
7	NA	NA	0.33	0.17	NA	NA	NA	NA	NA	NA

Mile Reaches begin at Division Street and proceed northward

NA - Not Applicable to Remedial Alternative

H:\WIP\10239 RI FS\Proposed Plan Submittal 120503\
Table 1-Sed Mass Sum 120303.xls

Table 5
Little Mississinewa River Floodplain Soil
Summary of Estimated PCB Mass Present/Removed/Residual
Remedial Alternatives 3f, 3g, 3h
Little Mississinewa River
Randolph County, Indiana

Estimated PCB Mass Removal From Floodplain Soil

Remedial Alternative	Existing Mass PCBs (Pounds)	Estimated Mass PCBs Removed (Pounds)	Estimated Mass PCBs Remaining (Pounds)	Estimated Percent of Total PCB Mass Removed	Estimated Total Project Cost (LMR Soil)
3a Totals	3674	1012	2662	28%	$ [illegible]
3b Totals	3674	3635	39	99%	$ 42,285,4[illegible]
3f Totals	3674	2751	924	75%	$ 16,465,019
3g Totals	3674	2328	1347	63%	$ 12,800,829
3h Totals	3674	2030	1645	55%	$ 12,023,012

Estimated Post-Remedial Residual Soil Concentration and Risk Exposures (Calculated by Exposure Area)

Floodplain Sample Area/Land Use	Maximum Post-Remedial Soil Concentration (ppm)	Post-Remedial Area Weighted Average Residual Concentration Assuming Uniform Excavation Depth of 1 foot or 2 feet in Individual Recreational Areas (ppm)		Post-Remedial Residual Risk Exposure for the 0-2 ft. Exposure Depth Intervals - Assuming Uniform Excavation Depth of 1 foot or 2 feet in Individual Recreational Areas (see notes 1, 2)	
		0 - 1 feet	0 - 2 feet	0 - 1 feet	0 - 2 feet
E - Residential 3a	8.3 (at 1-1.5 ft bgs)	0.50	NA	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
E - Residential 3b	1 (at 1.5-2 ft bgs)	0.40	0.40	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
E - Residential	4 (at 1-1.5 ft bgs)	0.87	0.52	$< 7 \times 10^{-7}$	$< 4 \times 10^{-7}$
F - Residential 3a	45 (at 1-1.5 ft bgs)	0.70	NA	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
F - Residential 3b	1 (at 2.5-3 ft bgs)	0.10	0.10	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
F - Residential	45 (at 1-1.5 ft bgs)	0.70	0.70	$< 6 \times 10^{-7}$	$< 6 \times 10^{-7}$
F - Recreational 3a	(at 1-1.5 ft bgs)	6.22	4.47	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
F - Recreational 3b	1 (at 2.5-3 ft bgs)	0.03	0.03	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
F - Recreational 3f	27 (at 2-3 ft bgs)	1.87	1.61	$< 1 \times 10^{-7}$	$< 1 \times 10^{-7}$
F - Recreational 3g	27 (at 2-3 ft bgs)	2.87	2.09	$< 2 \times 10^{-7}$	$< 2 \times 10^{-7}$
F - Recreational 3h	27 (at 2-3 ft bgs)	2.80	2.19	$< 2 \times 10^{-7}$	$< 2 \times 10^{-7}$
G - Residential 3a	44 (at 1-1.5 ft bgs)	1.20	NA	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
G - Residential 3b	1 (at 1.5-2 ft bgs)	0.10	0.10	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
G - Residential	4.6 at 1-1.5 ft bgs)	0.97	1.06	$< 9 \times 10^{-7}$	$< 8 \times 10^{-7}$
G - Recreational 3a	55 (at 0.5-1 ft bgs)	5.86	5.21	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
G - Recreational 3b	1 (at 1.5-2 ft bgs)	0.03	0.03	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
G - Recreational 3f	25 (at 2-3 ft bgs)	0.73	0.73	$< 5 \times 10^{-8}$	$< 5 \times 10^{-8}$
G - Recreational 3g	25 (at 2-3 ft bgs)	3.86	2.37	$< 3 \times 10^{-7}$	$< 2 \times 10^{-7}$
G - Recreational 3h	25 (at 2-3 ft bgs)	5.32	4.73	$< 2 \times 10^{-7}$	$< 2 \times 10^{-7}$
H - Recreational 3a	78 (at 1-1.5 ft bgs)	6.26	5.86	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
H - Recreational 3b	1 (at 1.5-2 ft bgs)[3]	0.10	0.20	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
H - Recreational 3f	46 (at 1-1.5 ft bgs)[3]	1.90	1.83	$< 1 \times 10^{-7}$	$< 1 \times 10^{-7}$
H - Recreational 3g	46 (at 1-1.5 ft bgs)[3]	3.24	2.94	$< 2 \times 10^{-7}$	$< 2 \times 10^{-7}$
H - Recreational 3h	46 (at 1-1.5 ft bgs)[3]	4.88	4.22	$< 4 \times 10^{-7}$	$< 3 \times 10^{-7}$
I - Recreational 3a	27 (at 1-1.5 ft bgs)	3.20	3.37	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
I - Recreational 3b	1 (at 1.5-2 ft bgs)	0.10	0.10	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
I - Recreational 3f	27 (at 1-1.5 ft bgs)	2.43	2.16	$< 2 \times 10^{-7}$	$< 2 \times 10^{-7}$
I - Recreational 3g	27 (at 1-1.5 ft bgs)	3.20	3.37	$< 3 \times 10^{-7}$	$< 3 \times 10^{-7}$
I - Recreational 3h	27 (at 1-1.5 ft bgs)	3.20	3.37	$< 3 \times 10^{-7}$	$< 3 \times 10^{-7}$
J - Residential 3a	8.8 (at 0.5-1 ft bgs)	0.90	NA	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
J - Residential 3b	1 (at 1.5-2 ft bgs)	0.20	0.40	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
J - Residential	4 (at 1-1.5 ft bgs)	0.90	0.90	$< 7 \times 10^{-7}$	$< 7 \times 10^{-7}$
J - Recreational 3a	52 (at 0.5-1 ft bgs)	1.61	1.43	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
J - Recreational 3b	1 (at 1.5-2 ft bgs)	0.16	0.16	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
J - Recreational 3f	10 (at 1-1.5 ft bgs)	0.92	0.97	$< 8 \times 10^{-8}$	$< 7 \times 10^{-8}$
J - Recreational 3g	11 (at 1-1.5 ft bgs)	1.05	1.08	$< 8 \times 10^{-8}$	$< 8 \times 10^{-8}$
J - Recreational 3h	11 (at 1-1.5 ft bgs)	1.05	1.08	$< 8 \times 10^{-8}$	$< 8 \times 10^{-8}$
K - Recreational 3a	17 (at 0-0.5 ft bgs)	5.46	3.92	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
K - Recreational 3b	1 (at 1.5-2 ft bgs)	0.04	0.04	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
K - Recreational 3f	9.3 (at 0-0.5 ft bgs)	2.21	1.84	$< 2 \times 10^{-7}$	$< 1 \times 10^{-7}$
K - Recreational 3g	17 (at 0-0.5 ft bgs)	5.46	3.92	$< 4 \times 10^{-7}$	$< 3 \times 10^{-7}$
K - Recreational 3h	17 (at 0-0.5 ft bgs)	5.46	3.92	$< 4 \times 10^{-7}$	$< 3 \times 10^{-7}$
L - Recreational 3a	22 (at 1-1.5 ft bgs)	5.83	9.10	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
L - Recreational 3b	1 (at 1.5-2 ft bgs)	0.02	0.02	$< 1 \times 10^{-6}$	$< 1 \times 10^{-6}$
L - Recreational 3f	22 (at 2-2.5 ft bgs)	2.24	4.42	$< 2 \times 10^{-7}$	$< 3 \times 10^{-7}$
L - Recreational 3g	22 (at 2-2.5 ft bgs)	2.24	6.26	$< 2 \times 10^{-7}$	$< 5 \times 10^{-7}$
L - Recreational 3h	22 (at 2-2.5 ft bgs)	6.47	10.06	$< 5 \times 10^{-7}$	$< 8 \times 10^{-7}$

Notes:

(1) The risk calculations contain the average area-weighted concentration risks for 0-1 foot and 0-2 feet depth soils in the Recreational Areas.

All of these risks are below USEPA's acceptable risk range of 10-4 to 10-6 and IDEM's target risk of 10-5.

(2) All of these risks are within or below USEPA's acceptable risk range of 10-4 to 10-6 and below IDEM's target risk of 10-5.

(3) Additional excavation in 2 Grids to depth of 3 feet

LEGEND:

SOURCES:
USGS 7.5 MINUTE
TOPOGRAPHIC MAPS–
UNION CITY, IN AND
COSMOS, IN QUADRANGLE

QUADRANGLE LOCATION

GENERALIZED
SITE LOCATION AREA

0 1000 2000 3000
SCALE IN FEET

N

SECOR

INTERNATIONAL INCORPORATED

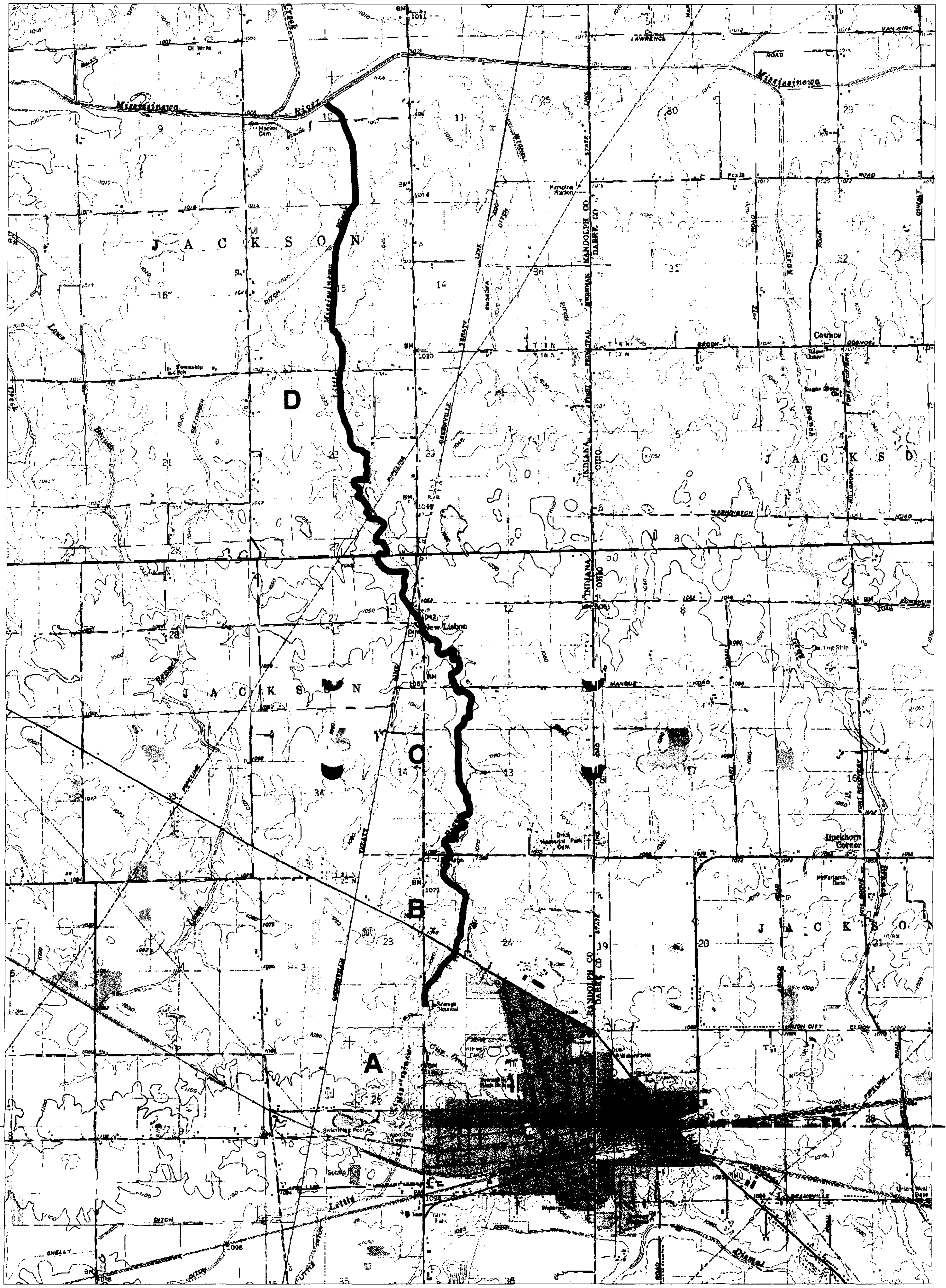
4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 5[illegible]10

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

GENERALIZED SITE LOCATION MAP

FIGURE
1

SECOR PROJECT #: 03UN.10236.00[illegible]03 | FILENAME: FIGURE1.1 | DATE: 04/13/03



LEGEND:

▨	COMPOSITE SAMPLE COLLECTION AT 50 FOOT INTERVALS	▬	COMPOSITE SAMPLE COLLECTION AT 250 FOOT INTERVALS
▬	COMPOSITE SAMPLE COLLECTION AT 100 FOOT INTERVALS	▬	COMPOSITE SAMPLE COLLECTION AT 500 FOOT INTERVALS

SOURCES:
USGS 7.5 MINUTE
TOPOGRAPHIC MAPS–
UNION CITY, IN AND
COSMOS, IN QUADRANGLE

QUADRANGLE LOCATION

0 1000 2000 3000
SCALE IN FEET

N

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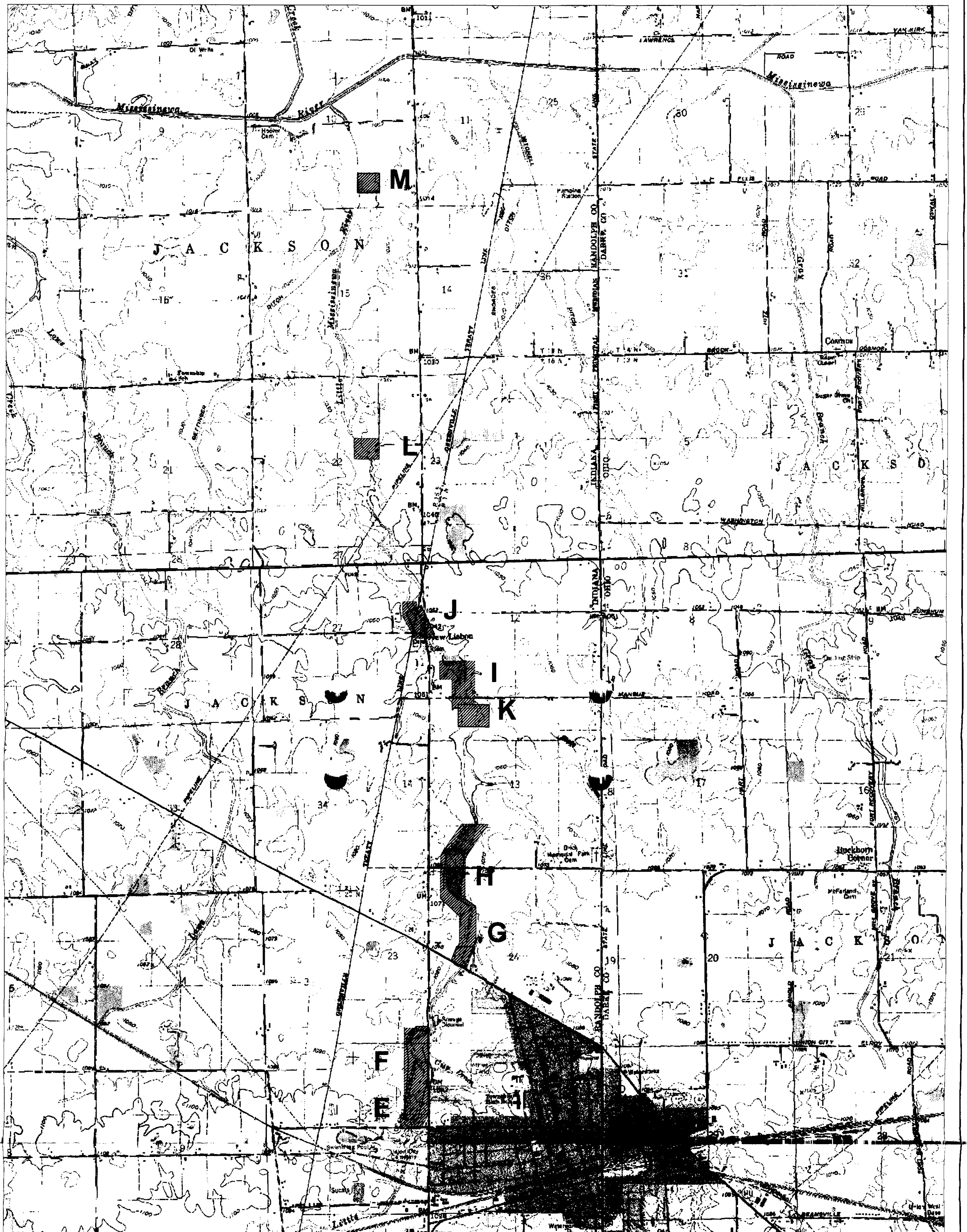
INTERNATIONAL INCORPORATED
4463 WHITE BEAR PARKWAY, SUITF 106
WHITE BEAR LAKE, MINNESOTA 5[illegible]10

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

LMR CHANNEL AND BANK
RI SAMPLING AREAS

FIGURE
2

SECOR PROJECT #: 03UN.10236.0[illegible]02 | FILENAME: 30102–AREAS | DATE: 04/13/03



SOURCES:
USGS 7.5 MINUTE
TOPOGRAPHIC MAPS–
UNION CITY, IN AND
COSMOS, IN QUADRANGLE

QUADRANGLE LOCATION

LEGEND:

▨ FLOODPLAIN ACTIVE TRANSFER ZONE REMEDIAL INVESTIGATION AREA LOCATIONS

▨ FLOODPLAIN REMEDIAL INVESTIGATION AREA E

0 1000 2000 3000

SCALE IN FEET

N

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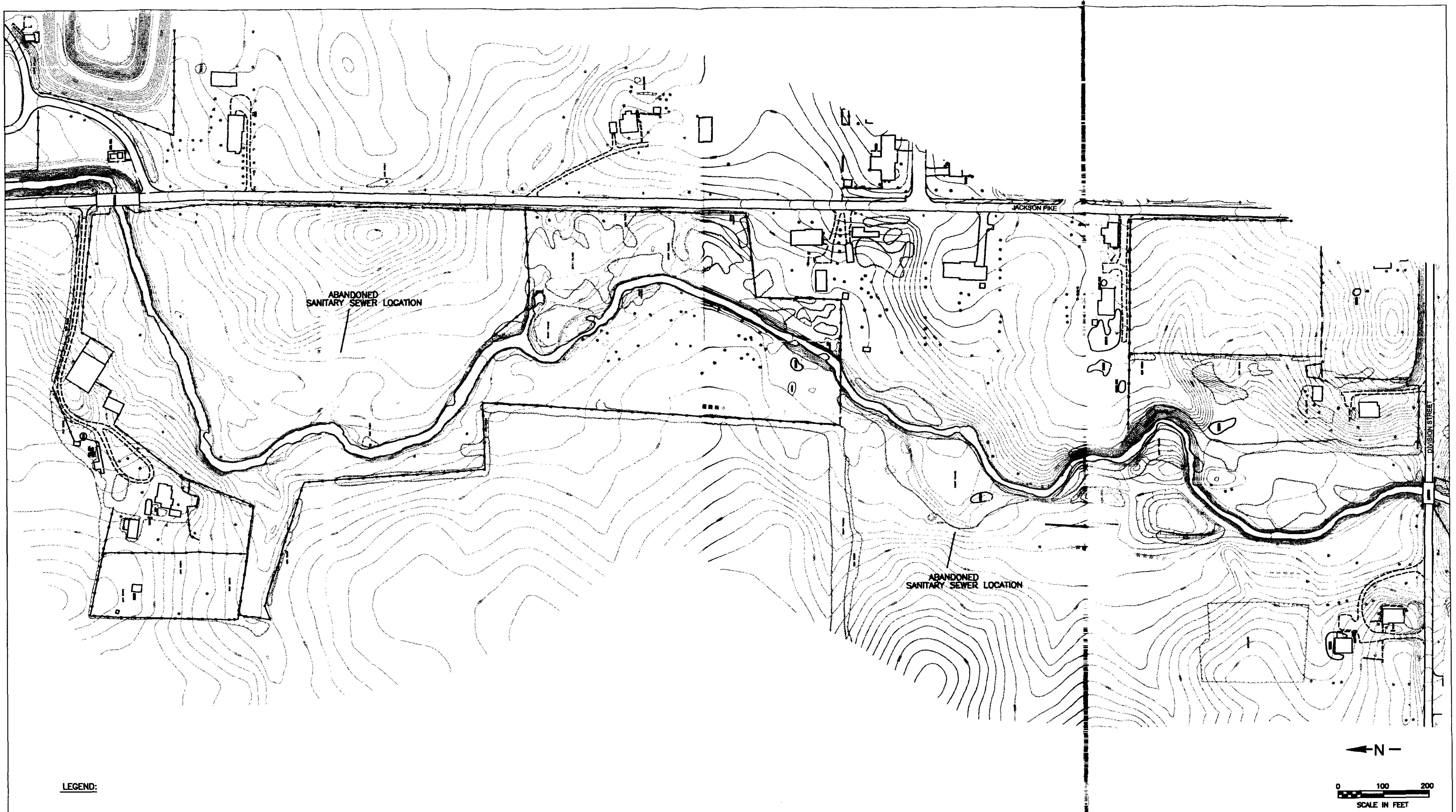
WHITE BEAR LAKE, MINNESOTA 5[illegible]10

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

FLOODPLAIN RI AREAS

SECOR PROJECT #: 03UN.10236.0[illegible]02 | FILENAME: 30102–AREAS–1 | DATE: 04/13/03

FIGURE
3



LEGEND:

ABANDONED SANITARY SEWER LOCATION
LITTLE MISSISSINEWA RIVER
VEGETATION
FENCE

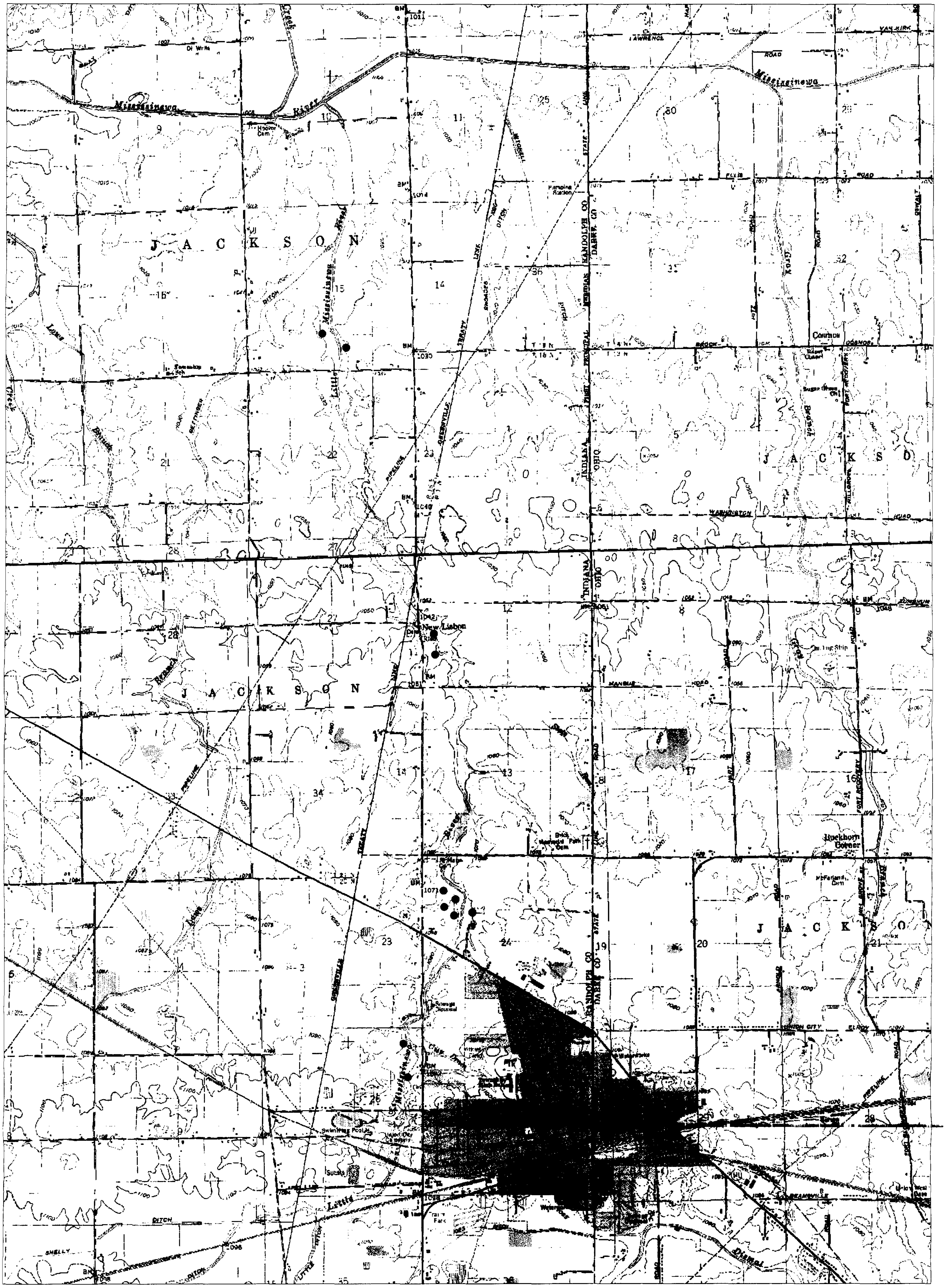
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

ABANDONED SANITARY SEWER LINE RI AREA

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
FIGURE1.4
DATE:
04/11/03

FIGURE
4



SOURCES:
USGS 7.5 MINUTE
TOPOGRAPHIC MAPS–
UNION CITY, IN AND
COSMOS, IN QUADRANGLE

QUADRANGLE LOCATION

LEGEND:

● SAMPLING LOCATION

0 1000 2000 3000
SCALE IN FEET

N

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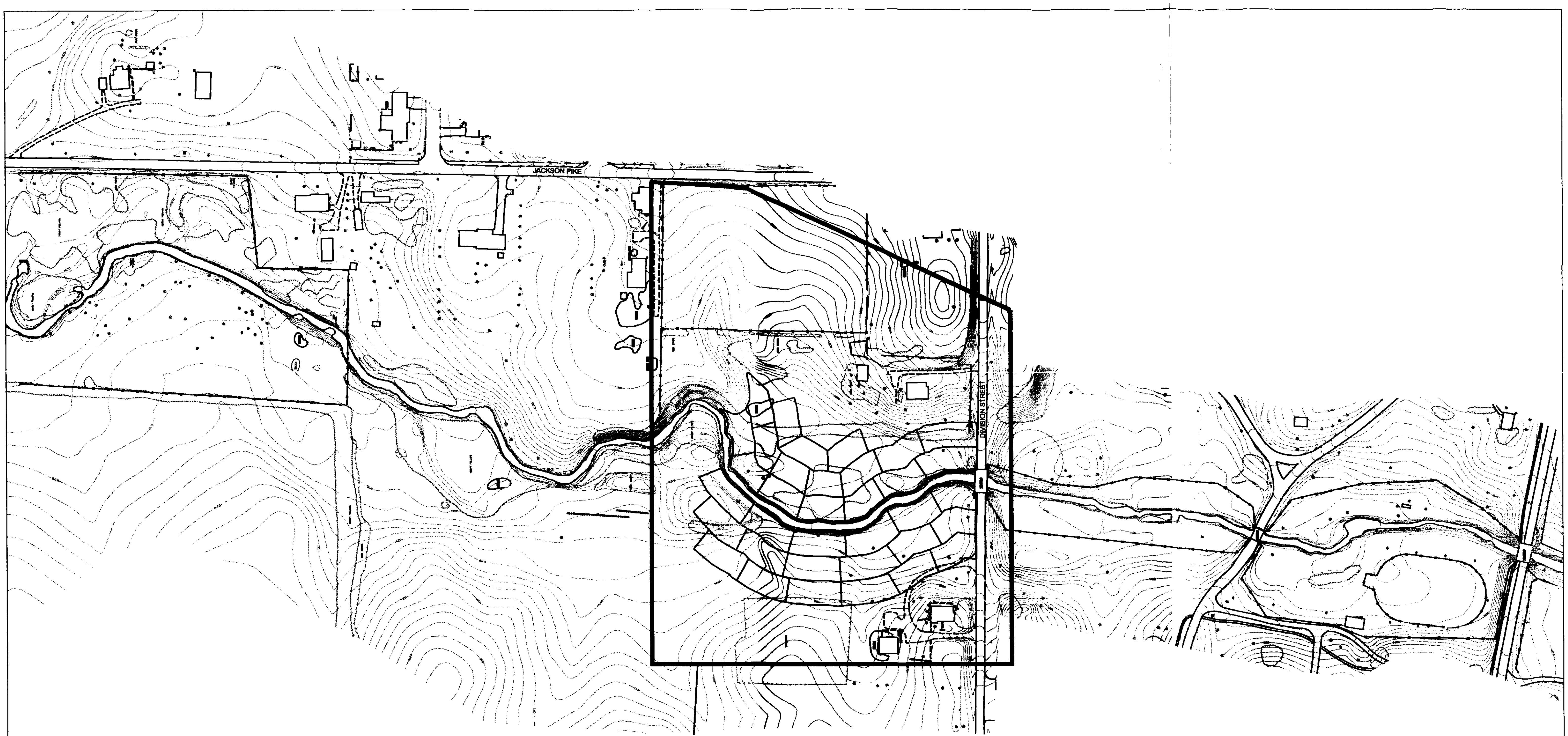
WHITE BEAR LAKE, MINNESOTA 55110

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

REPRESENTATIVE AGRICULTURAL SAMPLING AREAS

FIGURE
5

SECOR PROJECT #: 03UN.10236.00.002	FILENAME: 30102-RS	DATE: 04/16/03



GENERAL LOCATION OF
FLOODPLAIN REMEDIAL INVESTIGATION
AREA E

LEGEND:

- ▭ COMPOSITE SAMPLE GRID 50' X 100'
- LITTLE MISSISSINEWA RIVER
- VEGETATION
- FENCE

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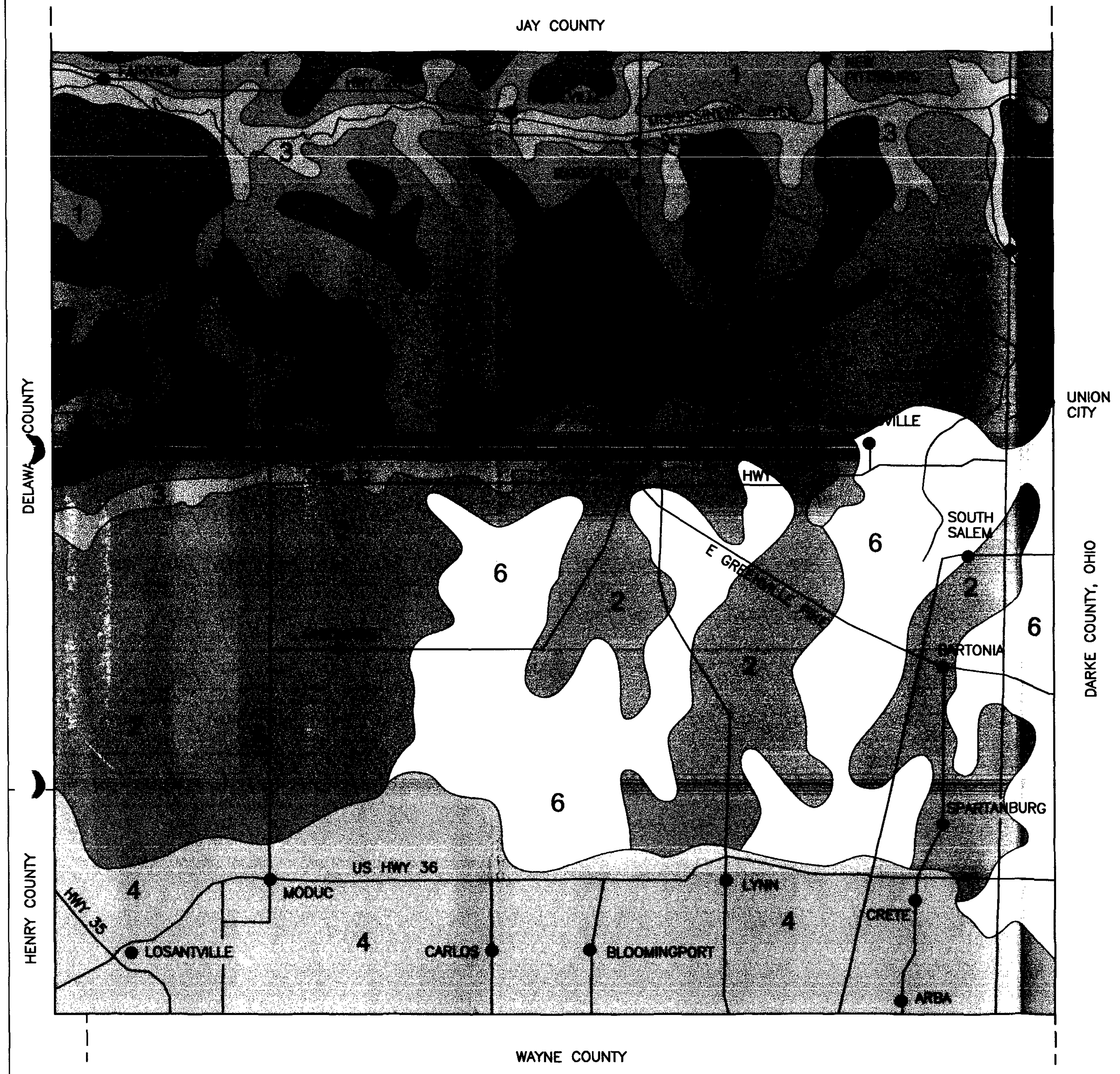
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

FLOODPLAIN RI AREA E

PROJECT NUMBER: 03UN.10236.00.003
CAD FILE NUMBER: FIGURE1.6
DATE: 04/11/03

FIGURE 6



LEGEND: *

1	GLYNWOOD–PEWANO–MORLEY ASSOCIATION: NEARLY LEVEL TO MODERATELY SLOPING, DEEP, MODERATELY WELL DRAINED, VERY POORLY DRAINED, AND WELL DRAINED, MEDIUM TEXTURED, AND MODERATELY FINE TEXTURED SOILS FORMED IN GLACIAL TILL; ON UPLANDS
2	CELINA–PATTON–LOSANTVILLE ASSOCIATION: NEARLY LEVEL TO MODERATELY SLOPING, DEEP, MODERATELY WELL DRAINED, POORLY DRAINED, AND WELL DRAINED, MEDIUM TEXTURED, AND MODERATELY FINE TEXTURED SOILS FORMED IN LOESS AND IN THE UNDERLYING GLACIAL TILL, IN GLACIAL TILL, AND IN LACUSTRINE SEDIMENTS; ON UPLANDS AND LAKE PLAINS
3	EEL–SLOAN–FOX ASSOCIATION: NEARLY LEVEL TO MODERATELY SLOPING, MODERATELY WELL DRAINED, VERY POORLY DRAINED, AND WELL DRAINED, MEDIUM TEXTURED SOILS THAT ARE DEEP OR MODERATELY DEEP OVER SAND AND GRAVEL; FORMED IN ALLUVIUM AND OUTWASH ON FLOOD PLAINS AND STREAM TERRACES
4	LOSANTVILLE, STONY SUBSOIL–PATTON COUNTY–CROSBY, STONY SUBSOIL ASSOCIATION: NEARLY LEVEL TO STRONGLY SLOPING, DEEP, WELL DRAINED, POORLY DRAINED, AND SOMEWHAT POORLY DRAINED, MEDIUM TEXTURED AND MODERATELY FINE TEXTURED SOILS FORMED IN GLACIAL TILL; ON UPLANDS
■	BLOUNT–PEWAMO ASSOCIATION: NEARLY LEVEL, DEEP, SOMEWHAT POORLY DRAINED AND VERY POORLY DRAINED, MEDIUM TEXTURED AND MODERATELY FINE TEXTURED SOILS FORMED IN GLACIAL TILL; ON UPLANDS ON UPLANDS
6	FINCASTLE–TREATY–CROSBY ASSOCIATION NEARLY LEVEL, DEEP, SOMEWHAT POORLY DRAINED AND VERY POORLY DRAINED, MEDIUM TEXTURED SOILS FORMED IN LOESS AND IN THE UNDERLYING GLACIAL TILL; ON UPLANDS

*– TEXTURE TERMS IN THE DESCRIPTIVE HEADINGS REFER TO THE SURFACE LAYER OF THE MAJOR SOILS IN EACH ASSOCIATION.

NOTE–
EACH AREA OUTLINED ON THIS MAP CONSISTS OF MORE THAN ONE KIND OF SOIL. THE MAP IS THUS MEANT FOR GENERAL PLANNING RATHER THAN A BASIS FOR THE DECISIONS ON THE USE OF SPECIFIC TRACTS.

SOURCE:
INDIANA DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER CONSERVATION COMMITTEE
RANDOLPH COUNTY, INDIANA

0 3
SCALE IN MILES

SCALE 1:190,080

N

SECOR
INTERNATIONAL INCORPORATED
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WHITE BEAR LAKE, MINNESOTA 55110

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

GENERAL SOIL MAP
RANDOLPH COUNTY, INDIANA

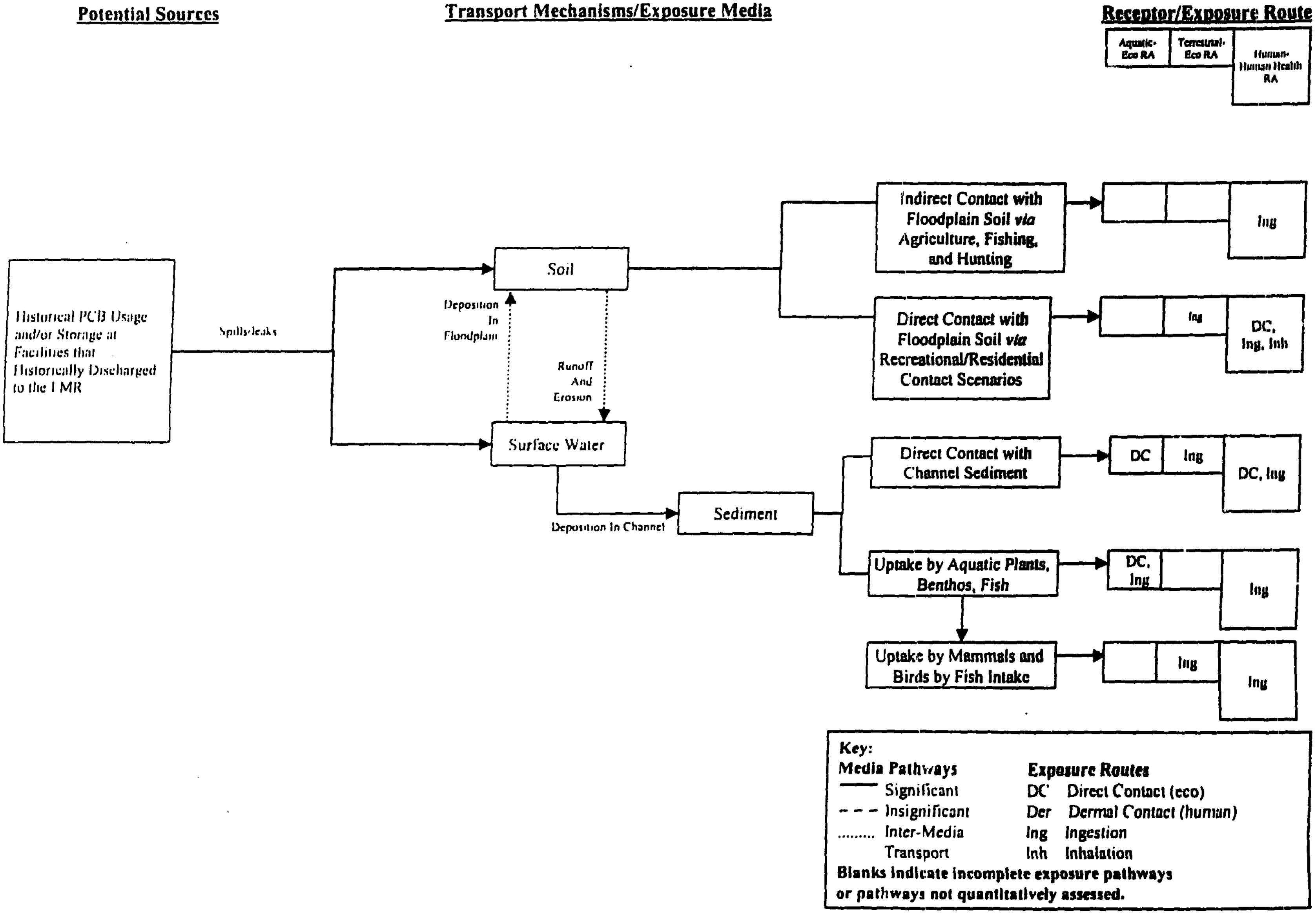
PROJECT NUMBER:
03UN.10239.00.0500
CAD FILE NUMBER:
FIGURE2.1
DATE:
04/10/03

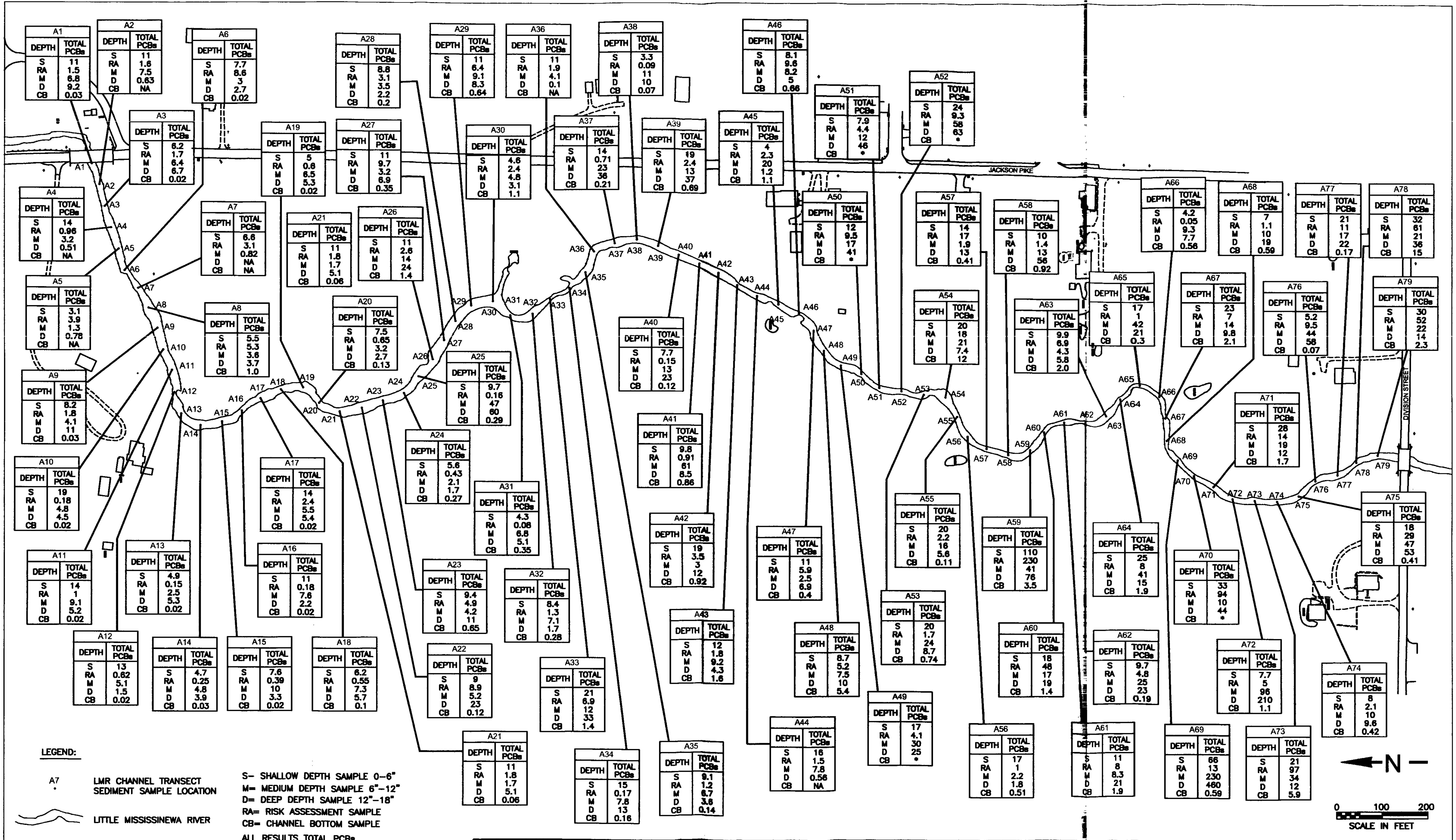
FIGURE
7

FIGURE 8

Conceptual Site Model
Little Mississinewa River
Randolph County, Indiana

PCB Release Sources, Pathways of Exposure, and Potentially Exposed Receptors





A1	
DEPTH	TOTAL PCBs
S	11
RA	1.5
M	6.8
D	9.2
CB	0.03

A2	
DEPTH	TOTAL PCBs
S	11
RA	1.6
M	7.5
D	0.63
CB	NA

A3	
DEPTH	TOTAL PCBs
S	6.2
RA	1.7
M	6.4
D	6.7
CB	0.02

A4	
DEPTH	TOTAL PCBs
S	14
RA	0.96
M	3.2
D	0.51
CB	NA

A5	
DEPTH	TOTAL PCBs
S	3.1
RA	3.9
M	1.3
D	0.78
CB	NA

A6	
DEPTH	TOTAL PCBs
S	7.7
RA	8.6
M	3
D	2.7
CB	0.02

A7	
DEPTH	TOTAL PCBs
S	6.6
RA	3.1
M	0.82
D	NA
CB	NA

A8	
DEPTH	TOTAL PCBs
S	5.5
RA	5.3
M	3.6
D	3.7
CB	1.0

A9	
DEPTH	TOTAL PCBs
S	8.2
RA	1.8
M	4.1
D	11
CB	0.03

A10	
DEPTH	TOTAL PCBs
S	19
RA	0.18
M	4.8
D	4.5
CB	0.02

A11	
DEPTH	TOTAL PCBs
S	14
RA	1
M	9.1
D	5.2
CB	0.02

A12	
DEPTH	TOTAL PCBs
S	13
RA	0.62
M	5.1
D	1.5
CB	0.02

A13	
DEPTH	TOTAL PCBs
S	4.9
RA	0.15
M	2.5
D	5.3
CB	0.02

A14	
DEPTH	TOTAL PCBs
S	4.7
RA	0.25
M	4.8
D	3.9
CB	0.03

A15	
DEPTH	TOTAL PCBs
S	7.6
RA	0.39
M	10
D	3.3
CB	0.02

A16	
DEPTH	TOTAL PCBs
S	11
RA	0.18
M	7.6
D	2.2
CB	0.02

A17	
DEPTH	TOTAL PCBs
S	14
RA	2.4
M	5.5
D	5.4
CB	0.02

A18	
DEPTH	TOTAL PCBs
S	6.2
RA	0.55
M	7.3
D	5.7
CB	0.1

A19	
DEPTH	TOTAL PCBs
S	5
RA	0.6
M	6.5
D	5.3
CB	0.02

A20	
DEPTH	TOTAL PCBs
S	7.5
RA	0.65
M	3.2
D	2.7
CB	0.13

A21	
DEPTH	TOTAL PCBs
S	11
RA	1.8
M	1.7
D	5.1
CB	0.06

A21	
DEPTH	TOTAL PCBs
S	11
RA	1.8
M	1.7
D	5.1
CB	0.06

A22	
DEPTH	TOTAL PCBs
S	9
RA	8.9
M	5.2
D	23
CB	0.12

A23	
DEPTH	TOTAL PCBs
S	9.4
RA	4.9
M	4.2
D	11
CB	0.65

A24	
DEPTH	TOTAL PCBs
S	5.6
RA	0.43
M	2.1
D	1.7
CB	0.27

A25	
DEPTH	TOTAL PCBs
S	9.7
RA	0.16
M	47
D	60
CB	0.29

A26	
DEPTH	TOTAL PCBs
S	11
RA	2.6
M	14
D	24
CB	1.4

A27	
DEPTH	TOTAL PCBs
S	11
RA	9.7
M	3.2
D	6.9
CB	0.35

A28	
DEPTH	TOTAL PCBs
S	8.8
RA	3.1
M	3.5
D	2.2
CB	0.2

A29	
DEPTH	TOTAL PCBs
S	11
RA	6.4
M	9.1
D	8.3
CB	0.64

A30	
DEPTH	TOTAL PCBs
S	4.6
RA	2.4
M	4.8
D	3.1
CB	1.1

A31	
DEPTH	TOTAL PCBs
S	4.3
RA	0.08
M	6.8
D	5.1
CB	0.35

A32	
DEPTH	TOTAL PCBs
S	8.4
RA	1.3
M	7.1
D	1.7
CB	0.28

A33	
DEPTH	TOTAL PCBs
S	21
RA	6.9
M	12
D	33
CB	1.4

A34	
DEPTH	TOTAL PCBs
S	15
RA	0.17
M	7.8
D	13
CB	0.16

A35	
DEPTH	TOTAL PCBs
S	9.1
RA	1.2
M	6.7
D	3.6
CB	0.14

A36	
DEPTH	TOTAL PCBs
S	11
RA	1.9
M	4.1
D	0.1
CB	NA

A37	
DEPTH	TOTAL PCBs
S	14
RA	0.71
M	23
D	36
CB	0.21

A38	
DEPTH	TOTAL PCBs
S	3.3
RA	0.09
M	11
D	10
CB	0.07

A39	
DEPTH	TOTAL PCBs
S	19
RA	2.4
M	13
D	37
CB	0.69

A40	
DEPTH	TOTAL PCBs
S	7.7
RA	0.15
M	13
D	23
CB	0.12

A41	
DEPTH	TOTAL PCBs
S	9.8
RA	0.91
M	61
D	8.5
CB	0.86

A42	
DEPTH	TOTAL PCBs
S	19
RA	3.5
M	3
D	12
CB	0.92

A43	
DEPTH	TOTAL PCBs
S	12
RA	1.8
M	9.2
D	4.3
CB	1.6

A44	
DEPTH	TOTAL PCBs
S	16
RA	1.5
M	7.8
D	0.56
CB	NA

A45	
DEPTH	TOTAL PCBs
S	4
RA	2.3
M	20
D	1.2
CB	1.1

A46	
DEPTH	TOTAL PCBs
S	8.1
RA	9.6
M	8.2
D	5
CB	0.66

A47	
DEPTH	TOTAL PCBs
S	11
RA	5.9
M	2.5
D	6.9
CB	0.4

A48	
DEPTH	TOTAL PCBs
S	8.7
RA	5.2
M	7.5
D	10
CB	5.4

A49	
DEPTH	TOTAL PCBs
S	17
RA	4.1
M	30
D	25
CB	*

A50	
DEPTH	TOTAL PCBs
S	12
RA	9.5
M	17
D	41
CB	*

A51	
DEPTH	TOTAL PCBs
S	7.9
RA	4.4
M	12
D	46
CB	*

A52	
DEPTH	TOTAL PCBs
S	24
RA	9.3
M	58
D	63
CB	*

A53	
DEPTH	TOTAL PCBs
S	20
RA	1.7
M	24
D	8.7
CB	0.74

A54	
DEPTH	TOTAL PCBs
S	20
RA	18
M	21
D	7.4
CB	12

A55	
DEPTH	TOTAL PCBs
S	20
RA	2.2
M	16
D	5.6
CB	0.11

A56	
DEPTH	TOTAL PCBs
S	17
RA	1
M	2.2
D	1.8
CB	0.51

A57	
DEPTH	TOTAL PCBs
S	14
RA	17
M	1.9
D	13
CB	0.41

A58	
DEPTH	TOTAL PCBs
S	10
RA	1.4
M	13
D	56
CB	0.92

A59	
DEPTH	TOTAL PCBs
S	110
RA	230
M	41
D	76
CB	3.5

A60	
DEPTH	TOTAL PCBs
S	18
RA	48
M	17
D	19
CB	1.4

A61	
DEPTH	TOTAL PCBs
S	11
RA	8
M	8.3
D	21
CB	1.9

A62	
DEPTH	TOTAL PCBs
S	9.7
RA	4.8
M	25
D	23
CB	0.19

A63	
DEPTH	TOTAL PCBs
S	9.9
RA	6.9
M	4.3
D	5.8
CB	2.0

A64	
DEPTH	TOTAL PCBs
S	25
RA	8
M	41
D	15
CB	1.9

A65	
DEPTH	TOTAL PCBs
S	17
RA	1
M	42
D	21
CB	0.3

A66	
DEPTH	TOTAL PCBs
S	4.2
RA	0.05
M	9.3
D	7.7
CB	0.56

A67	
DEPTH	TOTAL PCBs
S	23
RA	7
M	14
D	9.8
CB	2.1

A68	
DEPTH	TOTAL PCBs
S	7
RA	1.1
M	10
D	19
CB	0.59

A69	
DEPTH	TOTAL PCBs
S	66
RA	13
M	230
D	460
CB	0.59

A70	
DEPTH	TOTAL PCBs
S	33
RA	94
M	10
D	44
CB	*

A71	
DEPTH	TOTAL PCBs
S	28
RA	14
M	19
D	12
CB	1.7

A72	
DEPTH	TOTAL PCBs
S	7.7
RA	5
M	96
D	210
CB	1.1

A73	
DEPTH	TOTAL PCBs
S	21
RA	97
M	34
D	12
CB	5.9

A74	
DEPTH	TOTAL PCBs
S	8
RA	2.1
M	10
D	9.6
CB	0.42

A75	
DEPTH	TOTAL PCBs
S	18
RA	29
M	47
D	53
CB	0.41

A76	
DEPTH	TOTAL PCBs
S	5.2
RA	9.5
M	44
D	58
CB	0.07

A77	
DEPTH	TOTAL PCBs
S	21
RA	11
M	17
D	22
CB	0.17

A78	
DEPTH	TOTAL PCBs
S	32
RA	61
M	21
D	36
CB	15

A79	
DEPTH	TOTAL PCBs
S	30
RA	52
M	22
D	14
CB	2.3

LEGEND:

A7 •	LMR CHANNEL TRANSECT SEDIMENT SAMPLE LOCATION
	LITTLE MISSISSINEWA RIVER
	FENCE

S- SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"
RA= RISK ASSESSMENT SAMPLE
CB= CHANNEL BOTTOM SAMPLE
ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED
*= NO SAMPLE AVAILABLE

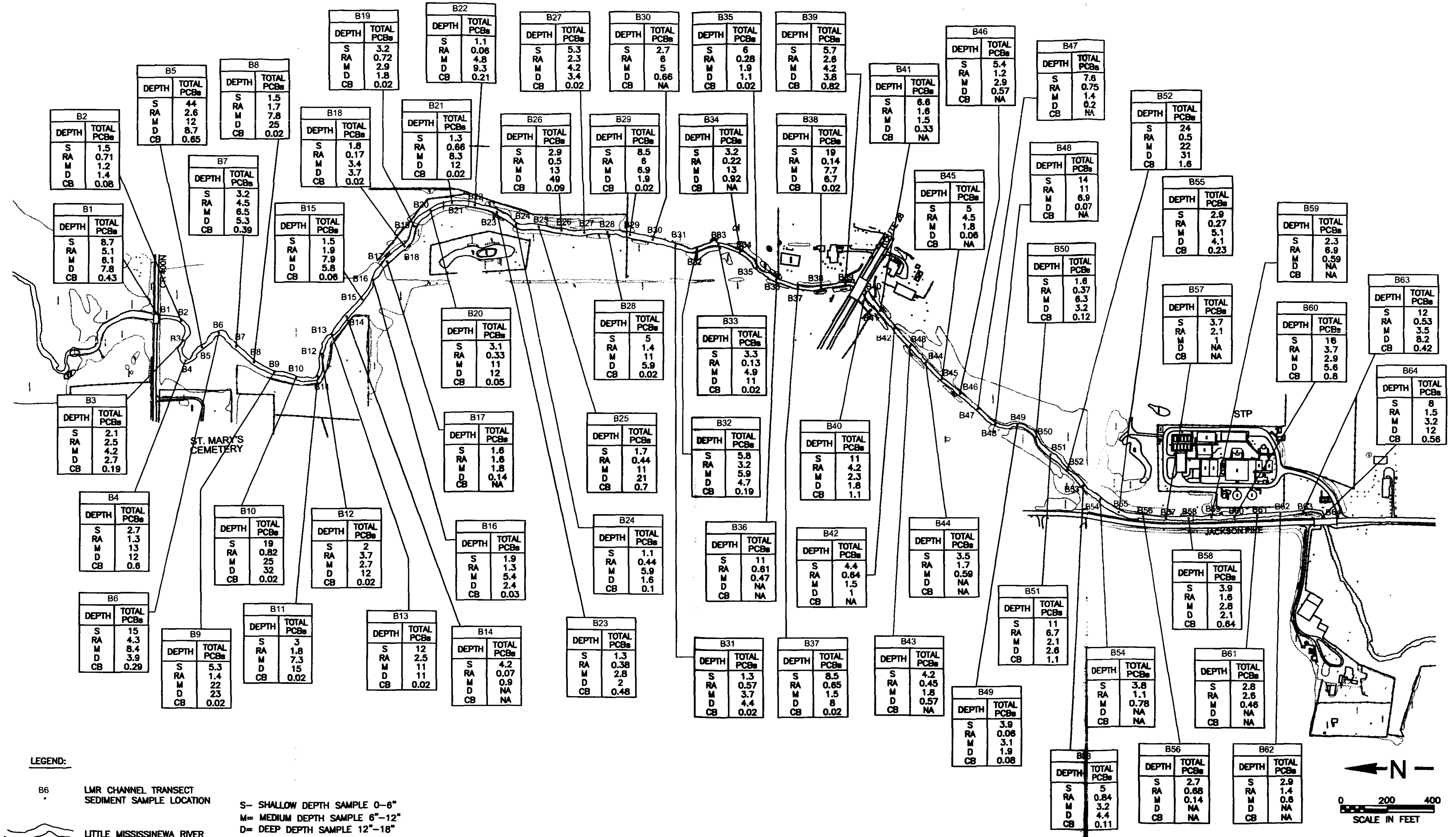
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA A- CHANNEL SEDIMENT SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10231.00.0500
CAD FILE NUMBER:
FIGURE4.1
DATE:
04/15/03

FIGURE
9



B1

DEPTH	TOTAL PCBs
S	8.7
RA	5.1
M	6.1
D	7.8
CB	0.43

B2

DEPTH	TOTAL PCBs
S	1.5
RA	0.71
M	1.2
D	1.4
CB	0.08

B3

DEPTH	TOTAL PCBs
S	2.1
RA	2.5
M	4.2
D	2.7
CB	0.19

B4

DEPTH	TOTAL PCBs
S	2.7
RA	1.3
M	13
D	12
CB	0.6

B5

DEPTH	TOTAL PCBs
S	44
RA	2.6
M	12
D	8.7
CB	0.65

B6

DEPTH	TOTAL PCBs
S	15
RA	4.3
M	8.4
D	3.9
CB	0.29

B7

DEPTH	TOTAL PCBs
S	3.2
RA	4.5
M	6.5
D	5.3
CB	0.39

B8

DEPTH	TOTAL PCBs
S	1.5
RA	1.7
M	7.8
D	25
CB	0.02

B9

DEPTH	TOTAL PCBs
S	5.3
RA	1.4
M	22
D	23
CB	0.02

B10

DEPTH	TOTAL PCBs
S	19
RA	0.82
M	25
D	32
CB	0.02

B11

DEPTH	TOTAL PCBs
S	3
RA	1.8
M	7.3
D	15
CB	0.02

B12

DEPTH	TOTAL PCBs
S	2
RA	3.7
M	2.7
D	12
CB	0.02

B13

DEPTH	TOTAL PCBs
S	12
RA	2.5
M	11
D	11
CB	0.02

B14

DEPTH	TOTAL PCBs
S	4.2
RA	0.07
M	0.9
D	NA
CB	NA

B15

DEPTH	TOTAL PCBs
S	1.5
RA	1.9
M	7.9
D	5.8
CB	0.06

B16

DEPTH	TOTAL PCBs
S	1.9
RA	1.3
M	5.4
D	2.4
CB	0.03

B17

DEPTH	TOTAL PCBs
S	1.6
RA	1.6
M	1.8
D	0.14
CB	NA

B18

DEPTH	TOTAL PCBs
S	1.8
RA	0.17
M	3.4
D	3.7
CB	0.02

B19

DEPTH	TOTAL PCBs
S	3.2
RA	0.72
M	2.9
D	1.8
CB	0.02

B20

DEPTH	TOTAL PCBs
S	3.1
RA	0.33
M	11
D	12
CB	0.05

B21

DEPTH	TOTAL PCBs
S	1.3
RA	0.66
M	8.3
D	12
CB	0.02

B22

DEPTH	TOTAL PCBs
S	1.1
RA	0.06
M	4.8
D	9.3
CB	0.21

B23

DEPTH	TOTAL PCBs
S	1.3
RA	0.38
M	2.8
D	2
CB	0.48

B24

DEPTH	TOTAL PCBs
S	1.1
RA	0.44
M	5.9
D	1.6
CB	0.1

B25

DEPTH	TOTAL PCBs
S	1.7
RA	0.44
M	11
D	21
CB	0.7

B26

DEPTH	TOTAL PCBs
S	2.9
RA	0.5
M	13
D	49
CB	0.09

B27

DEPTH	TOTAL PCBs
S	5.3
RA	2.3
M	4.2
D	3.4
CB	0.02

B28

DEPTH	TOTAL PCBs
S	5
RA	1.4
M	11
D	5.9
CB	0.02

B29

DEPTH	TOTAL PCBs
S	8.5
RA	6
M	6.9
D	1.9
CB	0.02

B30

DEPTH	TOTAL PCBs
S	2.7
RA	6
M	5
D	0.66
CB	NA

B31

DEPTH	TOTAL PCBs
S	1.3
RA	0.57
M	3.7
D	4.4
CB	0.02

B32

DEPTH	TOTAL PCBs
S	5.8
RA	3.2
M	5.9
D	4.7
CB	0.19

B33

DEPTH	TOTAL PCBs
S	3.3
RA	0.13
M	4.9
D	11
CB	0.02

B34

DEPTH	TOTAL PCBs
S	3.2
RA	0.22
M	13
D	0.92
CB	NA

B35

DEPTH	TOTAL PCBs
S	6
RA	0.28
M	1.9
D	1.1
CB	0.02

B36

DEPTH	TOTAL PCBs
S	11
RA	0.61
M	0.47
D	NA
CB	NA

B37

DEPTH	TOTAL PCBs
S	8.5
RA	0.65
M	1.5
D	8
CB	0.02

B38

DEPTH	TOTAL PCBs
S	19
RA	0.14
M	7.7
D	6.7
CB	0.02

B39

DEPTH	TOTAL PCBs
S	5.7
RA	2.6
M	4.2
D	3.8
CB	0.82

B40

DEPTH	TOTAL PCBs
S	11
RA	4.2
M	2.3
D	1.8
CB	1.1

B41

DEPTH	TOTAL PCBs
S	6.6
RA	1.6
M	1.5
D	0.33
CB	NA

B42

DEPTH	TOTAL PCBs
S	4.4
RA	0.64
M	1.5
D	1
CB	NA

B43

DEPTH	TOTAL PCBs
S	4.2
RA	0.45
M	1.8
D	0.57
CB	NA

B44

DEPTH	TOTAL PCBs
S	3.5
RA	1.7
M	0.59
D	NA
CB	NA

B45

DEPTH	TOTAL PCBs
S	5
RA	4.5
M	1.8
D	0.06
CB	NA

B46

DEPTH	TOTAL PCBs
S	5.4
RA	1.2
M	2.9
D	0.57
CB	NA

B47

DEPTH	TOTAL PCBs
S	7.6
RA	0.75
M	1.4
D	0.2
CB	NA

B48

DEPTH	TOTAL PCBs
S	14
RA	11
M	6.9
D	0.07
CB	NA

B49

DEPTH	TOTAL PCBs
S	3.9
RA	0.06
M	3.1
D	1.9
CB	0.08

B50

DEPTH	TOTAL PCBs
S	1.6
RA	0.37
M	6.3
D	3.2
CB	0.12

B51

DEPTH	TOTAL PCBs
S	11
RA	6.7
M	2.1
D	2.6
CB	1.1

B52

DEPTH	TOTAL PCBs
S	24
RA	0.5
M	22
D	31
CB	1.6

B53

DEPTH	TOTAL PCBs
S	5
RA	0.84
M	3.2
D	4.4
CB	0.11

B54

DEPTH	TOTAL PCBs
S	3.8
RA	1.1
M	0.78
D	NA
CB	NA

B55

DEPTH	TOTAL PCBs
S	2.9
RA	0.27
M	5.1
D	4.1
CB	0.23

B56

DEPTH	TOTAL PCBs
S	2.7
RA	0.68
M	0.14
D	NA
CB	NA

B57

DEPTH	TOTAL PCBs
S	3.7
RA	2.1
M	1
D	NA
CB	NA

B58

DEPTH	TOTAL PCBs
S	3.9
RA	1.6
M	2.8
D	2.1
CB	0.64

B59

DEPTH	TOTAL PCBs
S	2.3
RA	6.9
M	0.59
D	NA
CB	NA

B60

DEPTH	TOTAL PCBs
S	16
RA	3.7
M	2.9
D	5.6
CB	0.8

B61

DEPTH	TOTAL PCBs
S	2.8
RA	2.6
M	0.46
D	NA
CB	NA

B62

DEPTH	TOTAL PCBs
S	2.9
RA	1.4
M	0.6
D	NA
CB	NA

B63

DEPTH	TOTAL PCBs
S	12
RA	0.53
M	3.5
D	8.2
CB	0.42

B64

DEPTH	TOTAL PCBs
S	8
RA	1.5
M	3.2
D	12
CB	0.56

LEGEND:

B6 •	LMR CHANNEL TRANSECT SEDIMENT SAMPLE LOCATION
～	LITTLE MISSISSINEWA RIVER
⋯	VEGETATION
—•—	FENCE

S= SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"
RA= RISK ASSESSMENT SAMPLE
CB= CHANNEL BOTTOM SAMPLE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

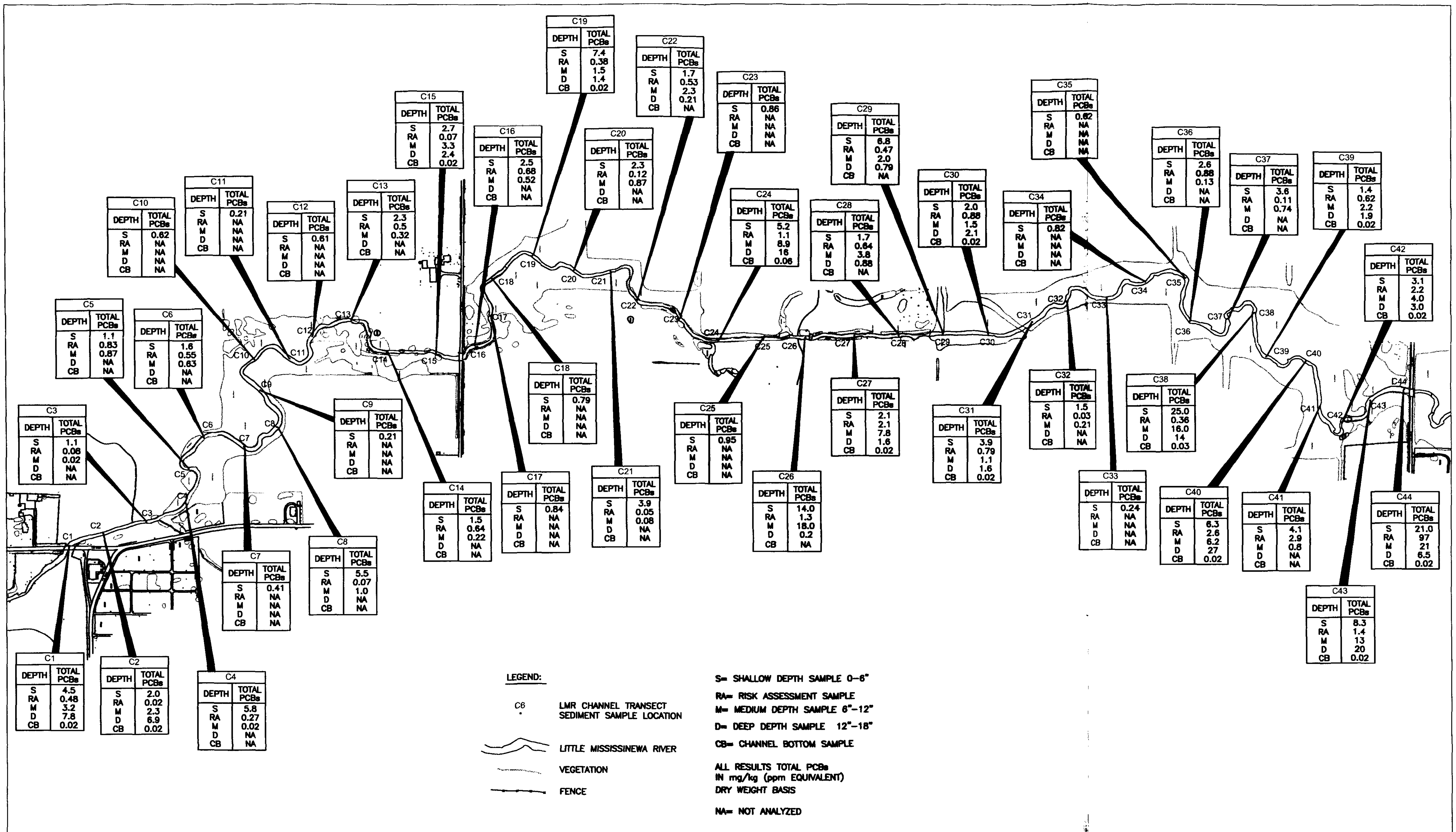
RI AREA B- CHANNEL SEDIMENT SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10231.00.0500

CAD FILE NUMBER:
FIGURE4.2

DATE:
04/16/03

FIGURE
10



C1	
DEPTH	TOTAL PCBs
S	4.5
RA	0.48
M	3.2
D	7.8
CB	0.02

C2	
DEPTH	TOTAL PCBs
S	2.0
RA	0.02
M	2.3
D	6.9
CB	0.02

C3	
DEPTH	TOTAL PCBs
S	1.1
RA	0.08
M	0.02
D	NA
CB	NA

C4	
DEPTH	TOTAL PCBs
S	5.8
RA	0.27
M	0.02
D	NA
CB	NA

C5	
DEPTH	TOTAL PCBs
S	1.1
RA	0.83
M	0.87
D	NA
CB	NA

C6	
DEPTH	TOTAL PCBs
S	1.6
RA	0.55
M	0.63
D	NA
CB	NA

C7	
DEPTH	TOTAL PCBs
S	0.41
RA	NA
M	NA
D	NA
CB	NA

C8	
DEPTH	TOTAL PCBs
S	5.5
RA	0.07
M	1.0
D	NA
CB	NA

C9	
DEPTH	TOTAL PCBs
S	0.21
RA	NA
M	NA
D	NA
CB	NA

C10	
DEPTH	TOTAL PCBs
S	0.62
RA	NA
M	NA
D	NA
CB	NA

C11	
DEPTH	TOTAL PCBs
S	0.21
RA	NA
M	NA
D	NA
CB	NA

C12	
DEPTH	TOTAL PCBs
S	0.61
RA	NA
M	NA
D	NA
CB	NA

C13	
DEPTH	TOTAL PCBs
S	2.3
RA	0.5
M	0.32
D	NA
CB	NA

C14	
DEPTH	TOTAL PCBs
S	1.5
RA	0.64
M	0.22
D	NA
CB	NA

C15	
DEPTH	TOTAL PCBs
S	2.7
RA	0.07
M	3.3
D	2.4
CB	0.02

C16	
DEPTH	TOTAL PCBs
S	2.5
RA	0.68
M	0.52
D	NA
CB	NA

C17	
DEPTH	TOTAL PCBs
S	0.84
RA	NA
M	NA
D	NA
CB	NA

C18	
DEPTH	TOTAL PCBs
S	0.79
RA	NA
M	NA
D	NA
CB	NA

C19	
DEPTH	TOTAL PCBs
S	7.4
RA	0.38
M	1.5
D	1.4
CB	0.02

C20	
DEPTH	TOTAL PCBs
S	2.3
RA	0.12
M	0.87
D	NA
CB	NA

C21	
DEPTH	TOTAL PCBs
S	3.9
RA	0.05
M	0.08
D	NA
CB	NA

C22	
DEPTH	TOTAL PCBs
S	1.7
RA	0.53
M	2.3
D	0.21
CB	NA

C23	
DEPTH	TOTAL PCBs
S	0.86
RA	NA
M	NA
D	NA
CB	NA

C24	
DEPTH	TOTAL PCBs
S	5.2
RA	1.1
M	8.9
D	16
CB	0.06

C25	
DEPTH	TOTAL PCBs
S	0.95
RA	NA
M	NA
D	NA
CB	NA

C26	
DEPTH	TOTAL PCBs
S	14.0
RA	1.3
M	18.0
D	0.2
CB	NA

C27	
DEPTH	TOTAL PCBs
S	2.1
RA	2.1
M	7.8
D	1.6
CB	0.02

C28	
DEPTH	TOTAL PCBs
S	1.7
RA	0.64
M	3.8
D	0.88
CB	NA

C29	
DEPTH	TOTAL PCBs
S	6.8
RA	0.47
M	2.0
D	0.79
CB	NA

C30	
DEPTH	TOTAL PCBs
S	2.0
RA	0.88
M	1.5
D	2.1
CB	0.02

C31	
DEPTH	TOTAL PCBs
S	3.9
RA	0.79
M	1.1
D	1.6
CB	0.02

C32	
DEPTH	TOTAL PCBs
S	1.5
RA	0.03
M	0.21
D	NA
CB	NA

C33	
DEPTH	TOTAL PCBs
S	0.24
RA	NA
M	NA
D	NA
CB	NA

C34	
DEPTH	TOTAL PCBs
S	0.82
RA	NA
M	NA
D	NA
CB	NA

C35	
DEPTH	TOTAL PCBs
S	0.82
RA	NA
M	NA
D	NA
CB	NA

C36	
DEPTH	TOTAL PCBs
S	2.6
RA	0.88
M	0.13
D	NA
CB	NA

C37	
DEPTH	TOTAL PCBs
S	3.6
RA	0.11
M	0.74
D	NA
CB	NA

C38	
DEPTH	TOTAL PCBs
S	25.0
RA	0.36
M	16.0
D	14
CB	0.03

C39	
DEPTH	TOTAL PCBs
S	1.4
RA	0.62
M	2.2
D	1.9
CB	0.02

C40	
DEPTH	TOTAL PCBs
S	6.3
RA	2.6
M	6.2
D	27
CB	0.02

C41	
DEPTH	TOTAL PCBs
S	4.1
RA	2.9
M	0.8
D	NA
CB	NA

C42	
DEPTH	TOTAL PCBs
S	3.1
RA	2.2
M	4.0
D	3.0
CB	0.02

C43	
DEPTH	TOTAL PCBs
S	8.3
RA	1.4
M	13
D	20
CB	0.02

C44	
DEPTH	TOTAL PCBs
S	21.0
RA	97
M	21
D	6.5
CB	0.02

LEGEND:

C6 •	LMR CHANNEL TRANSECT SEDIMENT SAMPLE LOCATION
	LITTLE MISSISSINEWA RIVER
	VEGETATION
	FENCE

S= SHALLOW DEPTH SAMPLE 0-6"
RA= RISK ASSESSMENT SAMPLE
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"
CB= CHANNEL BOTTOM SAMPLE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

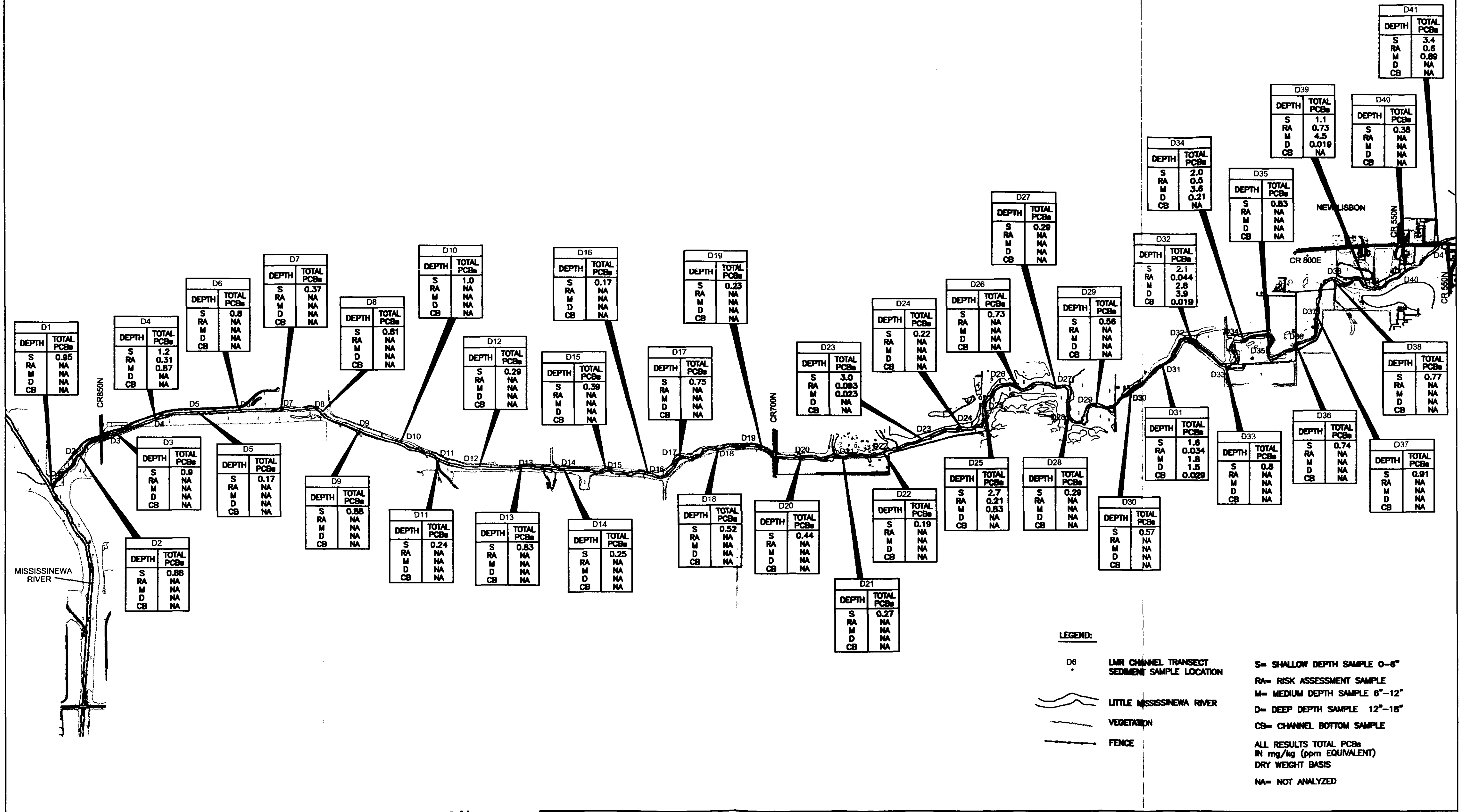
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA C– CHANNEL SEDIMENT SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10231.00.0500
CAD FILE NUMBER: FIGURE4.3
DATE: 04/16/03

FIGURE 11



D1

DEPTH	TOTAL PCBs
S	0.95
RA	NA
M	NA
D	NA
CB	NA

D2

DEPTH	TOTAL PCBs
S	0.88
RA	NA
M	NA
D	NA
CB	NA

D3

DEPTH	TOTAL PCBs
S	0.9
RA	NA
M	NA
D	NA
CB	NA

D4

DEPTH	TOTAL PCBs
S	1.2
RA	0.31
M	0.87
D	NA
CB	NA

D5

DEPTH	TOTAL PCBs
S	0.17
RA	NA
M	NA
D	NA
CB	NA

D6

DEPTH	TOTAL PCBs
S	0.8
RA	NA
M	NA
D	NA
CB	NA

D7

DEPTH	TOTAL PCBs
S	0.37
RA	NA
M	NA
D	NA
CB	NA

D8

DEPTH	TOTAL PCBs
S	0.81
RA	NA
M	NA
D	NA
CB	NA

D9

DEPTH	TOTAL PCBs
S	0.88
RA	NA
M	NA
D	NA
CB	NA

D10

DEPTH	TOTAL PCBs
S	1.0
RA	NA
M	NA
D	NA
CB	NA

D11

DEPTH	TOTAL PCBs
S	0.24
RA	NA
M	NA
D	NA
CB	NA

D12

DEPTH	TOTAL PCBs
S	0.29
RA	NA
M	NA
D	NA
CB	NA

D13

DEPTH	TOTAL PCBs
S	0.83
RA	NA
M	NA
D	NA
CB	NA

D14

DEPTH	TOTAL PCBs
S	0.25
RA	NA
M	NA
D	NA
CB	NA

D15

DEPTH	TOTAL PCBs
S	0.39
RA	NA
M	NA
D	NA
CB	NA

D16

DEPTH	TOTAL PCBs
S	0.17
RA	NA
M	NA
D	NA
CB	NA

D17

DEPTH	TOTAL PCBs
S	0.75
RA	NA
M	NA
D	NA
CB	NA

D18

DEPTH	TOTAL PCBs
S	0.52
RA	NA
M	NA
D	NA
CB	NA

D19

DEPTH	TOTAL PCBs
S	0.23
RA	NA
M	NA
D	NA
CB	NA

D20

DEPTH	TOTAL PCBs
S	0.44
RA	NA
M	NA
D	NA
CB	NA

D21

DEPTH	TOTAL PCBs
S	0.27
RA	NA
M	NA
D	NA
CB	NA

D22

DEPTH	TOTAL PCBs
S	0.19
RA	NA
M	NA
D	NA
CB	NA

D23

DEPTH	TOTAL PCBs
S	3.0
RA	0.093
M	0.023
D	NA
CB	NA

D24

DEPTH	TOTAL PCBs
S	0.22
RA	NA
M	NA
D	NA
CB	NA

D25

DEPTH	TOTAL PCBs
S	2.7
RA	0.21
M	0.83
D	NA
CB	NA

D26

DEPTH	TOTAL PCBs
S	0.73
RA	NA
M	NA
D	NA
CB	NA

D27

DEPTH	TOTAL PCBs
S	0.29
RA	NA
M	NA
D	NA
CB	NA

D28

DEPTH	TOTAL PCBs
S	0.29
RA	NA
M	NA
D	NA
CB	NA

D29

DEPTH	TOTAL PCBs
S	0.56
RA	NA
M	NA
D	NA
CB	NA

D30

DEPTH	TOTAL PCBs
S	0.57
RA	NA
M	NA
D	NA
CB	NA

D31

DEPTH	TOTAL PCBs
S	1.6
RA	0.034
M	1.8
D	1.5
CB	0.029

D32

DEPTH	TOTAL PCBs
S	2.1
RA	0.044
M	2.8
D	3.9
CB	0.019

D33

DEPTH	TOTAL PCBs
S	0.8
RA	NA
M	NA
D	NA
CB	NA

D34

DEPTH	TOTAL PCBs
S	2.0
RA	0.5
M	3.6
D	0.21
CB	NA

D35

DEPTH	TOTAL PCBs
S	0.83
RA	NA
M	NA
D	NA
CB	NA

D36

DEPTH	TOTAL PCBs
S	0.74
RA	NA
M	NA
D	NA
CB	NA

D37

DEPTH	TOTAL PCBs
S	0.91
RA	NA
M	NA
D	NA
CB	NA

D38

DEPTH	TOTAL PCBs
S	0.77
RA	NA
M	NA
D	NA
CB	NA

D39

DEPTH	TOTAL PCBs
S	1.1
RA	0.73
M	4.5
D	0.019
CB	NA

D40

DEPTH	TOTAL PCBs
S	0.38
RA	NA
M	NA
D	NA
CB	NA

D41

DEPTH	TOTAL PCBs
S	3.4
RA	0.6
M	0.89
D	NA
CB	NA

LEGEND:

D6 •	LMR CHANNEL TRANSECT SEDIMENT SAMPLE LOCATION
〰	LITTLE MISSISSINEWA RIVER
—	VEGETATION
—•—	FENCE

S= SHALLOW DEPTH SAMPLE 0-6"

RA= RISK ASSESSMENT SAMPLE

M= MEDIUM DEPTH SAMPLE 6"-12"

D= DEEP DEPTH SAMPLE 12"-18"

CB= CHANNEL BOTTOM SAMPLE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

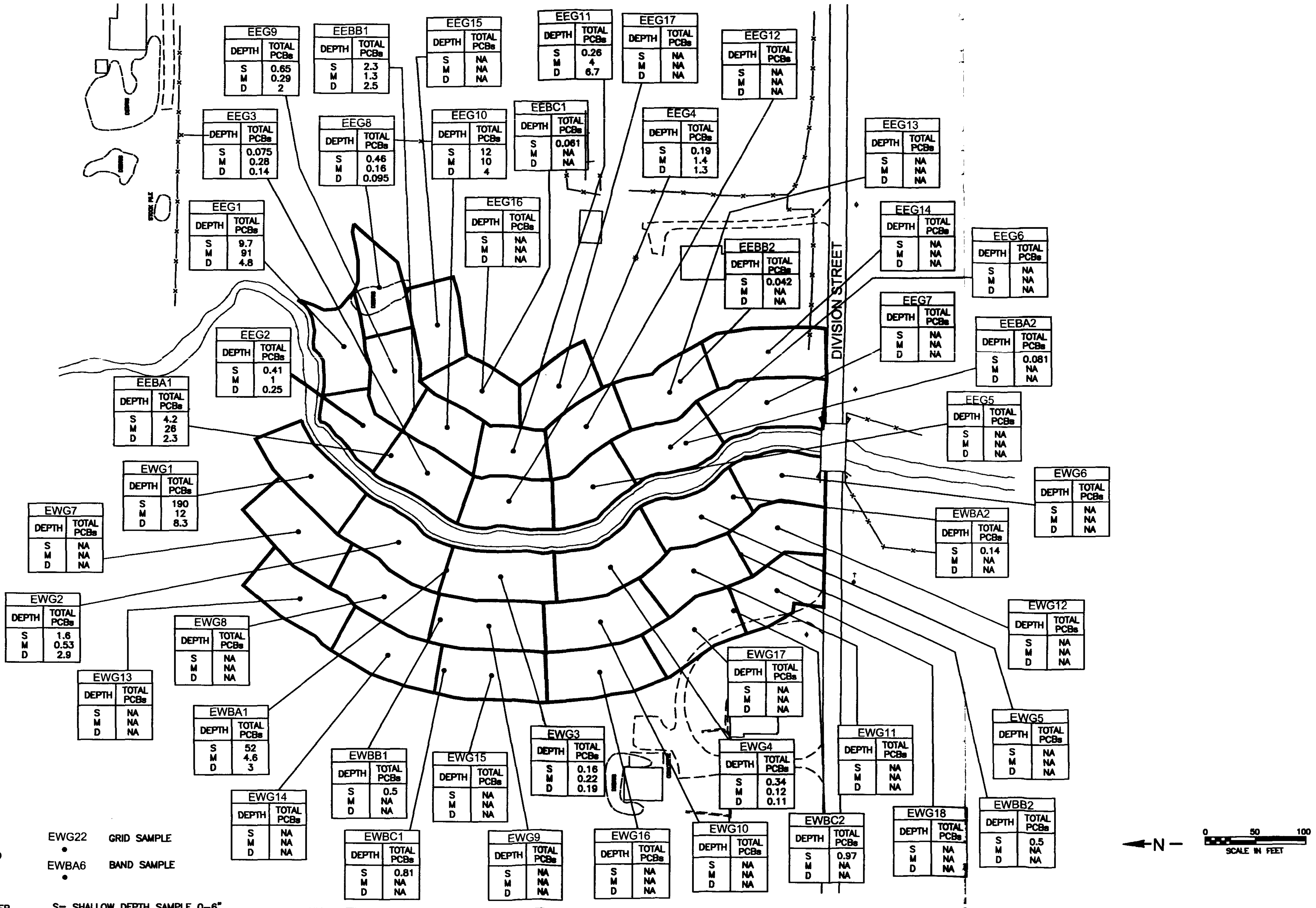
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA D- CHANNEL SEDIMENT SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10231.00.0500
CAD FILE NUMBER: FIGURE4.4
DATE: 04/16/03

FIGURE 12



DEPTH / TOTAL PCBs

	S	M	D
EEG9	0.65	0.29	2
EEBB1	2.3	1.3	2.5
EEG15	NA	NA	NA
EEG11	0.26	4	6.7
EEG17	NA	NA	NA
EEG12	NA	NA	NA
EEG3	0.075	0.28	0.14
EEG8	0.46	0.16	0.095
EEG10	12	10	4
EEBC1	0.061	NA	NA
EEG4	0.19	1.4	1.3
EEG13	NA	NA	NA
EEG1	9.7	91	4.8
EEG16	NA	NA	NA
EEG14	NA	NA	NA
EEBB2	0.042	NA	NA
EEG6	NA	NA	NA
EEG2	0.41	1	0.25
EEG7	NA	NA	NA
EEBA2	0.081	NA	NA
EEBA1	4.2	26	2.3
EEG5	NA	NA	NA
EWG1	190	12	8.3
EWG6	NA	NA	NA
EWG7	NA	NA	NA
EWBA2	0.14	NA	NA
EWG2	1.6	0.53	2.9
EWG8	NA	NA	NA
EWG12	NA	NA	NA
EWG13	NA	NA	NA
EWG17	NA	NA	NA
EWBA1	52	4.6	3
EWG3	0.16	0.22	0.19
EWG4	0.34	0.12	0.11
EWG11	NA	NA	NA
EWG5	NA	NA	NA
EWBB1	0.5	NA	NA
EWG15	NA	NA	NA
EWG14	NA	NA	NA
EWBC1	0.81	NA	NA
EWG9	NA	NA	NA
EWG16	NA	NA	NA
EWG10	NA	NA	NA
EWBC2	0.97	NA	NA
EWG18	NA	NA	NA
EWBB2	0.5	NA	NA

LEGEND:

- COMPOSITE SAMPLE BAND
- COMPOSITE SAMPLE GRID 25' X 50'
- LITTLE MISSISSINEWA RIVER
- FENCE

EWG22 ● GRID SAMPLE

EWBA6 ● BAND SAMPLE

S= SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"

ALL RESULTS TOTAL PCBs IN mg/kg (ppm EQUIVALENT) DRY WEIGHT BASIS

NA= NOT ANALYZED

SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

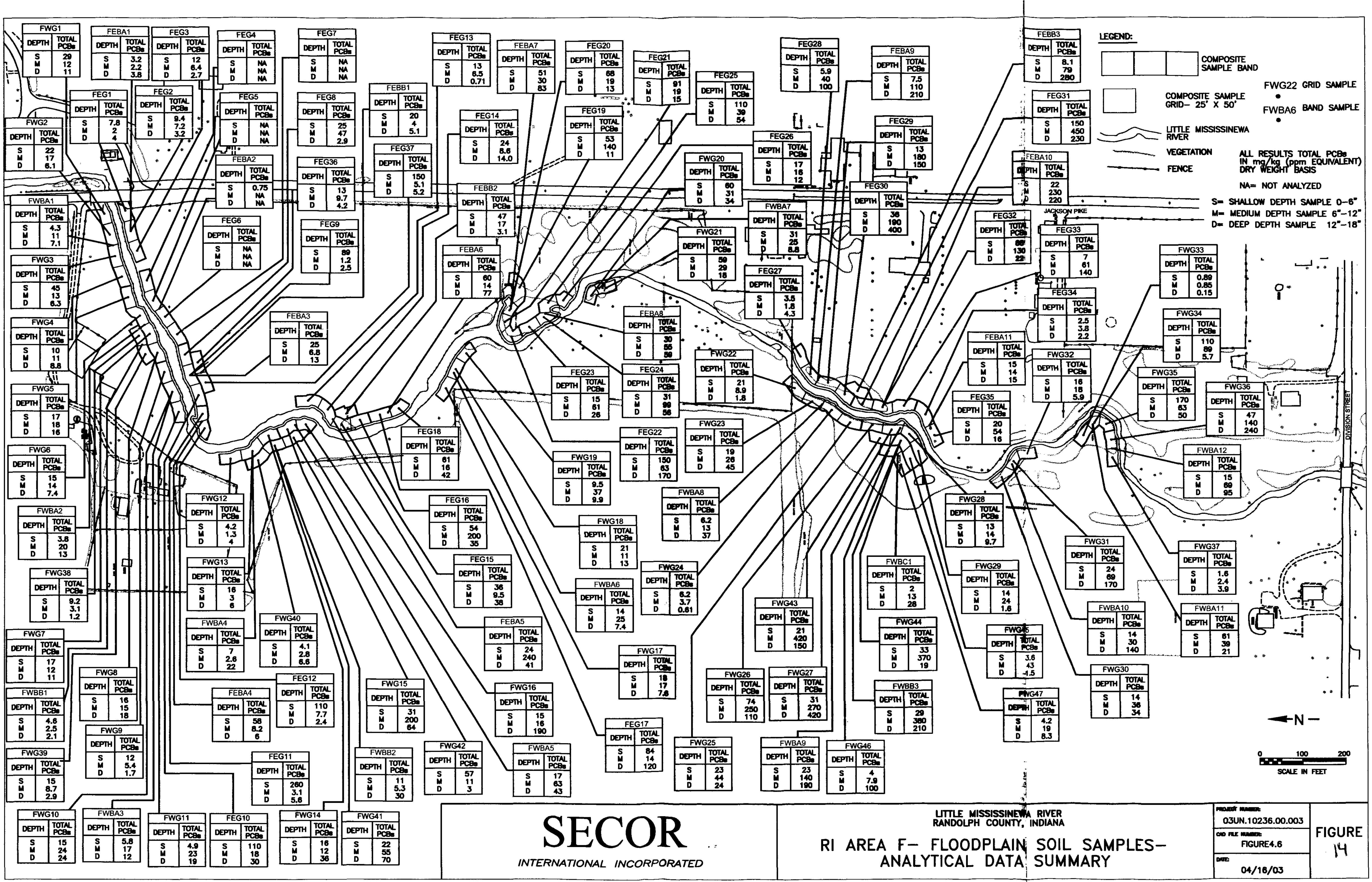
RI AREA E- FLOODPLAIN SOIL SAMPLES-
ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10236.00.003

CAD FILE NUMBER: FIGURE4.5

DATE: 04/16/03

FIGURE
13



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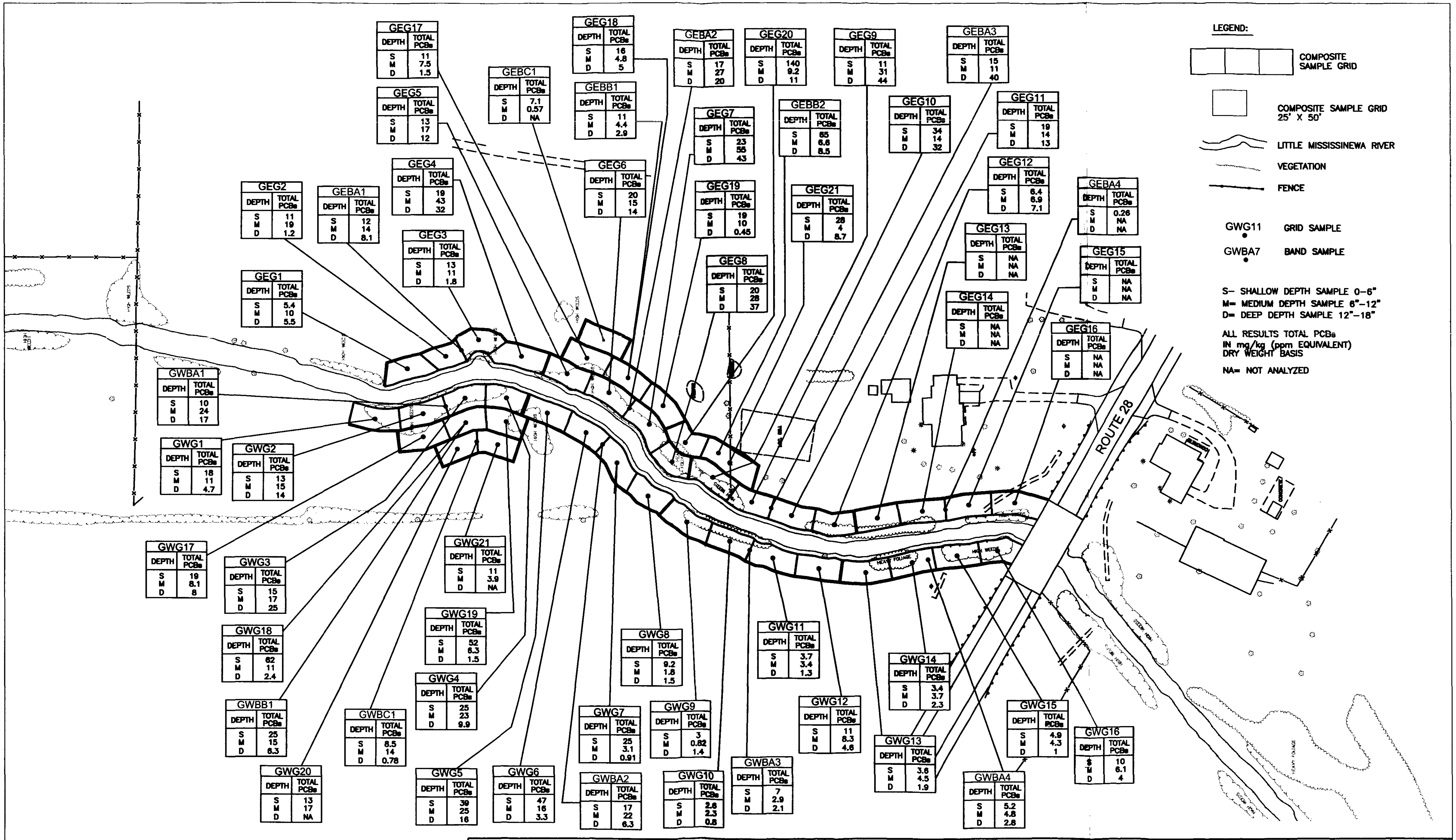
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA F– FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10236.00.003
CAD FILE NUMBER: FIGURE4.6
DATE: 04/16/03

FIGURE 14



GEG17

DEPTH	TOTAL PCBs
S	11
M	7.5
D	1.5

GEG5

DEPTH	TOTAL PCBs
S	13
M	17
D	12

GEBC1

DEPTH	TOTAL PCBs
S	7.1
M	0.57
D	NA

GEG18

DEPTH	TOTAL PCBs
S	16
M	4.8
D	5

GEBB1

DEPTH	TOTAL PCBs
S	11
M	4.4
D	2.9

GEBA2

DEPTH	TOTAL PCBs
S	17
M	27
D	20

GEG20

DEPTH	TOTAL PCBs
S	140
M	9.2
D	11

GEG9

DEPTH	TOTAL PCBs
S	11
M	31
D	44

GEBA3

DEPTH	TOTAL PCBs
S	15
M	11
D	40

GEG7

DEPTH	TOTAL PCBs
S	23
M	55
D	43

GEBB2

DEPTH	TOTAL PCBs
S	65
M	6.6
D	8.5

GEG10

DEPTH	TOTAL PCBs
S	34
M	14
D	32

GEG11

DEPTH	TOTAL PCBs
S	19
M	14
D	13

GEG4

DEPTH	TOTAL PCBs
S	19
M	43
D	32

GEG6

DEPTH	TOTAL PCBs
S	20
M	15
D	14

GEG12

DEPTH	TOTAL PCBs
S	6.4
M	6.9
D	7.1

GEG2

DEPTH	TOTAL PCBs
S	11
M	19
D	1.2

GEBA1

DEPTH	TOTAL PCBs
S	12
M	14
D	8.1

GEG19

DEPTH	TOTAL PCBs
S	19
M	10
D	0.45

GEG21

DEPTH	TOTAL PCBs
S	28
M	4
D	8.7

GEBA4

DEPTH	TOTAL PCBs
S	0.26
M	NA
D	NA

GEG3

DEPTH	TOTAL PCBs
S	13
M	11
D	1.8

GEG13

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

GEG15

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

GEG1

DEPTH	TOTAL PCBs
S	5.4
M	10
D	5.5

GEG8

DEPTH	TOTAL PCBs
S	20
M	28
D	37

GEG14

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

GEG16

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

GWBA1

DEPTH	TOTAL PCBs
S	10
M	24
D	17

GWG1

DEPTH	TOTAL PCBs
S	18
M	11
D	4.7

GWG2

DEPTH	TOTAL PCBs
S	13
M	15
D	14

GWG17

DEPTH	TOTAL PCBs
S	19
M	8.1
D	8

GWG3

DEPTH	TOTAL PCBs
S	15
M	17
D	25

GWG21

DEPTH	TOTAL PCBs
S	11
M	3.9
D	NA

GWG19

DEPTH	TOTAL PCBs
S	52
M	6.3
D	1.5

GWG18

DEPTH	TOTAL PCBs
S	62
M	11
D	2.4

GWG8

DEPTH	TOTAL PCBs
S	9.2
M	1.8
D	1.5

GWG11

DEPTH	TOTAL PCBs
S	3.7
M	3.4
D	1.3

GWG14

DEPTH	TOTAL PCBs
S	3.4
M	3.7
D	2.3

GWG4

DEPTH	TOTAL PCBs
S	25
M	23
D	9.9

GWBB1

DEPTH	TOTAL PCBs
S	25
M	15
D	6.3

GWBC1

DEPTH	TOTAL PCBs
S	8.5
M	14
D	0.78

GWG7

DEPTH	TOTAL PCBs
S	25
M	3.1
D	0.91

GWG9

DEPTH	TOTAL PCBs
S	3
M	0.82
D	1.4

GWG12

DEPTH	TOTAL PCBs
S	11
M	8.3
D	4.6

GWG15

DEPTH	TOTAL RCBs
S	4.9
M	4.3
D	1

GWG16

DEPTH	TOTAL PCBs
S	10
M	6.1
D	4

GWG13

DEPTH	TOTAL PCBs
S	3.6
M	4.5
D	1.9

GWG20

DEPTH	TOTAL PCBs
S	13
M	17
D	NA

GWG5

DEPTH	TOTAL PCBs
S	39
M	25
D	16

GWG6

DEPTH	TOTAL PCBs
S	47
M	16
D	3.3

GWBA2

DEPTH	TOTAL PCBs
S	17
M	22
D	6.3

GWG10

DEPTH	TOTAL PCBs
S	2.6
M	2.3
D	0.8

GWBA3

DEPTH	TOTAL PCBs
S	7
M	2.9
D	2.1

GWBA4

DEPTH	TOTAL PCBs
S	5.2
M	4.8
D	2.8

LEGEND:

▭▭▭	COMPOSITE SAMPLE GRID
▭	COMPOSITE SAMPLE GRID 25' X 50'
〰	LITTLE MISSISSINEWA RIVER
⋯	VEGETATION
—•—•—	FENCE
GWG11 ●	GRID SAMPLE
GWBA7 ●	BAND SAMPLE

S– SHALLOW DEPTH SAMPLE 0–6"
M= MEDIUM DEPTH SAMPLE 6"–12"
D= DEEP DEPTH SAMPLE 12"–18"

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

SECOR

INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

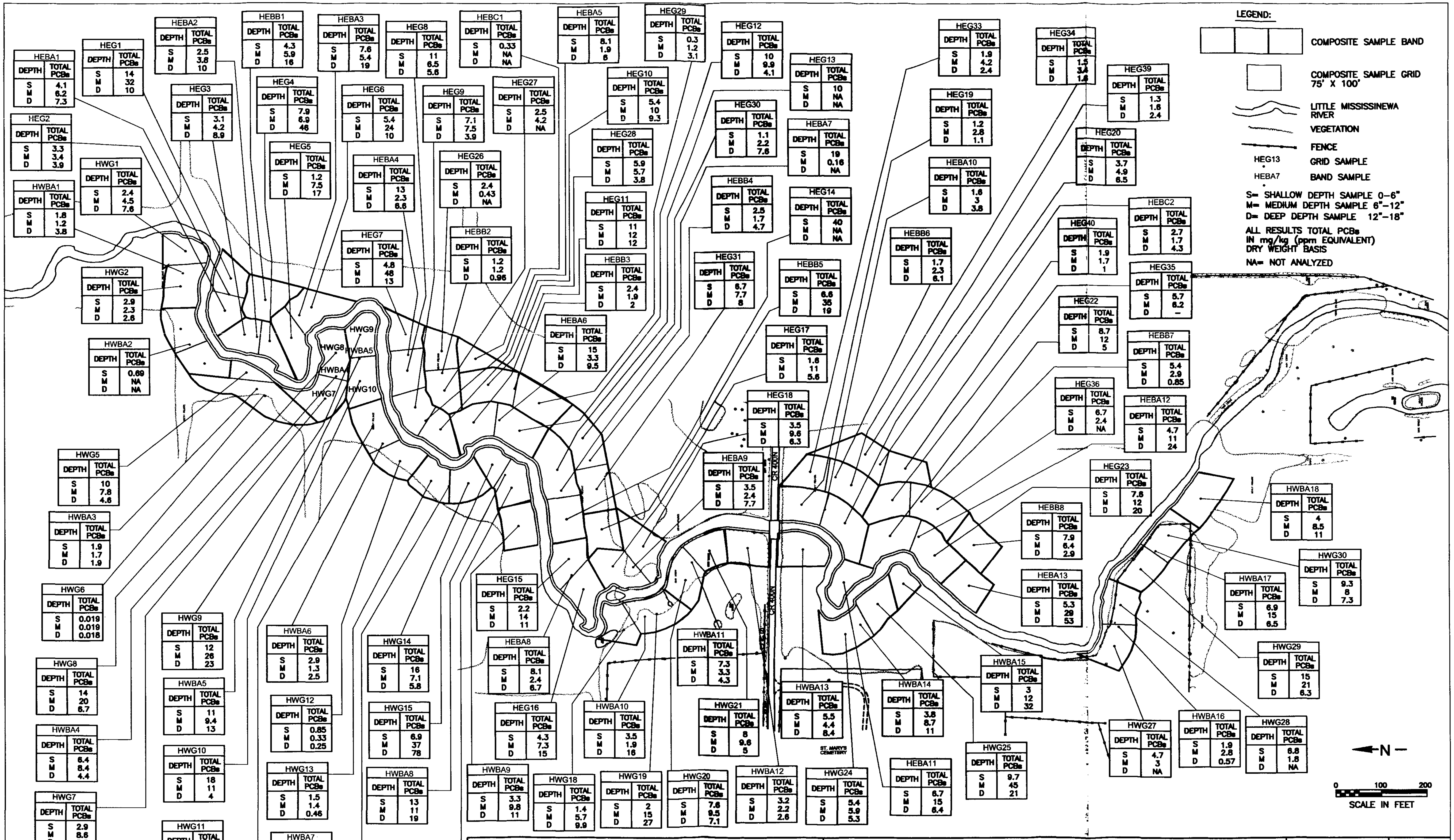
RI AREA G– FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003

CAD FILE NUMBER:
FIGURE4.7

DATE:
04/16/03

FIGURE
15



LEGEND:

- COMPOSITE SAMPLE BAND
- COMPOSITE SAMPLE GRID 75' X 100'
- LITTLE MISSISSINEWA RIVER
- VEGETATION
- FENCE
- HEG13 GRID SAMPLE
- HEBA7 BAND SAMPLE

S= SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

	DEPTH	TOTAL PCBs
HEBA1	S	4.1
	M	6.2
	D	7.3
HEG1	S	14
	M	32
	D	10
HEBA2	S	2.5
	M	3.8
	D	10
HEBB1	S	4.3
	M	5.9
	D	16
HEBA3	S	7.6
	M	5.4
	D	19
HEG8	S	11
	M	6.5
	D	5.6
HEBC1	S	0.33
	M	NA
	D	NA
HEBA5	S	8.1
	M	1.9
	D	6
HEG29	S	0.3
	M	1.2
	D	3.1
HEG12	S	10
	M	9.9
	D	4.1
HEG13	S	10
	M	NA
	D	NA
HEG33	S	1.9
	M	4.2
	D	2.4
HEG34	S	1.5
	M	3.4
	D	1.6
HEG39	S	1.3
	M	1.6
	D	2.4
HEG2	S	3.3
	M	3.4
	D	3.9
HEG3	S	3.1
	M	4.2
	D	8.9
HEG4	S	7.9
	M	6.9
	D	46
HEG6	S	5.4
	M	24
	D	10
HEG9	S	7.1
	M	7.5
	D	3.9
HEG27	S	2.5
	M	4.2
	D	NA
HEG10	S	5.4
	M	10
	D	9.3
HEG30	S	1.1
	M	2.2
	D	7.6
HEBA7	S	19
	M	0.16
	D	NA
HEG19	S	1.2
	M	2.8
	D	1.1
HEG20	S	3.7
	M	4.9
	D	6.5
HWBA1	S	1.8
	M	1.2
	D	3.8
HWG1	S	2.4
	M	4.5
	D	7.6
HEG5	S	1.2
	M	7.5
	D	17
HEBA4	S	13
	M	2.3
	D	6.6
HEG26	S	2.4
	M	0.43
	D	NA
HEG28	S	5.9
	M	5.7
	D	3.8
HEG11	S	11
	M	12
	D	12
HEBB4	S	2.5
	M	1.7
	D	4.7
HEG14	S	40
	M	NA
	D	NA
HEBA10	S	1.6
	M	3
	D	3.8
HEBC2	S	2.7
	M	1.7
	D	4.3
HEG40	S	1.9
	M	1.7
	D	1
HEG7	S	4.8
	M	48
	D	13
HEBB2	S	1.2
	M	1.2
	D	0.96
HEBB3	S	2.4
	M	1.9
	D	2
HEG31	S	6.7
	M	7.7
	D	8
HEBB5	S	6.6
	M	35
	D	19
HEBB6	S	1.7
	M	2.3
	D	6.1
HEG35	S	5.7
	M	6.2
	D	–
HWG2	S	2.9
	M	2.3
	D	2.6
HEBA6	S	15
	M	3.3
	D	9.5
HEG22	S	8.7
	M	12
	D	5
HWBA2	S	0.69
	M	NA
	D	NA
HEG17	S	1.6
	M	11
	D	5.6
HEBB7	S	5.4
	M	2.9
	D	0.85
HEG36	S	6.7
	M	2.4
	D	NA
HEBA12	S	4.7
	M	11
	D	24
HEG18	S	3.5
	M	9.6
	D	6.3
HWG5	S	10
	M	7.8
	D	4.6
HEBA9	S	3.5
	M	2.4
	D	7.7
HEG23	S	7.6
	M	12
	D	20
HWBA18	S	4
	M	8.5
	D	11
HWBA3	S	1.9
	M	1.7
	D	1.9
HEBB8	S	7.9
	M	6.4
	D	2.9
HWG30	S	9.3
	M	8
	D	7.3
HEG15	S	2.2
	M	14
	D	11
HEBA13	S	5.3
	M	29
	D	53
HWBA17	S	6.9
	M	15
	D	6.5
HWG6	S	0.019
	M	0.019
	D	0.018
HWG9	S	12
	M	26
	D	23
HWBA6	S	2.9
	M	1.3
	D	2.5
HWG14	S	16
	M	7.1
	D	5.8
HEBA8	S	8.1
	M	2.4
	D	6.7
HWBA11	S	7.3
	M	3.3
	D	4.3
HWG29	S	15
	M	21
	D	6.3
HWBA15	S	3
	M	12
	D	32
HWG8	S	14
	M	20
	D	6.7
HWBA5	S	11
	M	9.4
	D	13
HWG12	S	0.85
	M	0.33
	D	0.25
HWG15	S	6.9
	M	37
	D	78
HEG16	S	4.3
	M	7.3
	D	15
HWBA10	S	3.5
	M	1.9
	D	16
HWG21	S	8
	M	9.6
	D	5
HWBA13	S	5.5
	M	4.4
	D	8.4
HWBA14	S	3.8
	M	8.7
	D	11
HWG27	S	4.7
	M	3
	D	NA
HWBA16	S	1.9
	M	2.8
	D	0.57
HWG28	S	6.8
	M	1.8
	D	NA
HWBA4	S	6.4
	M	8.4
	D	4.4
HWG10	S	18
	M	11
	D	4
HWG13	S	1.5
	M	1.4
	D	0.46
HWBA8	S	13
	M	11
	D	19
HWBA9	S	3.3
	M	9.8
	D	11
HWG18	S	1.4
	M	5.7
	D	9.9
HWG19	S	2
	M	15
	D	27
HWG20	S	7.6
	M	9.5
	D	7.1
HWBA12	S	3.2
	M	2.2
	D	2.6
HWG24	S	5.4
	M	5.9
	D	5.3
HEBA11	S	6.7
	M	15
	D	6.4
HWG25	S	9.7
	M	45
	D	21
HWG7	S	2.9
	M	8.6
	D	3.3
HWG11	S	10
	M	6.3
	D	4
HWBA7	S	6.5
	M	1.9
	D	1.4
HWG16	S	10
	M	13
	D	4.2

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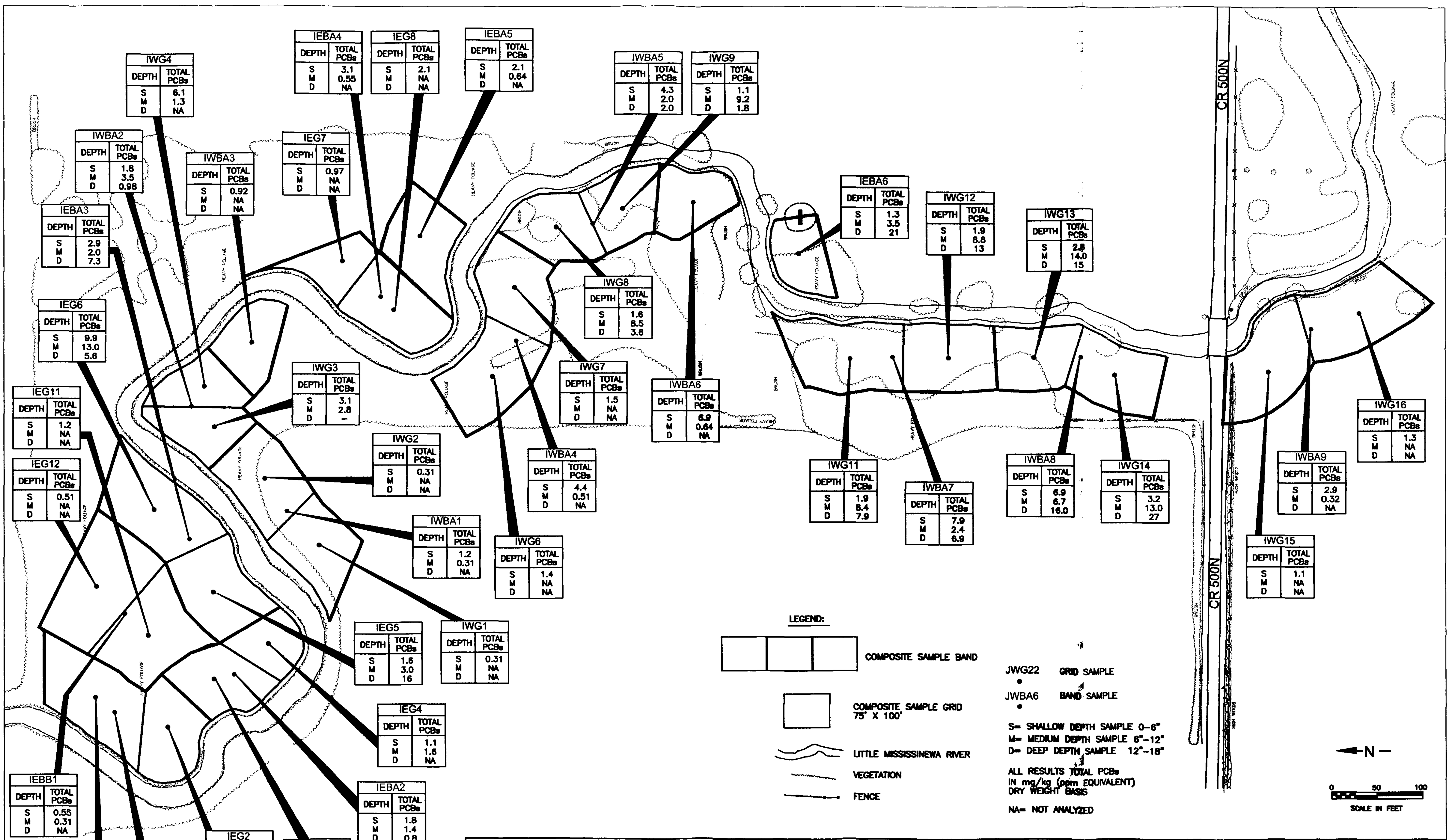
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA H- FLOODPLAIN SOIL SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10231.00.0001
CAD FILE NUMBER: FIGURE4.8
DATE: 04/16/03

FIGURE 16



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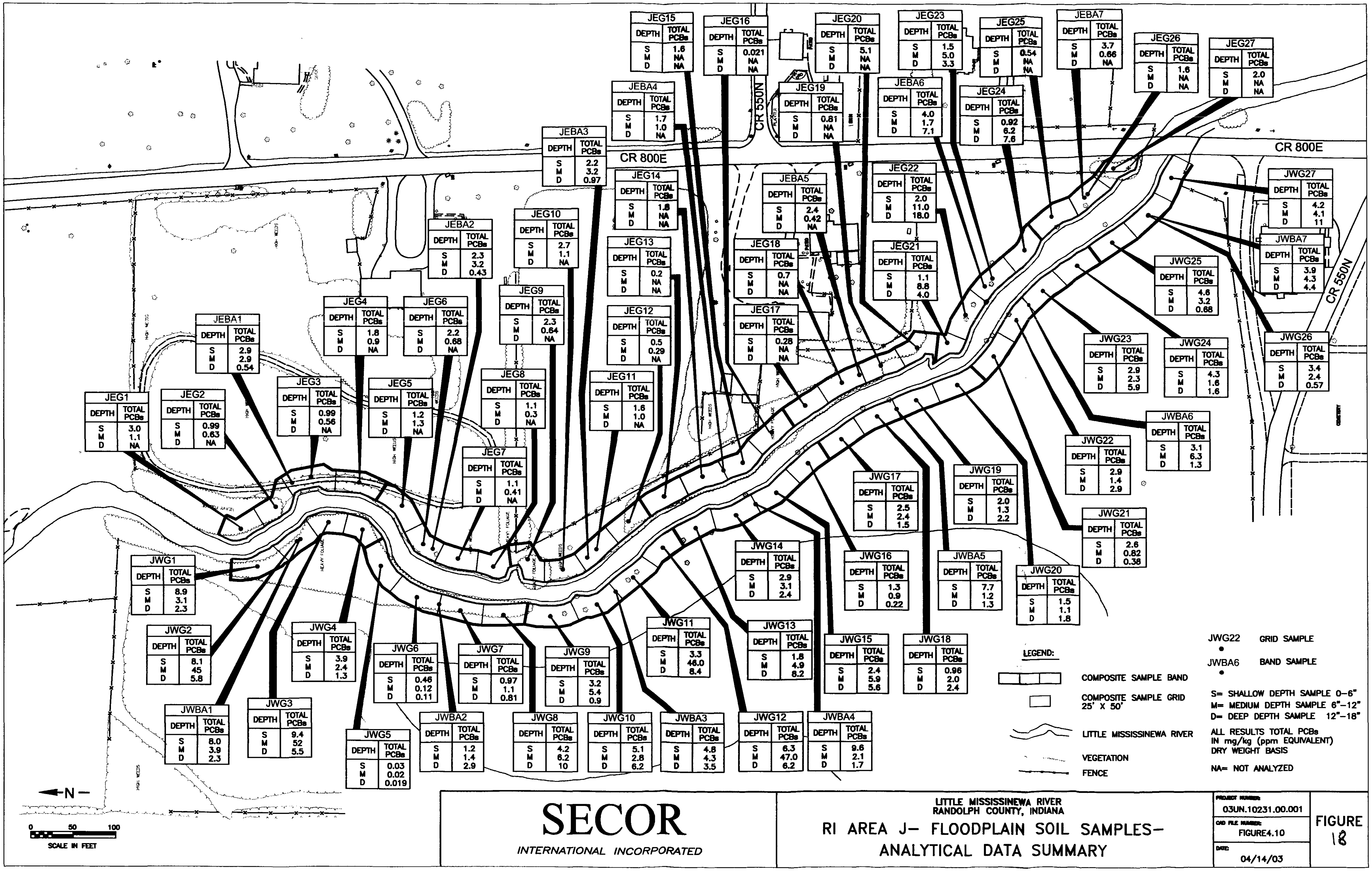
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA I– FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10231.00.0500
CAD FILE NUMBER: FIGURE4.9
DATE: 04/16/03

FIGURE
17



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LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA J- FLOODPLAIN SOIL SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10231.00.001

CAD FILE NUMBER:
FIGURE4.10

DATE:
04/14/03

FIGURE
18

KEG1	
DEPTH	TOTAL PCBs
S	15
M	3.7
D	NA

KEG6	
DEPTH	TOTAL PCBs
S	3.1
M	NA
D	NA

KEBB2	
DEPTH	TOTAL PCBs
S	3.1
M	0.76
D	NA

KEBC1	
DEPTH	TOTAL PCBs
S	0.058
M	NA
D	NA

KWBA2	
DEPTH	TOTAL PCBs
S	12
M	2.2
D	0.92

KWG4	
DEPTH	TOTAL PCBs
S	14
M	2
D	NA

KEBB1	
DEPTH	TOTAL PCBs
S	0.6
M	NA
D	NA

KEG7	
DEPTH	TOTAL PCBs
S	4.4
M	NA
D	NA

KWG2	
DEPTH	TOTAL PCBs
S	10
M	2.2
D	NA

KWG3	
DEPTH	TOTAL PCBs
S	17
M	3
D	NA

KEG3	
DEPTH	TOTAL PCBs
S	8.2
M	5.4
D	1.3

KWBA1	
DEPTH	TOTAL PCBs
S	9.5
M	1.7
D	1

KEBA2	
DEPTH	TOTAL PCBs
S	11
M	3.1
D	1.2

KEG2	
DEPTH	TOTAL PCBs
S	9.3
M	4.7
D	NA

KWBA3	
DEPTH	TOTAL PCBs
S	5.6
M	1.4
D	0.51

KEG4	
DEPTH	TOTAL PCBs
S	11
M	2.3
D	0.78

KWG7	
DEPTH	TOTAL PCBs
S	3.6
M	NA
D	NA

KEBA1	
DEPTH	TOTAL PCBs
S	8.2
M	2.7
D	0.75

KWG6	
DEPTH	TOTAL PCBs
S	4.7
M	NA
D	NA

KWBB1	
DEPTH	TOTAL PCBs
S	3.4
M	0.92
D	NA

KWG1	
DEPTH	TOTAL PCBs
S	11
M	1.7
D	NA

LEGEND:

▭▭▭	ADDITIONAL SAMPLING BAND
▭	ADDITIONAL SAMPLING GRID
〰	LITTLE MISSISSINEWA RIVER
~	VEGETATION
—·—	FENCE
KWG2 ●	GRID SAMPLE
KWBB1 ●	BAND SAMPLE

S= SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

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LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA K– FLOODPLAIN SOIL SAMPLES–
ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
SAMPLE-DATA-K
DATE:
04/16/03

FIGURE
19

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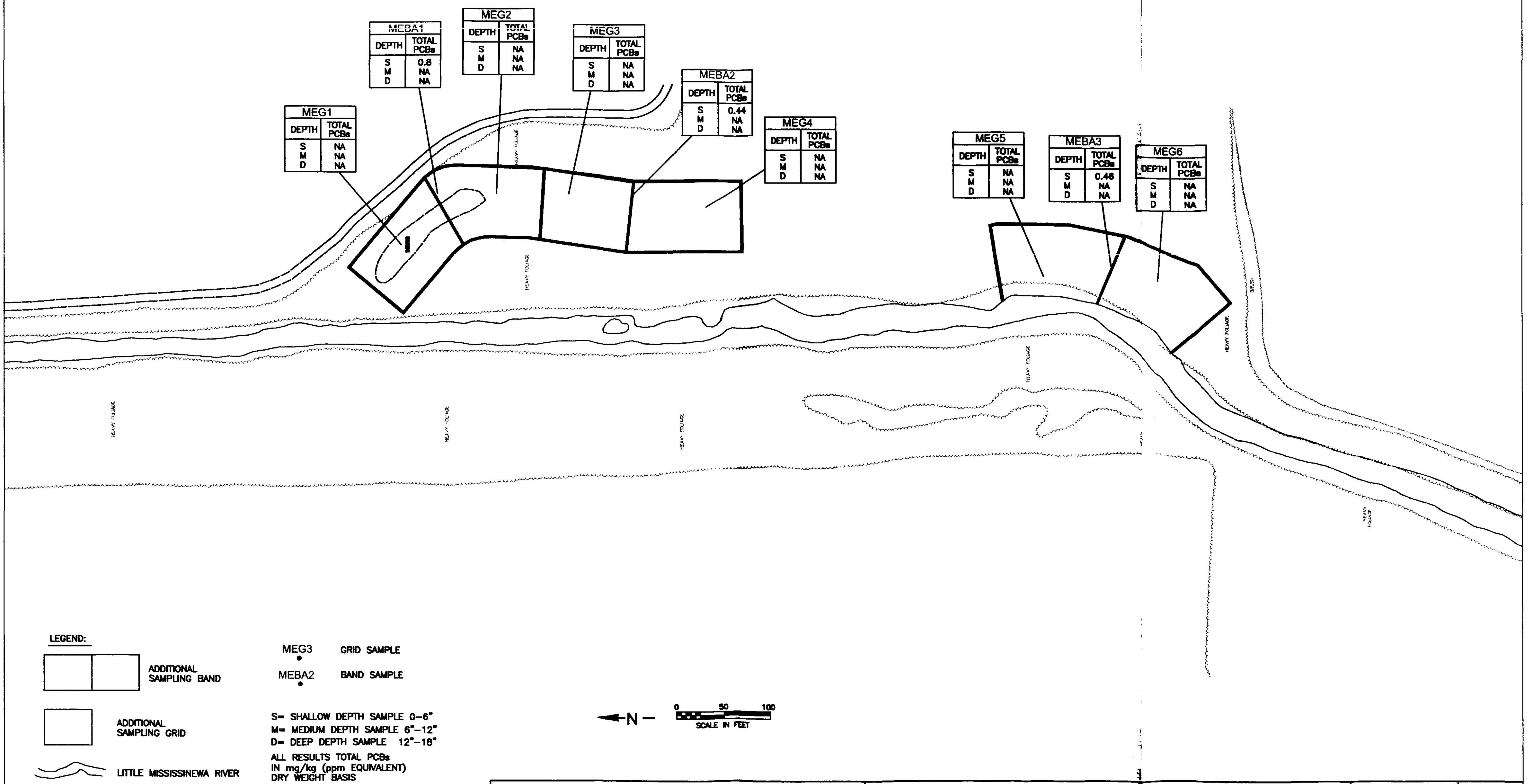
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA L– FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
FIGURE4.12
DATE:
04/16/03

FIGURE
20



MEG1

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

MEBA1

DEPTH	TOTAL PCBs
S	0.8
M	NA
D	NA

MEG2

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

MEG3

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

MEBA2

DEPTH	TOTAL PCBs
S	0.44
M	NA
D	NA

MEG4

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

MEG5

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

MEBA3

DEPTH	TOTAL PCBs
S	0.46
M	NA
D	NA

MEG6

DEPTH	TOTAL PCBs
S	NA
M	NA
D	NA

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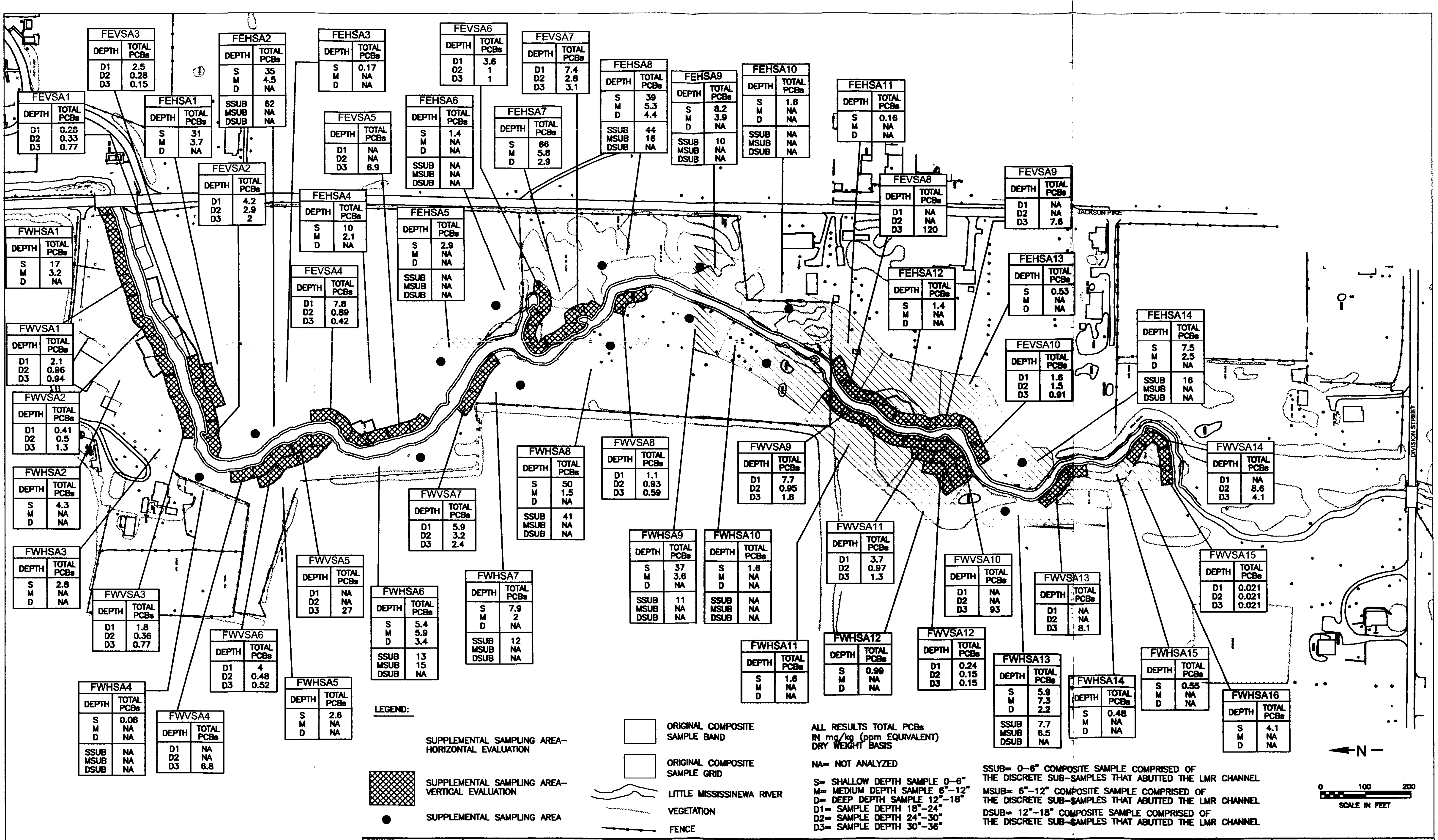
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA M- FLOODPLAIN SOIL SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER: 03UN.10236.00.003
CAD FILE NUMBER: FIGURE4.13
DATE: 04/16/03

FIGURE
21



FEVSA3

DEPTH	TOTAL PCBs
D1	2.5
D2	0.28
D3	0.15

FEVSA1

DEPTH	TOTAL PCBs
D1	0.28
D2	0.33
D3	0.77

FEHSA1

DEPTH	TOTAL PCBs
S	31
M	3.7
D	NA

FEHSA2

DEPTH	TOTAL PCBs
S	35
M	4.5
D	NA
SSUB	62
MSUB	NA
DSUB	NA

FEHSA3

DEPTH	TOTAL PCBs
S	0.17
M	NA
D	NA

FEVSA5

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	6.9

FEVSA2

DEPTH	TOTAL PCBs
D1	4.2
D2	2.9
D3	2

FEHSA4

DEPTH	TOTAL PCBs
S	10
M	2.1
D	NA

FWHSA1

DEPTH	TOTAL PCBs
S	17
M	3.2
D	NA

FEVSA4

DEPTH	TOTAL PCBs
D1	7.8
D2	0.89
D3	0.42

FEVSA6

DEPTH	TOTAL PCBs
D1	3.6
D2	1
D3	1

FEHSA6

DEPTH	TOTAL PCBs
S	1.4
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

FEHSA5

DEPTH	TOTAL PCBs
S	2.9
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

FEVSA7

DEPTH	TOTAL PCBs
D1	7.4
D2	2.8
D3	3.1

FEHSA7

DEPTH	TOTAL PCBs
S	66
M	5.8
D	2.9

FEHSA8

DEPTH	TOTAL PCBs
S	39
M	5.3
D	4.4
SSUB	44
MSUB	16
DSUB	NA

FEHSA9

DEPTH	TOTAL PCBs
S	8.2
M	3.9
D	NA
SSUB	10
MSUB	NA
DSUB	NA

FEHSA10

DEPTH	TOTAL PCBs
S	1.6
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

FEHSA11

DEPTH	TOTAL PCBs
S	0.16
M	NA
D	NA

FEVSA8

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	120

FEVSA9

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	7.6

FEHSA12

DEPTH	TOTAL PCBs
S	1.4
M	NA
D	NA

FEHSA13

DEPTH	TOTAL PCBs
S	0.53
M	NA
D	NA

FEVSA10

DEPTH	TOTAL PCBs
D1	1.6
D2	1.5
D3	0.91

FEHSA14

DEPTH	TOTAL PCBs
S	7.5
M	2.5
D	NA
SSUB	16
MSUB	NA
DSUB	NA

FWVSA1

DEPTH	TOTAL PCBs
D1	2.1
D2	0.96
D3	0.94

FWVSA2

DEPTH	TOTAL PCBs
D1	0.41
D2	0.5
D3	1.3

FWHSA2

DEPTH	TOTAL PCBs
S	4.3
M	NA
D	NA

FWHSA3

DEPTH	TOTAL PCBs
S	2.8
M	NA
D	NA

FWVSA3

DEPTH	TOTAL PCBs
D1	1.8
D2	0.36
D3	0.77

FWHSA4

DEPTH	TOTAL PCBs
S	0.08
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

FWVSA4

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	6.8

FWVSA6

DEPTH	TOTAL PCBs
D1	4
D2	0.48
D3	0.52

FWVSA5

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	27

FWHSA5

DEPTH	TOTAL PCBs
S	2.6
M	NA
D	NA

FWHSA6

DEPTH	TOTAL PCBs
S	5.4
M	5.9
D	3.4
SSUB	13
MSUB	15
DSUB	NA

FWVSA7

DEPTH	TOTAL PCBs
D1	5.9
D2	3.2
D3	2.4

FWHSA7

DEPTH	TOTAL PCBs
S	7.9
M	2
D	NA
SSUB	12
MSUB	NA
DSUB	NA

FWHSA8

DEPTH	TOTAL PCBs
S	50
M	1.5
D	NA
SSUB	41
MSUB	NA
DSUB	NA

FWVSA8

DEPTH	TOTAL PCBs
D1	1.1
D2	0.93
D3	0.59

FWVSA9

DEPTH	TOTAL PCBs
D1	7.7
D2	0.95
D3	1.8

FWHSA9

DEPTH	TOTAL PCBs
S	37
M	3.6
D	NA
SSUB	11
MSUB	NA
DSUB	NA

FWHSA10

DEPTH	TOTAL PCBs
S	1.6
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

FWVSA11

DEPTH	TOTAL PCBs
D1	3.7
D2	0.97
D3	1.3

FWHSA11

DEPTH	TOTAL PCBs
S	1.6
M	NA
D	NA

FWHSA12

DEPTH	TOTAL PCBs
S	0.99
M	NA
D	NA

FWVSA12

DEPTH	TOTAL PCBs
D1	0.24
D2	0.15
D3	0.15

FWVSA10

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	93

FWHSA13

DEPTH	TOTAL PCBs
S	5.9
M	7.3
D	2.2
SSUB	7.7
MSUB	6.5
DSUB	NA

FWVSA13

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	8.1

FWHSA14

DEPTH	TOTAL PCBs
S	0.48
M	NA
D	NA

FWHSA15

DEPTH	TOTAL PCBs
S	0.55
M	NA
D	NA

FWVSA14

DEPTH	TOTAL PCBs
D1	NA
D2	8.6
D3	4.1

FWVSA15

DEPTH	TOTAL PCBs
D1	0.021
D2	0.021
D3	0.021

FWHSA16

DEPTH	TOTAL PCBs
S	4.1
M	NA
D	NA

LEGEND:

▨	SUPPLEMENTAL SAMPLING AREA–HORIZONTAL EVALUATION
▩	SUPPLEMENTAL SAMPLING AREA–VERTICAL EVALUATION
●	SUPPLEMENTAL SAMPLING AREA
☐	ORIGINAL COMPOSITE SAMPLE BAND
☐	ORIGINAL COMPOSITE SAMPLE GRID
〰	LITTLE MISSISSINEWA RIVER
~	VEGETATION
—•—	FENCE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

S= SHALLOW DEPTH SAMPLE 0–6"
M= MEDIUM DEPTH SAMPLE 6"–12"
D= DEEP DEPTH SAMPLE 12"–18"
D1= SAMPLE DEPTH 18"–24"
D2= SAMPLE DEPTH 24"–30"
D3= SAMPLE DEPTH 30"–36"

SSUB= 0–6" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

MSUB= 6"–12" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

DSUB= 12"–18" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

DESIGNED BY
B. BARQUEST
DRAWN BY
K. MITCHELL
APPROVED BY
B. BARQUEST
DATE
03/27/02

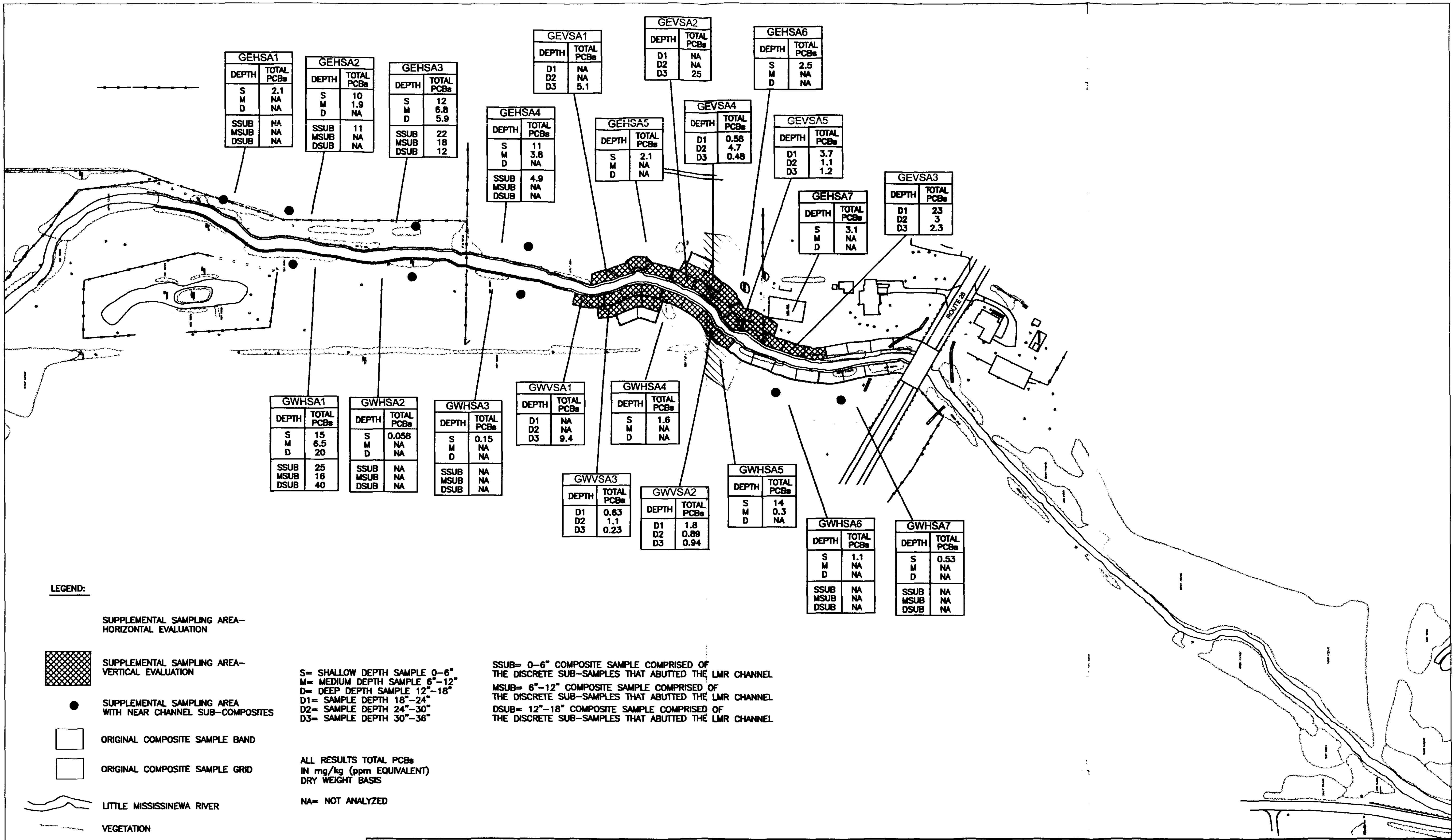
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA F SUPPLEMENTAL VERTICAL AND HORIZONTAL FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
SAMPLE–VERIFIED–REV1
DATE:
04/16/03

FIGURE
22



GEHSA1

DEPTH	TOTAL PCBs
S	2.1
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

GEHSA2

DEPTH	TOTAL PCBs
S	10
M	1.9
D	NA
SSUB	11
MSUB	NA
DSUB	NA

GEHSA3

DEPTH	TOTAL PCBs
S	12
M	6.8
D	5.9
SSUB	22
MSUB	18
DSUB	12

GEHSA4

DEPTH	TOTAL PCBs
S	11
M	3.8
D	NA
SSUB	4.9
MSUB	NA
DSUB	NA

GEVSA1

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	5.1

GEHSA5

DEPTH	TOTAL PCBs
S	2.1
M	NA
D	NA

GEVSA2

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	25

GEVSA4

DEPTH	TOTAL PCBs
D1	0.58
D2	4.7
D3	0.48

GEHSA6

DEPTH	TOTAL PCBs
S	2.5
M	NA
D	NA

GEVSA5

DEPTH	TOTAL PCBs
D1	3.7
D2	1.1
D3	1.2

GEHSA7

DEPTH	TOTAL PCBs
S	3.1
M	NA
D	NA

GEVSA3

DEPTH	TOTAL PCBs
D1	23
D2	3
D3	2.3

GWHSA1

DEPTH	TOTAL PCBs
S	15
M	6.5
D	20
SSUB	25
MSUB	16
DSUB	40

GWHSA2

DEPTH	TOTAL PCBs
S	0.058
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

GWHSA3

DEPTH	TOTAL PCBs
S	0.15
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

GWVSA1

DEPTH	TOTAL PCBs
D1	NA
D2	NA
D3	9.4

GWHSA4

DEPTH	TOTAL PCBs
S	1.6
M	NA
D	NA

GWVSA3

DEPTH	TOTAL PCBs
D1	0.63
D2	1.1
D3	0.23

GWVSA2

DEPTH	TOTAL PCBs
D1	1.8
D2	0.89
D3	0.94

GWHSA5

DEPTH	TOTAL PCBs
S	14
M	0.3
D	NA

GWHSA6

DEPTH	TOTAL PCBs
S	1.1
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

GWHSA7

DEPTH	TOTAL PCBs
S	0.53
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

LEGEND:

SUPPLEMENTAL SAMPLING AREA- HORIZONTAL EVALUATION

▨ SUPPLEMENTAL SAMPLING AREA- VERTICAL EVALUATION

● SUPPLEMENTAL SAMPLING AREA WITH NEAR CHANNEL SUB-COMPOSITES

☐ ORIGINAL COMPOSITE SAMPLE BAND

☐ ORIGINAL COMPOSITE SAMPLE GRID

LITTLE MISSISSINEWA RIVER

VEGETATION

FENCE

S= SHALLOW DEPTH SAMPLE 0-6"
M= MEDIUM DEPTH SAMPLE 6"-12"
D= DEEP DEPTH SAMPLE 12"-18"
D1= SAMPLE DEPTH 18"-24"
D2= SAMPLE DEPTH 24"-30"
D3= SAMPLE DEPTH 30"-36"

SSUB= 0-6" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL
MSUB= 6"-12" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL
DSUB= 12"-18" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

ALL RESULTS TOTAL PCBs IN mg/kg (ppm EQUIVALENT) DRY WEIGHT BASIS

NA= NOT ANALYZED

0 100 200
SCALE IN FEET

DESIGNED BY
B. BARQUEST
DRAWN BY
K. MITCHELL
APPROVED BY
B. BARQUEST
DATE
03/27/02

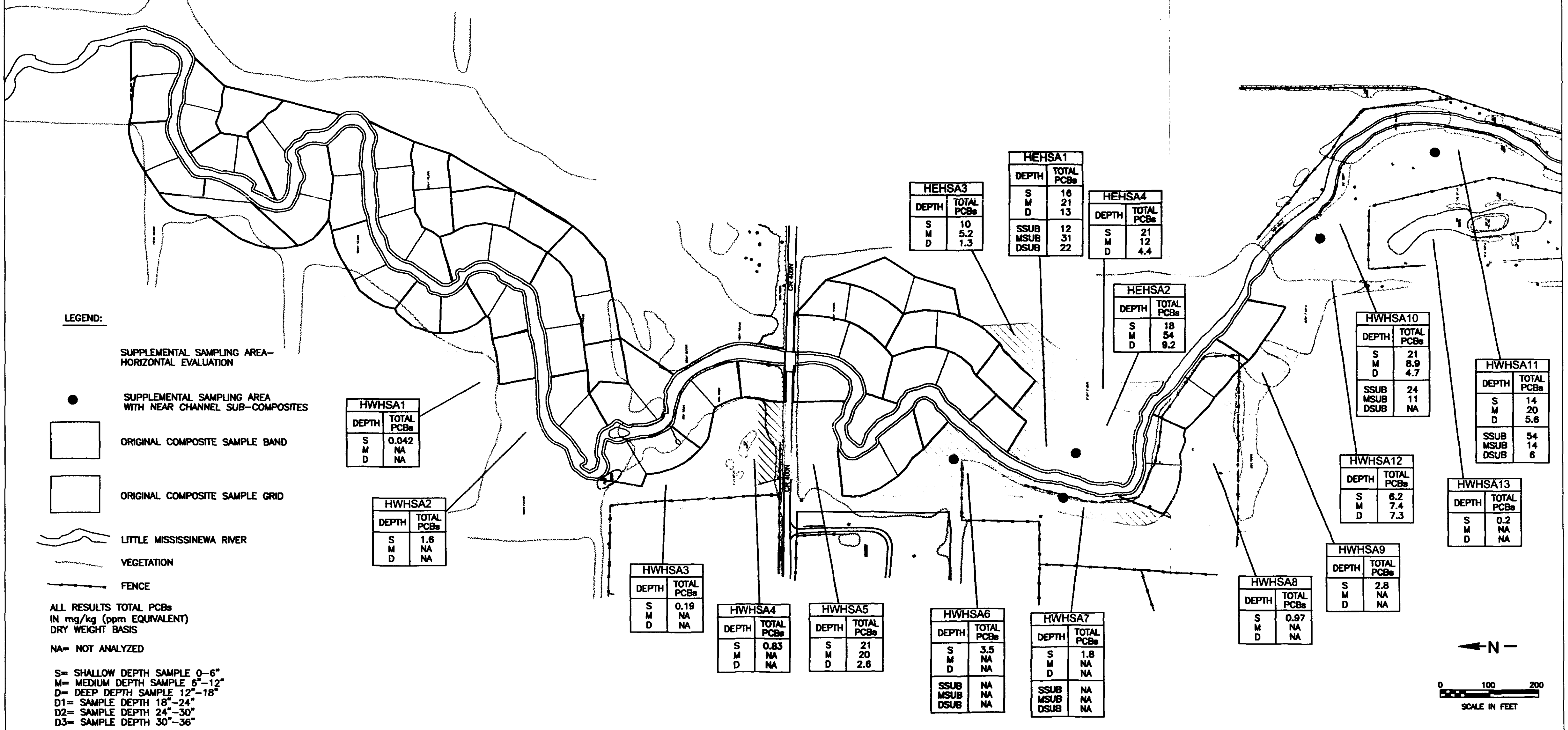
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA G SUPPLEMENTAL VERTICAL AND HORIZONTAL FLOODPLAIN SOIL SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
SAMPLE-VERIFIED-REV1
DATE:
04/16/03

FIGURE
23



LEGEND:

SUPPLEMENTAL SAMPLING AREA–HORIZONTAL EVALUATION

● SUPPLEMENTAL SAMPLING AREA WITH NEAR CHANNEL SUB–COMPOSITES

ORIGINAL COMPOSITE SAMPLE BAND

ORIGINAL COMPOSITE SAMPLE GRID

LITTLE MISSISSINEWA RIVER

VEGETATION

FENCE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

S= SHALLOW DEPTH SAMPLE 0–6"
M= MEDIUM DEPTH SAMPLE 6"–12"
D= DEEP DEPTH SAMPLE 12"–18"
D1= SAMPLE DEPTH 18"–24"
D2= SAMPLE DEPTH 24"–30"
D3= SAMPLE DEPTH 30"–36"

SSUB= 0–6" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL
MSUB= 6"–12" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL
DSUB= 12"–18" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL

HEHSA3

DEPTH	TOTAL PCBs
S	10
M	5.2
D	1.3

HEHSA1

DEPTH	TOTAL PCBs
S	16
M	21
D	13
SSUB	12
MSUB	31
DSUB	22

HEHSA4

DEPTH	TOTAL PCBs
S	21
M	12
D	4.4

HEHSA2

DEPTH	TOTAL PCBs
S	18
M	54
D	9.2

HWHSA10

DEPTH	TOTAL PCBs
S	21
M	8.9
D	4.7
SSUB	24
MSUB	11
DSUB	NA

HWHSA11

DEPTH	TOTAL PCBs
S	14
M	20
D	5.6
SSUB	54
MSUB	14
DSUB	6

HWHSA1

DEPTH	TOTAL PCBs
S	0.042
M	NA
D	NA

HWHSA2

DEPTH	TOTAL PCBs
S	1.6
M	NA
D	NA

HWHSA12

DEPTH	TOTAL PCBs
S	6.2
M	7.4
D	7.3

HWHSA13

DEPTH	TOTAL PCBs
S	0.2
M	NA
D	NA

HWHSA9

DEPTH	TOTAL PCBs
S	2.8
M	NA
D	NA

HWHSA3

DEPTH	TOTAL PCBs
S	0.19
M	NA
D	NA

HWHSA8

DEPTH	TOTAL PCBs
S	0.97
M	NA
D	NA

HWHSA4

DEPTH	TOTAL PCBs
S	0.83
M	NA
D	NA

HWHSA5

DEPTH	TOTAL PCBs
S	21
M	20
D	2.6

HWHSA6

DEPTH	TOTAL PCBs
S	3.5
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

HWHSA7

DEPTH	TOTAL PCBs
S	1.8
M	NA
D	NA
SSUB	NA
MSUB	NA
DSUB	NA

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B. BARQUEST
DRAWN BY
K. MITCHELL
APPROVED BY
B. BARQUEST
DATE
03/27/02

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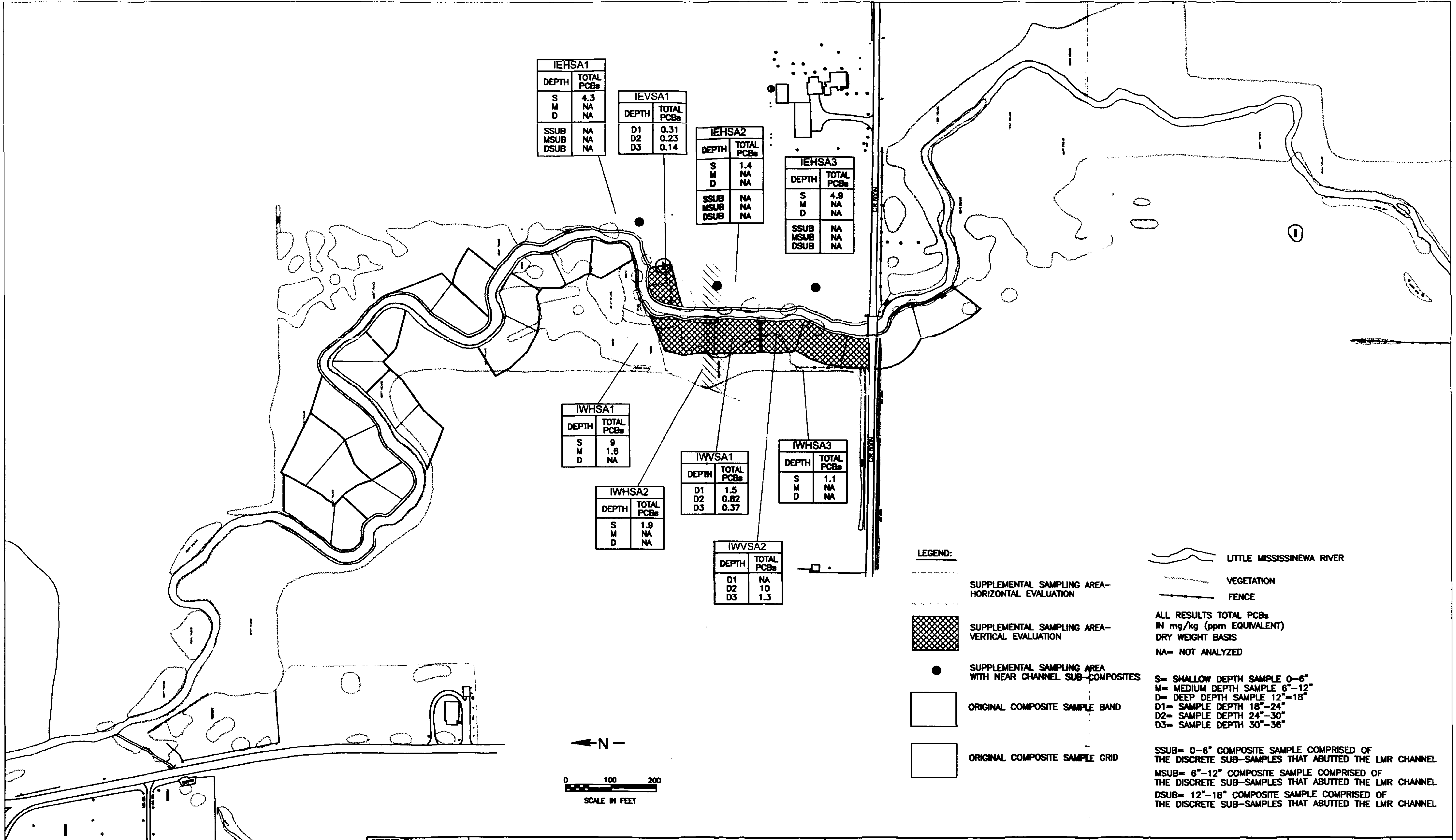
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA H SUPPLEMENTAL HORIZONTAL FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER
03UN.10236.00.003
CAD FILE NUMBER
SAMPLE–VERIFIED–REV1
DATE
04/16/03

FIGURE
24



IEHSA1

DEPTH	TOTAL PCBs
S M D	4.3 NA NA
SSUB MSUB DSUB	NA NA NA

IEVSA1

DEPTH	TOTAL PCBs
D1 D2 D3	0.31 0.23 0.14

IEHSA2

DEPTH	TOTAL PCBs
S M D	1.4 NA NA
SSUB MSUB DSUB	NA NA NA

IEHSA3

DEPTH	TOTAL PCBs
S M D	4.9 NA NA
SSUB MSUB DSUB	NA NA NA

IWHSA1

DEPTH	TOTAL PCBs
S M D	9 1.6 NA

IWHSA2

DEPTH	TOTAL PCBs
S M D	1.9 NA NA

IWVSA1

DEPTH	TOTAL PCBs
D1 D2 D3	1.5 0.82 0.37

IWHSA3

DEPTH	TOTAL PCBs
S M D	1.1 NA NA

IWVSA2

DEPTH	TOTAL PCBs
D1 D2 D3	NA 10 1.3

LEGEND:

┄	SUPPLEMENTAL SAMPLING AREA–HORIZONTAL EVALUATION
▩	SUPPLEMENTAL SAMPLING AREA–VERTICAL EVALUATION
●	SUPPLEMENTAL SAMPLING AREA WITH NEAR CHANNEL SUB-COMPOSITES
☐	ORIGINAL COMPOSITE SAMPLE BAND
☐	ORIGINAL COMPOSITE SAMPLE GRID
≈	LITTLE MISSISSINEWA RIVER
┄	VEGETATION
—•—	FENCE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

S= SHALLOW DEPTH SAMPLE 0–6"
M= MEDIUM DEPTH SAMPLE 6"–12"
D= DEEP DEPTH SAMPLE 12"=18"
D1= SAMPLE DEPTH 18"–24"
D2= SAMPLE DEPTH 24"–30"
D3= SAMPLE DEPTH 30"–36"

SSUB= 0–6" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

MSUB= 6"–12" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

DSUB= 12"–18" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB-SAMPLES THAT ABUTTED THE LMR CHANNEL

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DATE
03/27/02

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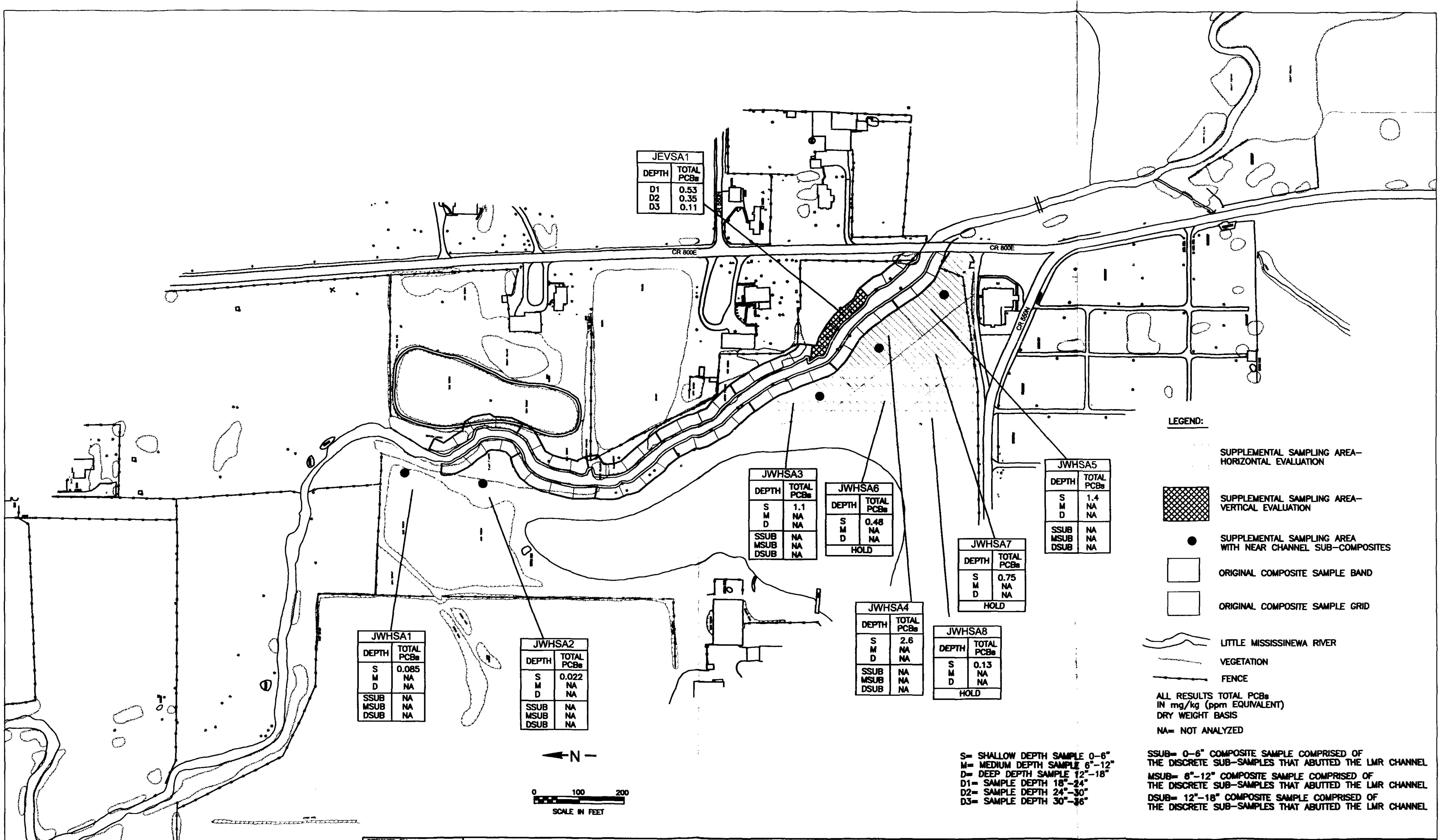
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA I SUPPLEMENTAL VERTICAL AND HORIZONTAL FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
SAMPLE-VERIFIED-REV1
DATE:
04/16/03

FIGURE
25



JEVSA1	
DEPTH	TOTAL PCBs
D1 D2 D3	0.53 0.35 0.11

JWHSA1	
DEPTH	TOTAL PCBs
S M D	0.085 NA NA
SSUB MSUB DSUB	NA NA NA

JWHSA2	
DEPTH	TOTAL PCBs
S M D	0.022 NA NA
SSUB MSUB DSUB	NA NA NA

JWHSA3	
DEPTH	TOTAL PCBs
S M D	1.1 NA NA
SSUB MSUB DSUB	NA NA NA

JWHSA6	
DEPTH	TOTAL PCBs
S M D	0.48 NA NA
HOLD	

JWHSA4	
DEPTH	TOTAL PCBs
S M D	2.6 NA NA
SSUB MSUB DSUB	NA NA NA

JWHSA8	
DEPTH	TOTAL PCBs
S M D	0.13 NA NA
HOLD	

JWHSA7	
DEPTH	TOTAL PCBs
S M D	0.75 NA NA
HOLD	

JWHSA5	
DEPTH	TOTAL PCBs
S M D	1.4 NA NA
SSUB MSUB DSUB	NA NA NA

LEGEND:

	SUPPLEMENTAL SAMPLING AREA– HORIZONTAL EVALUATION
▩	SUPPLEMENTAL SAMPLING AREA– VERTICAL EVALUATION
●	SUPPLEMENTAL SAMPLING AREA WITH NEAR CHANNEL SUB–COMPOSITES
☐	ORIGINAL COMPOSITE SAMPLE BAND
☐	ORIGINAL COMPOSITE SAMPLE GRID
	LITTLE MISSISSINEWA RIVER
	VEGETATION
	FENCE

ALL RESULTS TOTAL PCBs
IN mg/kg (ppm EQUIVALENT)
DRY WEIGHT BASIS

NA= NOT ANALYZED

S= SHALLOW DEPTH SAMPLE 0–6"
M= MEDIUM DEPTH SAMPLE 6"–12"
D= DEEP DEPTH SAMPLE 12"–18"
D1= SAMPLE DEPTH 18"–24"
D2= SAMPLE DEPTH 24"–30"
D3= SAMPLE DEPTH 30"–36"

SSUB= 0–6" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL

MSUB= 6"–12" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL

DSUB= 12"–18" COMPOSITE SAMPLE COMPRISED OF THE DISCRETE SUB–SAMPLES THAT ABUTTED THE LMR CHANNEL

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K. MITCHELL
APPROVED BY
B. BARQUEST
DATE
03/27/02

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LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA J SUPPLEMENTAL VERTICAL AND HORIZONTAL FLOODPLAIN SOIL SAMPLES– ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
03UN.10236.00.003
CAD FILE NUMBER:
SAMPLE–VERIFIED–REV1
DATE:
04/16/03

FIGURE
26

SOURCES:
USGS 7.5 MINUTE
TOPOGRAPHIC MAPS–
UNION CITY, IN AND
COSMOS, IN QUADRANGLE

LEGEND:

DAGW1-S ●	SAMPLING LOCATION
(0.021)	TOTAL PCBs IN mg/kg (ppm EQUIVALENT) DRY WEIGHT BASIS

0 1000 2000 3000
SCALE IN FEET

N

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4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 55110

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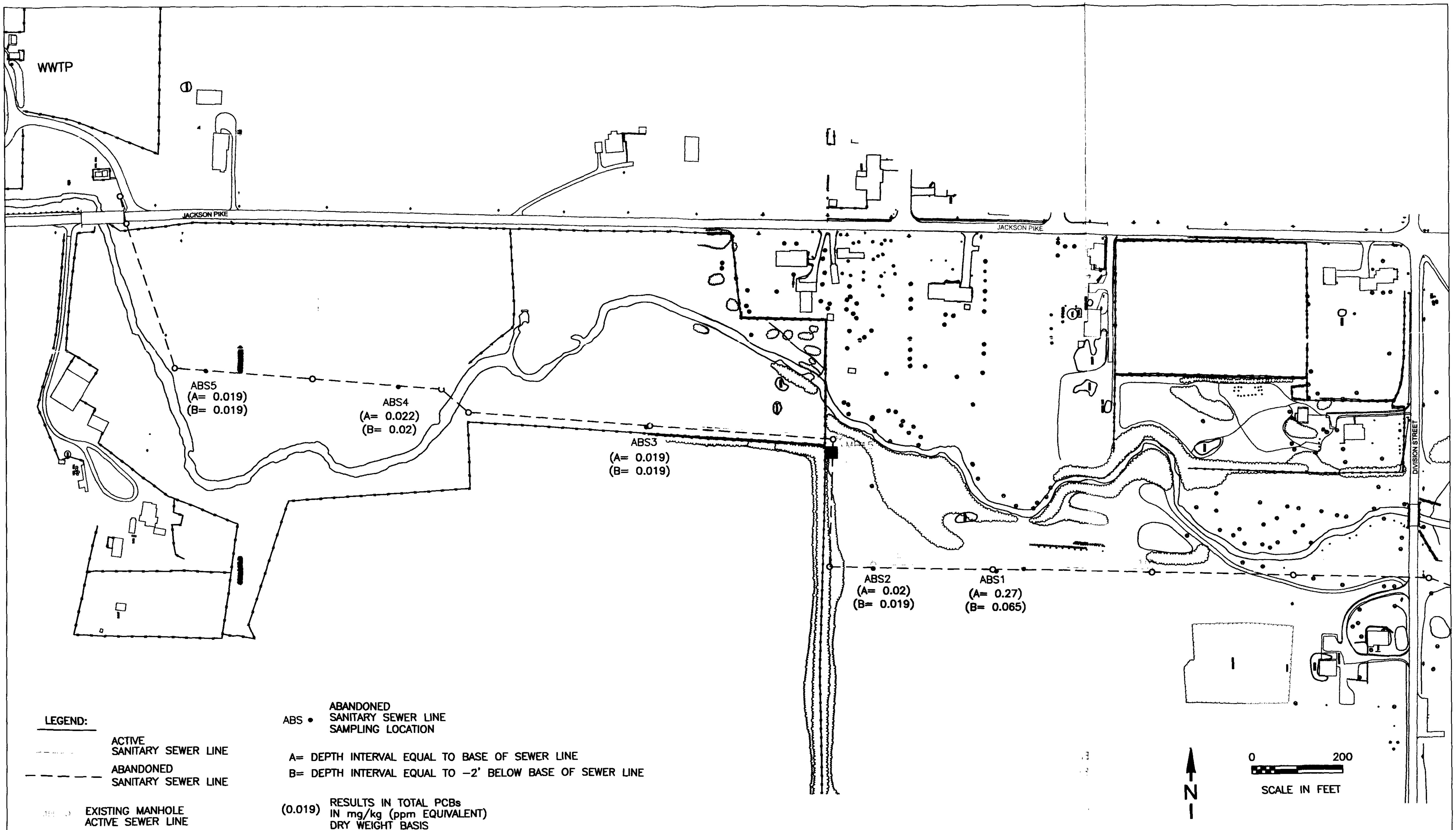
RANDOLPH COUNTY, INDIANA

RI AGRICULTURAL FLOODPLAIN
SOIL SAMPLES–
ANALYTICAL DATA SUMMARY

SECOR PROJECT #: 03UN.10236.00.002 | FILENAME: 30102-RS | DATE: 04/16/03

FIGURE
27



LEGEND:

- - -	ACTIVE SANITARY SEWER LINE
— — — —	ABANDONED SANITARY SEWER LINE
○	EXISTING MANHOLE ACTIVE SEWER LINE
■	ABANDONED SANITARY SEWER LINE INTERVAL SEDIMENT SAMPLING LOCATION
ABS ●	ABANDONED SANITARY SEWER LINE SAMPLING LOCATION

A= DEPTH INTERVAL EQUAL TO BASE OF SEWER LINE

B= DEPTH INTERVAL EQUAL TO −2' BELOW BASE OF SEWER LINE

(0.019)	RESULTS IN TOTAL PCBs IN mg/kg (ppm EQUIVALENT) DRY WEIGHT BASIS

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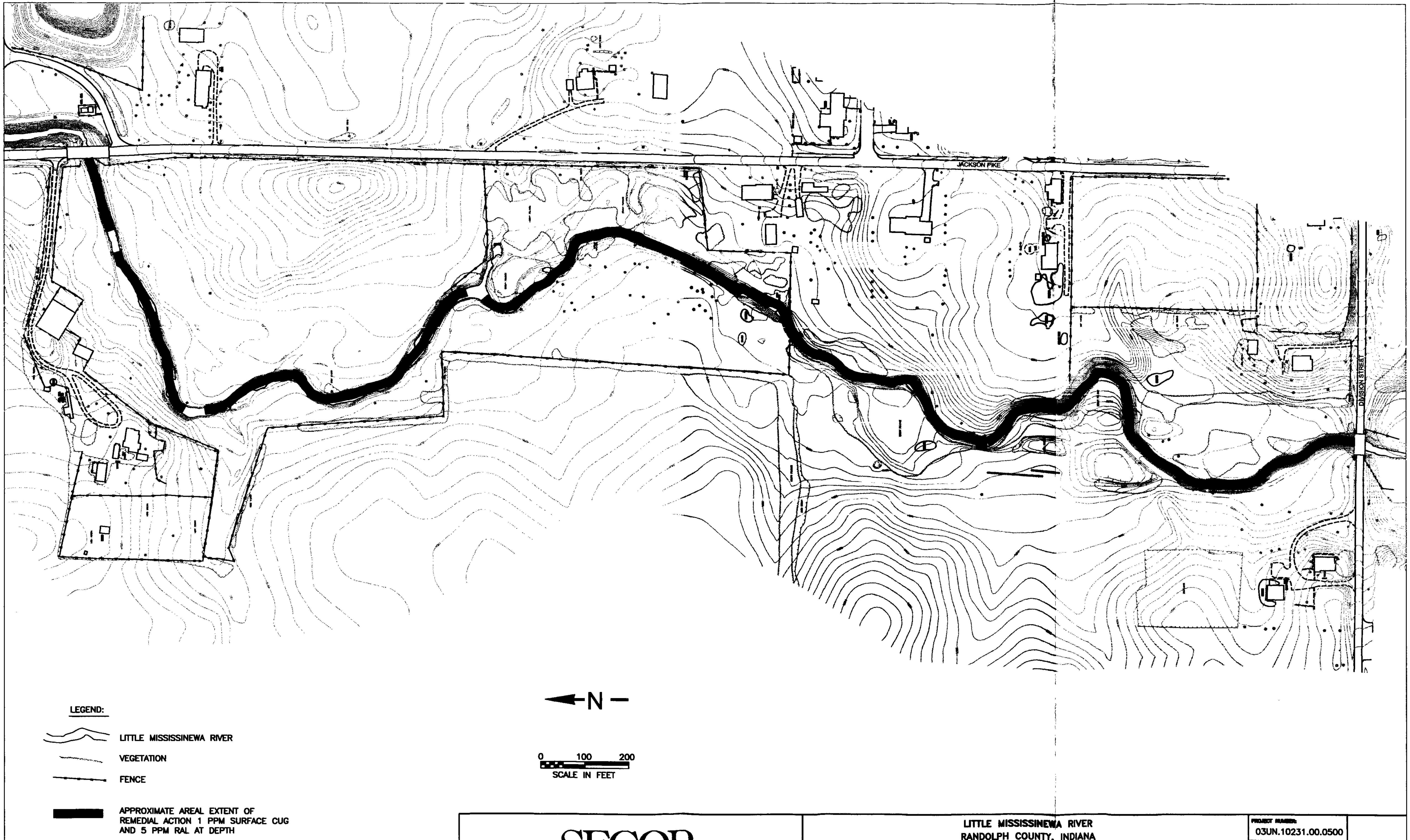
WHITE BEAR LAKE, MINNESOTA 55110

LITTLE MISSISSINEWA RIVER
UNION CITY, INDIANA

ABANDONED SANITARY SEWER LINE SAMPLES- ANALYTICAL DATA SUMMARY

PROJECT NUMBER:
030T.10231.00.0001
CAD FILE NUMBER:
FIGURE4.19
DATE:
04/16/03

FIGURE
28



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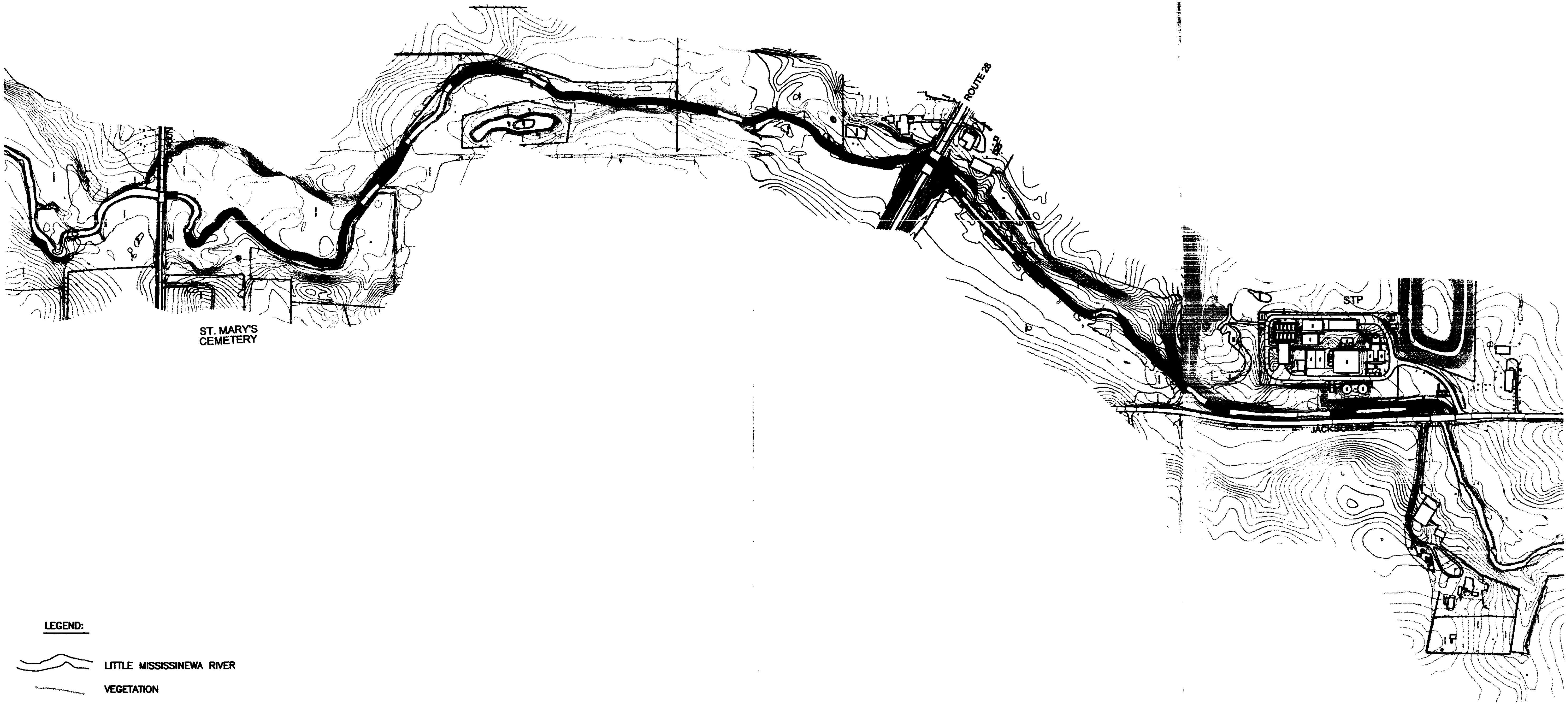
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA A– APPROXIMATE AREAL EXTENT OF REMEDIAL ACTION 1 PPM SURFACE CUG AND 5 PPM RAL AT DEPTH

PROJECT NUMBER: 03UN.10231.00.0500
CAD FILE NUMBER: FIGURE 5–52
DATE: 09/13/03

FIGURE
29



LEGEND:

LITTLE MISSISSINEWA RIVER

VEGETATION

FENCE

APPROXIMATE AREAL EXTENT OF REMEDIAL ACTION 1 PPM SURFACE CUG AND 5 PPM RAL AT DEPTH

←N —

0 200 400
SCALE IN FEET

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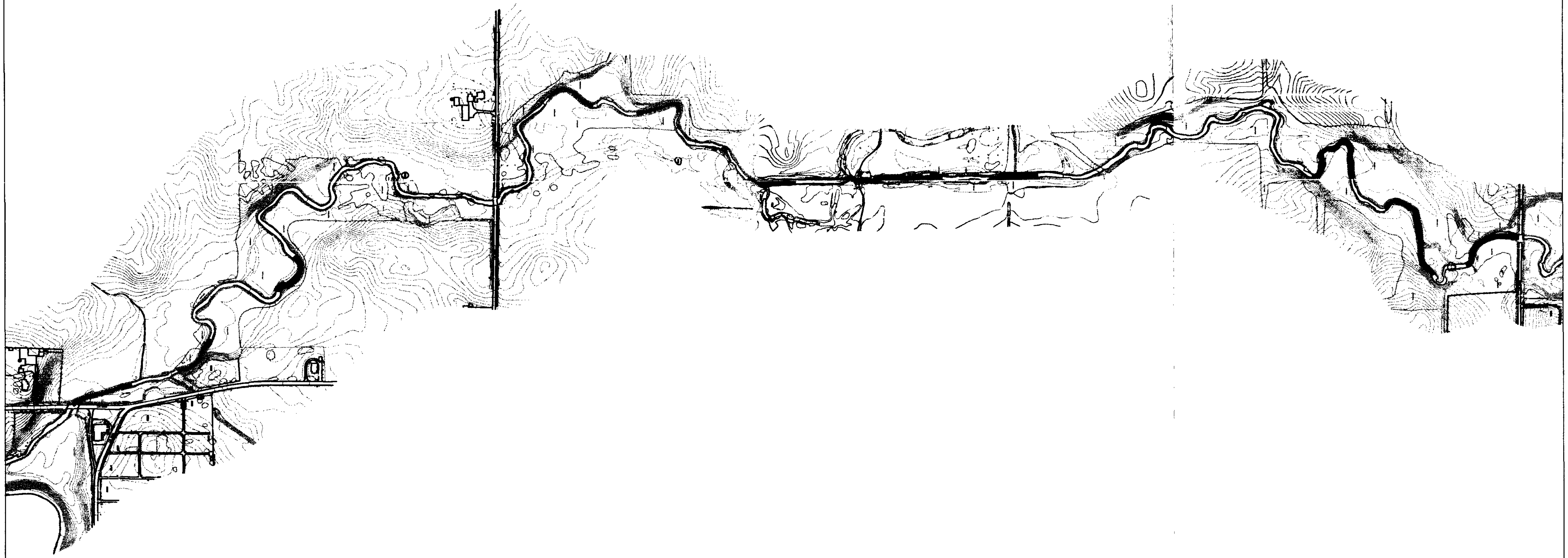
LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA B– APPROXIMATE AREAL EXTENT OF REMEDIAL ACTION 1 PPM SURFACE CUG AND 5 PPM RAL AT DEPTH

PROJECT NUMBER: 03UN.10231.00.0500
CAD FILE NUMBER: FIGURE 5–53A
DATE: 02/05/04

FIGURE 30



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LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

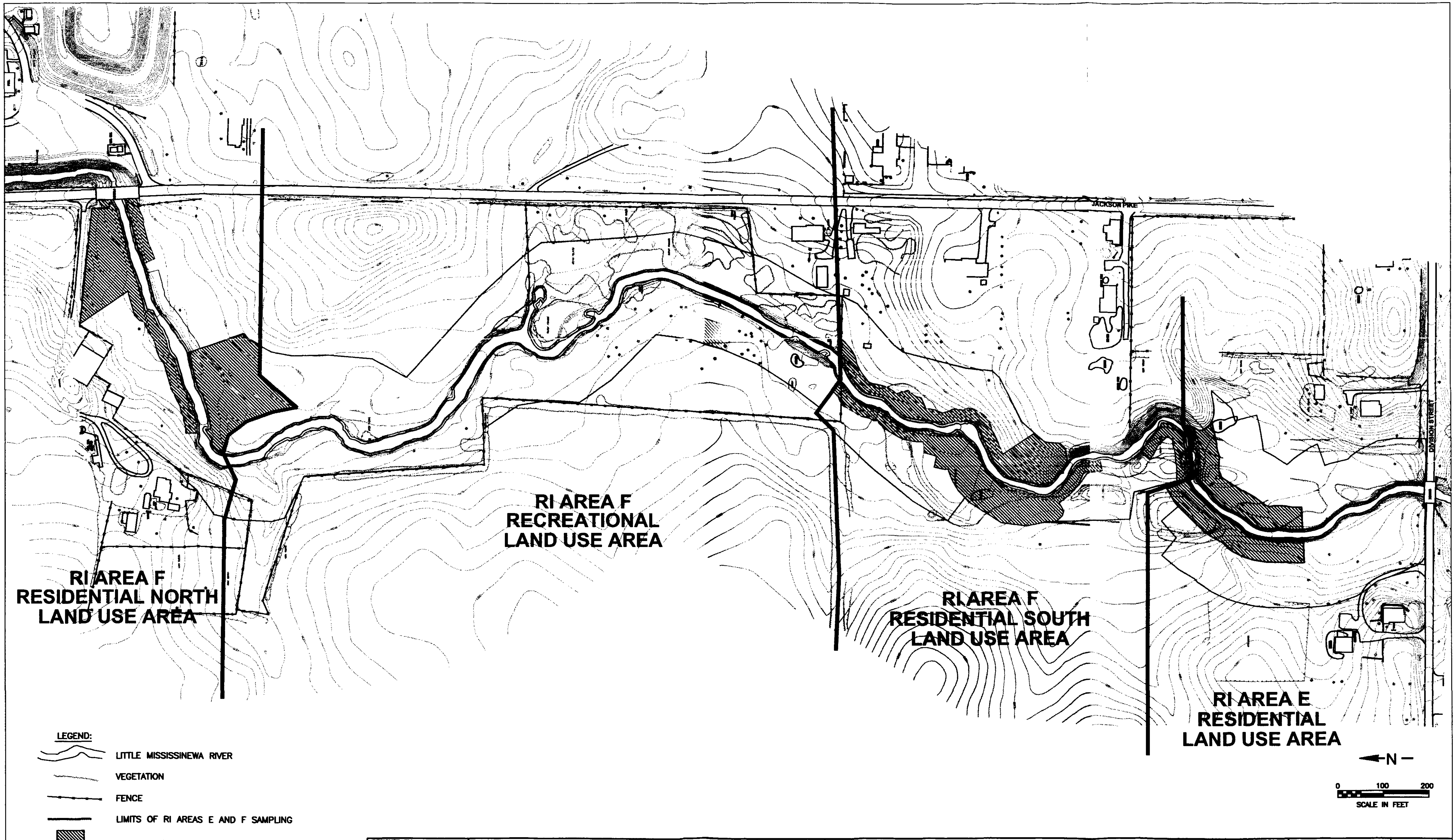
RI AREA C– APPROXIMATE AREAL EXTENT OF REMEDIAL ACTION 1 PPM SURFACE CUG AND 5 PPM RAL AT DEPTH

PROJECT NUMBER:
03UN.10231.00.0500

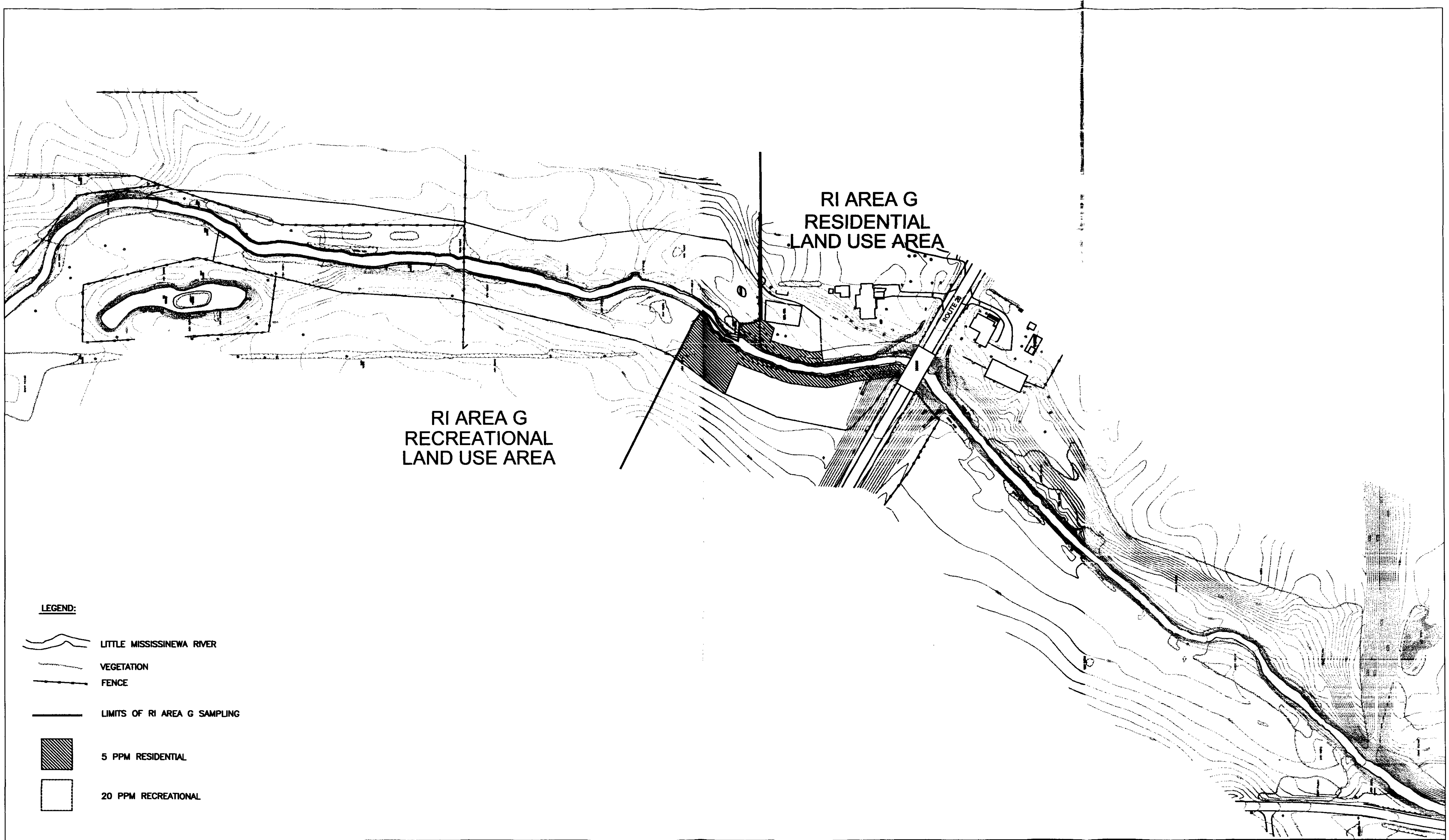
CAD FILE NUMBER:
FIGURE 5–54

DATE:
09/14/03

FIGURE
31



DESIGNED BY B. BARQUEST DRAWN BY K. MITCHELL APPROVED BY B. BARQUEST DATE 03/27/02	SECOR INTERNATIONAL INCORPORATED	LITTLE MISSISSINEWA RIVER RANDOLPH COUNTY, INDIANA RI AREAS E AND F– APPROXIMATE AREAL EXTENT OF 5 PPM RESIDENTIAL AND 20 PPM RECREATIONAL EXPOSURE AREA SOIL SOURCE REMOVAL	PROJECT NUMBER: 03UN.10239.00.003 CAD FILE NUMBER: AREAS(E–F) DATE: 06/24/04	FIGURE 32



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K. MITCHELL
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B. BARQUEST
DATE
03/27/02

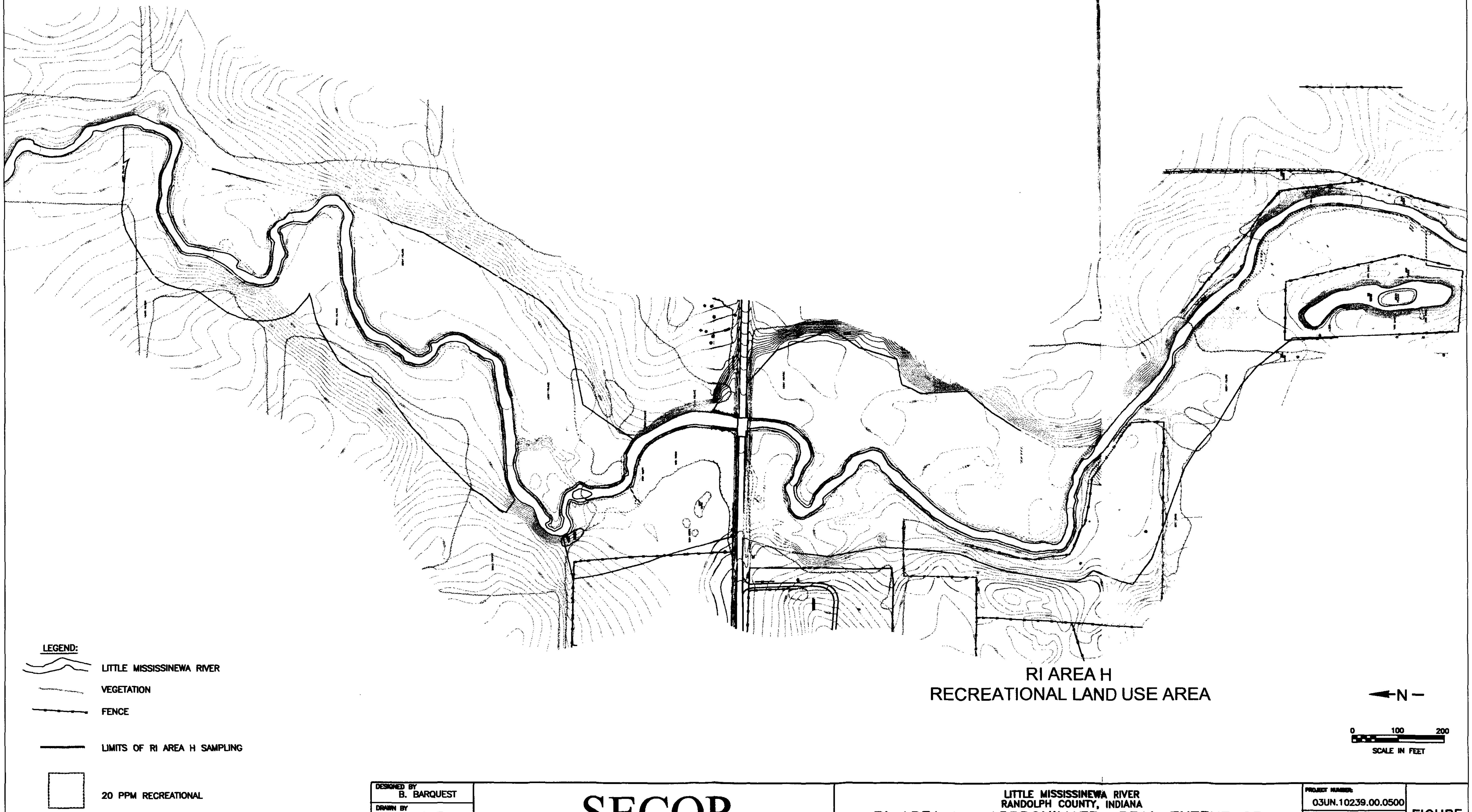
SECOR
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA G– APPROXIMATE AREAL EXTENT OF
5 PPM RESIDENTIAL AND 20 PPM RECREATIONAL
EXPOSURE AREA SOIL SOURCE REMOVAL

PROJECT NUMBER:
03UN.10239.00.003
CAD FILE NUMBER:
FIGURE 5-67
DATE:
02/05/04

FIGURE
33



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DRAWN BY	K. MITCHELL
APPROVED BY	B. BARQUEST
DATE	03/27/02

SECOR

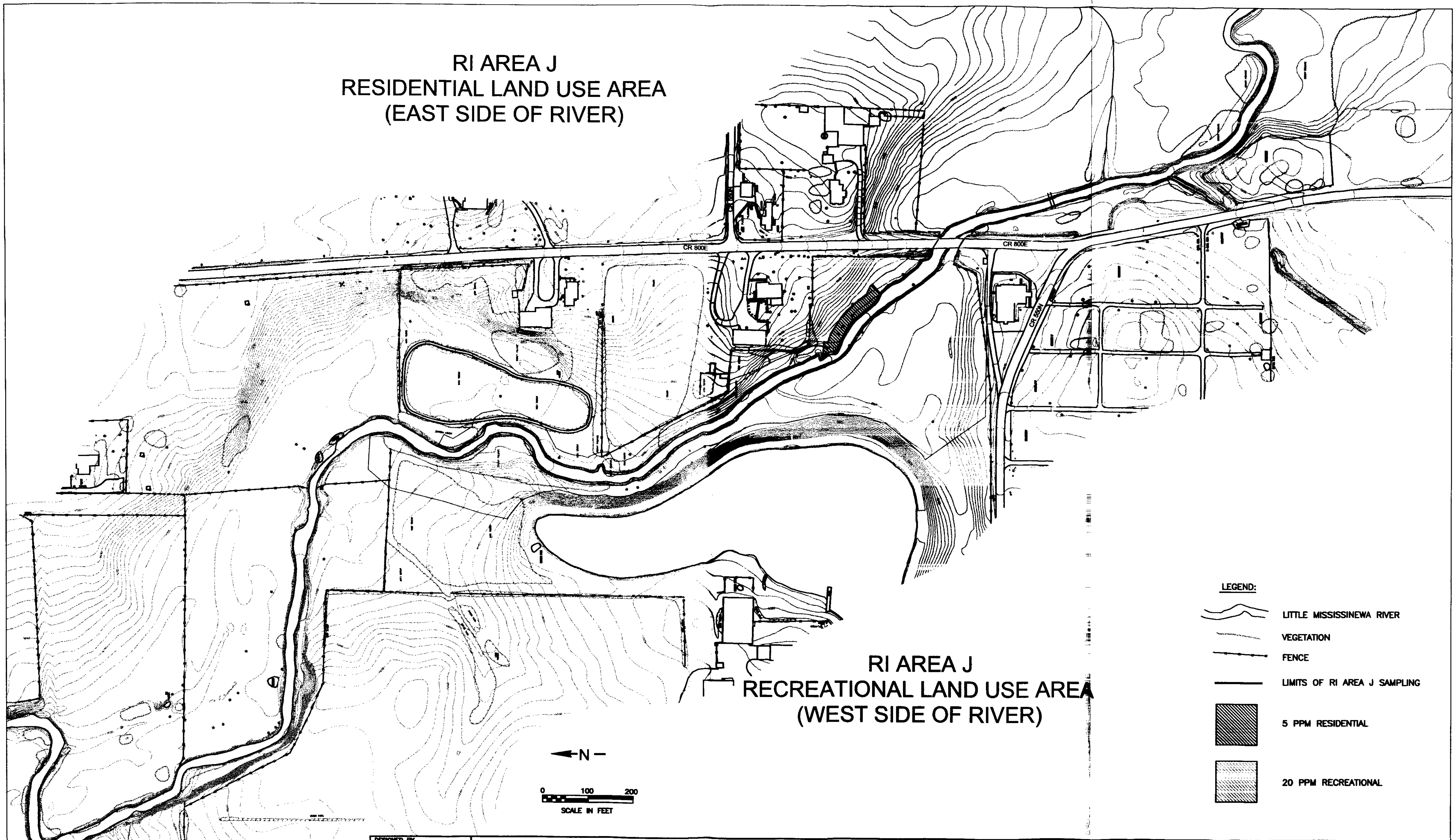
INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA H– APPROXIMATE AREAL EXTENT OF 20 PPM RECREATIONAL EXPOSURE AREA SOIL SOURCE REMOVAL

PROJECT NUMBER:	03UN.10239.00.0500
CAD FILE NUMBER:	FIGURE 5-68
DATE:	09/14/03

FIGURE
34



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B. BARQUEST

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K. MITCHELL

APPROVED BY
B. BARQUEST

DATE
03/27/02

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INTERNATIONAL INCORPORATED

LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

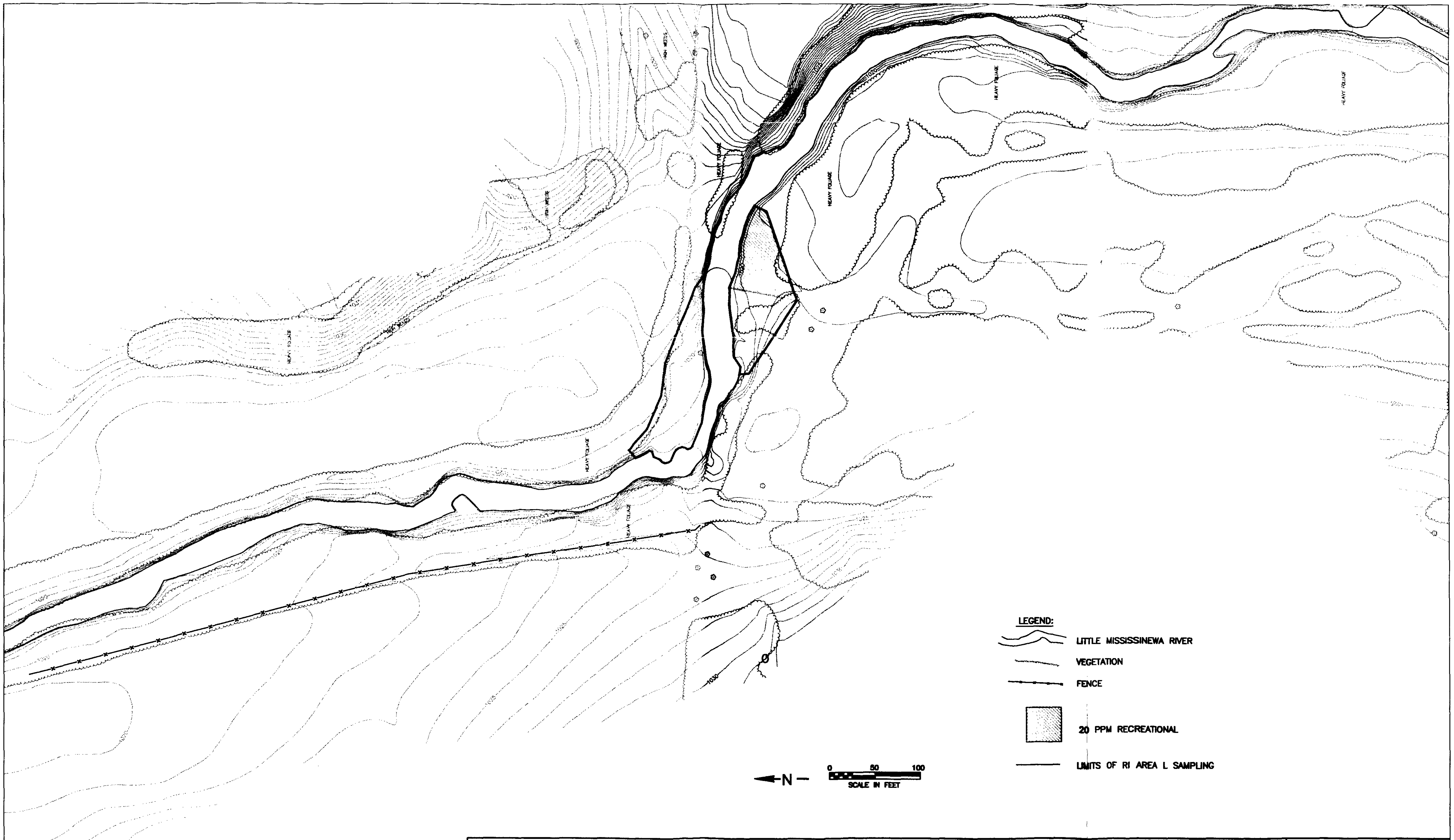
RI AREA J– APPROXIMATE AREAL EXTENT OF
5 PPM RESIDENTIAL AND 20 PPM RECREATIONAL
EXPOSURE AREA SOIL SOURCE REMOVAL

PROJECT NUMBER:
03UN.10236.00.003

CAD FILE NUMBER:
FIGURE 5-69

DATE:
09/14/03

FIGURE
35



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LITTLE MISSISSINEWA RIVER
RANDOLPH COUNTY, INDIANA

RI AREA L– APPROXIMATE AREAL EXTENT OF 20 PPM RECREATIONAL EXPOSURE AREA SOIL SOURCE REMOVAL

PROJECT NUMBER:
03UN.10236.00.003

CAD FILE NUMBER:
FIGURE 5-70

DATE:
04/28/03

FIGURE
36

APPENDIX A- RESPONSIVENESS SUMMARY

The public comment period for the Little Mississinewa River Site was held from April 6 to May 6, 2004. A public meeting was held at the New Lisbon Church on April 6, 2004. Approximately 30 persons were in attendance. The majority of the concerns expressed by the public were in regard to the scope of work to be performed on specific properties and property access.

Five written comments were received from the public during the public comment period. Two comments were from local residents, one was from the Randolph County Drainage Board, one was from the Indiana Department of Environmental Management (IDEM), and one was from the Potentially Responsible Parties (PRPs) for the Site. In addition, the Site Remedial Project Manager (RPM) performed a Site visit on May 21, 2004 to observe the specific concerns of two homeowners whose properties will be impacted by the cleanup activities outlined in this Record of Decision.

The comments will be answered separately. Two of the commenters had multiple comments, and these comments will be addressed last. The format for this Responsiveness Summary is to separate the comments by who made them, to restate the comments, and then provide EPA's response to the comments.

COMMENT #1: The commenter stated concern for erosion that occurs during flooding of the Little Mississinewa River (LMR) and asked for an EPA Site visit to discuss this concern.

EPA RESPONSE: The EPA RPM visited the subject property on May 21, 2004, and discussed the concerns the resident had with past and potential future property loss from erosion caused by the LMR during flood events. The resident had used crushed concrete to harden the river bank where the erosion was occurring, and this seemed to be an effective solution to the problem. The RPM assured the resident that erosion protection would be re-established during the restoration of the LMR after the PCBs were removed from the river and the flood plain areas on this property. This seemed to be a satisfactory solution to the concern, and this issue will be addressed during the Remedial Design (RD) for the LMR cleanup.

COMMENT #2: The commenter suggested that the LMR channel and contaminated flood plain areas be purchased and maintained as a wildlife habitat, at a greatly reduced cost compared to that of the preferred alternative.

EPA RESPONSE: EPA agrees that such an alternative would be much less costly than the preferred alternative from the Proposed Plan (Alternative 3f as modified by the provision of a recreational flood plain cleanup level of 20 ppm PCBs); however, this alternative is similar to the No Action alternative in that it would provide no removal or mitigation of the considerable PCB contamination in the LMR channel and flood plain areas. Since this suggested alternative would not be protective of human health and the environment, EPA could not select such an alternative. The concept of a wildlife habitat is interesting. EPA cannot dictate the future land uses of the LMR channel and flood plain areas, but the quality of the LMR and its ecosystem will be improved by implementing the selected remedy, and EPA supports beneficial reuse of sites cleaned up under the Superfund program.

COMMENT #3: The Randolph County Drainage Board submitted a comment that endorsed the removal of contaminated sediments from the channel of the LMR and stated that all tile drains in the LMR should be properly exposed and protected from damage or destruction (presumably during the remedial action).

EPA RESPONSE: EPA thanks the commenter for the support of the cleanup plan. EPA will work with the PRPs (if they perform the cleanup) or will instruct its contractor (if EPA performs the cleanup) to ensure that all tile drains in the portions of the LMR where excavation and removal of PCBs will be required are properly exposed and protected from damage or destruction. Additionally, EPA will consider, during the design of the remedy, the possibility of restoring the LMR channel in a way that minimizes the continued blockage of the tile drains in the portion of the LMR requiring cleanup. This is stated in the ROD.

COMMENT #4: The Indiana Department of Environmental Management (IDEM) submitted 3 comments to the Proposed Plan.

COMMENT 4a: The first comment stated that IDEM desires assurances that EPA will consider excavation of PCB-contaminated sediments and soils to depths that exceed the criteria outlined in the Proposed Plan (i.e. 3 feet for river channel sediments and 2 feet for open flood plain areas).

EPA RESPONSE: In the absence of additional sampling data, EPA cannot be specific about the areas of the LMR channel and flood plain where deeper excavation will enhance the remedy for the Site; however, EPA will take necessary steps to determine where such opportunities exist (i.e. areas where minimal additional excavation will result in achievement of RALs and a reduced reliance on institutional controls) during the remedial design. EPA will then use its discretion to determine when and where additional excavation, if any, will be implemented. This is stated in the ROD.

COMMENT 4b: IDEM indicated that the need for deed restrictions on residents' properties where PCB contamination that exceeds RALs is left in place must be clearly stated (in the ROD), since this was not clear in the Proposed Plan.

EPA RESPONSE: The ROD indicates that institutional controls are needed on properties where wastes are left in place above RALs.

COMMENT 4c: IDEM asked whether EPA would be amenable to allowing the backfilling of excavated areas of the river channel to depth levels that are lower than current levels, in order to address the concern stated by some residents at the public meeting that their tile drains are partially to fully covered by sediments. IDEM then asked if EPA supported reduced backfilling, then would that change the depths of excavation in such areas.

EPA RESPONSE: As stated in response to comment #3 above, EPA is willing to consider, where appropriate, the possibility of restoring the LMR channel in a way that minimizes the continued blockage of the tile drains in the portion of the LMR requiring cleanup. However, such consideration would neither extend the depth of excavation in the LMR channel nor apply to portions of the LMR where sediment removal is not required per the selected remedy.

COMMENT #5: Counsel for the PRPs submitted a letter containing 16 comments, with several supporting enclosures. EPA will answer the comments in the order that they appear in the letter.

COMMENT 5a: The first comment was not a comment, but rather a re-statement of the thoroughness of the RI conducted at the LMR Site.

EPA RESPONSE: EPA agrees that the remedy selection process was greatly enhanced by the thoroughness of the RI conducted by the PRPs.

COMMENT 5b: The second comment indicated support for EPA's proposed remedy for the final 3.5 miles of the LMR (from New Lisbon to the confluence with the Mississinewa River), which is monitored natural recovery (MNR).

EPA RESPONSE: EPA thanks the commenters for support of this portion of the Proposed Plan for the LMR Site.

COMMENT 5c: This comment stated that EPA should reserve the option, for River Area A and flood plain Area F, to allow selective re-routing, altering, or reshaping of the course of the LMR channel as an alternative remedial approach.

EPA RESPONSE: EPA recognizes the need for flexibility in implementing the remedy at the LMR Site, especially given that access agreements must be procured from multiple property owners, each of whom will have specific concerns with respect to the excavation and restoration of their property. EPA will need to look at specific homeowner requests on a case-by-case basis, at all times assuring that granting any such requests results in a cleanup that is, at a minimum, equally protective as that outlined in this ROD. For example, a resident may want additional fill material placed on their property after excavation is completed to help prevent future erosion and/or flooding of their property. To the extent that such a request is reasonable and provides a result that is at least as protective as the selected remedy, EPA could approve it as part of the remedial design. Flexibility is essential to the timely and successful completion of the remedy; however, EPA will not predetermine the acceptability of particular requests at this time but will rather review such requests on a case-by-case basis during access procurement and remedial design.

COMMENT 5d: The PRPs assert that statements made by residents at the April 6, 2004 public meeting, regarding silting in of tile drains, supports the PRPs' assertions that the scour potential in the LMR is minimal. An updated scour analysis (from the December 5, 2003 analysis sent to EPA) is provided in an enclosure to the comment letter. The conclusions of the updated scour analysis are that the scour potential of the LMR is minimal and that residual PCB concentrations in deep sediments associated with the implementation of Alternative 3h will not pose a threat to human health and the environment.

EPA RESPONSE: EPA reviewed the PRPs' updated scour analysis and believes that the conclusions in the March 18, 2004 EPA "LMR Channel Scour Potential" Memorandum are supportable.

First, one of the statements the PRPs make in support of their scour potential analysis is that "observed LMR flow rates are insufficient to result in measurable scouring of the LMR channel bed areas comprised of gravel and/or cobble sized materials". Whether or not this statement is true (EPA indicates in its March 18, 2004 memorandum that the 160-fold increase in flow that occurs during peak flow versus average flow, along with constrictions along the flow path, such as bridges, creates a high potential for channel scour), the PRP scour analysis fails to indicate what percentage of the LMR channel bed areas are comprised of gravel and/or cobble-sized material. EPA's observations and experience in sampling portions of the LMR channel indicate that there are significant portions of the LMR that are not comprised of gravel and/or cobble sized material. The scour potential in these portions of the LMR is even greater.

Second, the silting in of some tile drains, as stated by several residents at the April 6, 2004 public meeting, does not provide any real basis for predicting scour potential in the LMR. It is expected that portions of any river will be depositional areas, while other portions in the river will experience a "net loss" of sediment. An understanding of where the depositional and "net loss" areas occur in the LMR is important in designing the plan for post-excavation restoration of the LMR channel.

Last, EPA is aware from site visits as recently as May 21, 2004, that many residents have experienced significant erosion along portions of their properties, and some have taken actions to "harden" the river banks in these erosion-prone areas. This indicates the importance of not only protecting the current riverbed from future scour, but also the banks of the LMR. Recontamination of the river channel and flood plain areas can occur not only from scour of the existing channel, but also from erosion of flood plain areas where PCBs are left in place. This is a critical consideration that EPA will assess in the design of post-excavation restoration of the LMR channel.

COMMENT 5e: The PRPs state their support of EPA's proposed decision to extend application of the calculated risk-based cleanup goals to a 12-inch depth in the river channel (as opposed to a 6-inch depth) to ensure overall future protectiveness of the remedy.

EPA RESPONSE: EPA thanks the commenters for support of this decision.

COMMENT 5f: The PRPs state their agreement with EPA's proposed remedy for shallow river sediments (0-12 inch depth) and residential flood plain areas.

EPA RESPONSE: EPA thanks the commenters for this comment.

COMMENT 5g: The PRPs state that EPA's proposed RAL of 5 ppm PCBs for deep sediments (depths greater than 12 inches) is inappropriate, and that a higher RAL with appropriate river restoration is supportable.

EPA RESPONSE: The 5 ppm RAL for river sediments below a depth of 12 inches is appropriate for several reasons: 1) the 5 ppm RAL provides a much greater degree of certainty that significant recontamination of the river channel and the flood plain areas will not occur (which could lead to remedy failure and the need for additional work at additional cost and disruption to residents); 2) IDEM supports the 5 ppm RAL; and 3) to the extent that no one commented negatively on EPA's Proposed Plan, the local residents appear to support EPA's cleanup plan for deep sediments.

COMMENT 5h: The PRPs disagree with EPA's proposed RAL of 20 ppm for recreational flood plain areas and the ecological basis upon which EPA chose this RAL. The PRPs assert that the 30 ppm RAL they prefer (based on a 5 ppm CUG) is as protective as the 20 ppm RAL proposed by USEPA (based on a 4 ppm CUG) because either approach will result in protection of 94 % of robin fledgling areas.

EPA RESPONSE: Ecologically-based CUGs for the recreational flood plain areas are taken from an assessment of the risks of flood plain PCBs to robins at the Sheybogan River and Harbor Superfund site in Wisconsin. Three sets of CUGs were reported, one based on total PCBs, and the remainder based on two congener-specific approaches. The PRPs and EPA separately calculated RALs for LMR based on the Sheboygan CUGs and LMR PCB data for the recreational flood plain areas. The EPA LOAEL-based RALs differ somewhat from those calculated by the PRPs for two reasons: the PRPs started with the highest of three LOAEL-based CUGs calculated through the three approaches, while the central value is used by the EPA consistent with the selection at the Sheboygan River and Harbor Superfund site, and the PRPs used a rounded value for the size of a robin fledgling-stage foraging area, but EPA used the unrounded value. When corrected for rounding errors and the true CUG used at Sheboygan, the 30 ppm RAL favored by the PRPs addresses less than two-thirds of the robin fledgling areas currently at risk, which results in overall protection of 91 % of the total potential robin fledgling areas in the recreational flood plain area. A 20 ppm RAL addresses over three-fourths of the areas currently at risk, for an overall protection of 94 % of the total potential robin fledgling areas. Protection of all of the robin fledgling areas currently at risk would require a RAL of 10 ppm, however, this option was not selected due to the analysis of the nine criteria used for evaluation of remedial alternatives.

COMMENT 5i: The PRPs indicate that EPA's Proposed Plan should be modified to provide greater flexibility in how the final RALs are achieved in surface soils (1-12 inch zone) throughout the Site. They cite two examples where covering/capping may be preferable to excavation- where swales exist and where excavation to a 1- or 2- foot depth may damage existing trees.

EPA RESPONSE: EPA does not agree that altering a selected excavation remedy to a capping remedy is appropriate or allowable under the guise of EPA discretion; however, EPA will consider specific resident concerns in the process of procuring access, and EPA has clarified in the ROD that the maximum excavation depth in heavily wooded areas is one foot. This is consistent with EPA's stated goal of preserving the trees in the flood plain areas. EPA also notes that raising the grade (soil surface) around trees, as in a capping remedy, is stressful and may result in tree mortality.

COMMENT 5j: The PRPs state that they agree with EPA that Alternatives 1 (No Action), 2 (capping), and 3b, c, d, and e are not appropriate for the Site.

EPA RESPONSE: Comment noted.

COMMENT 5k: The PRPS state that of the remaining alternatives (3 a, f, g, and h), they support remedy 3h. They provide several rationales, including that remedy 3h is the most NCP-compliant approach and best comports with EPA's guiding principles for managing contaminated sediment risks at hazardous waste sites; creates less risk of habitat destruction, will take less time to implement; and the fact that residents did not raise any concerns about the proposed cleanup goals (CUGs) and remedial action levels for the Site at the April 6, 2004 public meeting.

EPA RESPONSE: EPA agrees that Alternative 3h will take less time to implement than the preferred alternative (3f); however, this difference may not be significant since Alternative 3f is estimated to take 3 years to implement, while Alternative 3h will likely take 2 to 2 ½ years. EPA also agrees that Alternative 3h creates less risk of habitat destruction than the preferred alternative, although EPA believes that habitat destruction can be minimized and controlled under both alternatives. The net effect on the LMR habitat would be positive for both alternatives, but greater for Alternative 3f. EPA disagrees that because residents did not raise concerns at the public meeting about CUGs and RALs for the preferred alternative, they are not concerned about the CUGs and RALs selected for the Site. It is difficult to gauge the public reaction to Alternative 3h because it was not recommended by EPA in the Proposed Plan, but in most cases where contamination is left in place, residents prefer alternatives that minimize the amount of contamination left in place and thus the degree to which land use restrictions will be placed on their properties. This would clearly favor Alternative 3f, which removes a considerable amount of additional PCB-contaminated soils and sediments as compared to Alternative 3h. Moreover, the absence of public comment on CUGs and RALs is more likely an indication of public acceptance of the preferred alternative. EPA also disagrees with the PRPs' assertion that Alternative 3h is the most NCP-compliant. As stated in the Comparative Analysis of Alternatives (Section 8.3 of the ROD), Alternative 3h would 1) provide marginal overall protectiveness of human health and the environment; 2) not provide certainty of long-term effectiveness and permanence; 3) not be accepted by the State agency (IDEM), whose public comment requested greater removal of PCBs in certain areas of the LMR and its flood plain than provided by Alternative 3f; and 4) probably be less favorable to the local community.

Alternative 3h does not achieve EPA's RAL for recreational flood plain areas (3f RAL is 20 ppm; 3h RAL is 30 ppm) based on a qualitative risk assessment by EPA's ecologist, nor does it provide certainty that the frequent and significant flooding of the LMR will not recontaminate the LMR channel and flood plain areas with higher PCB levels left in place (20 ppm for 3h; 5 ppm for 3f). Alternative 3h applies RALs that are significantly less conservative than the removal action these same PRPs conducted in 2001-2002, and would allow less flexibility for river channel restoration, such as addressing the concerns of some community members and the Randolph County Drainage Board regarding the silting-in of tile drains. For example, leaving 20 ppm PCBs at a depth of 12 inches and then backfilling only 6 inches to address the tile drain concerns (in essence, lowering the current river channel 6 inches to leave the tile drains fully exposed and functional) would leave only a six-inch backfill layer over sediments with PCB concentrations up to 20 ppm.

The PRPs argument regarding Alternative 3h best comporting with EPA sediment guiding principles is not relevant since the real bar for remedy selection is the nine criteria analysis required by the NCP. EPA successfully conducted a Tier 1 sediment consultation (based on the sediment guiding principles) for the preferred alternative, but

EPA believes that Alternative 3f provides the best balance among the nine criteria, and that is the primary basis for Alternative 3f being the selected remedy for the LMR Site.

COMMENT 5L: The PRPs indicate support for the use of geotextile membranes and/or other engineering controls in the event that RALs are not achieved due to the application of excavation depth limitations (e.g. one foot for heavily wooded flood plain areas).

EPA RESPONSE: EPA agrees with this comment. This provision was outlined in the preferred alternative and is part of the selected remedy.

COMMENT 5m: The PRPs want EPA to state that, if the land use of a particular property changes prior to implementation of the remedy (example provided was converting a residential property to recreational), that the cleanup action taken at such a property would be in accordance with the new land use.

EPA RESPONSE: EPA agrees that the cleanup action taken at a given property will be in accordance with the land use (residential or recreational) at the time the cleanup occurs.

COMMENT 5n: The PRPs state that the existing land use controls, coupled with post-remedial operation and maintenance procedures, would be sufficient to ensure the long-term permanence and effectiveness of the remedy selected and implemented.

EPA RESPONSE: EPA cannot agree with or dispute this comment until it gains a full understanding of the nature of the existing land use controls and the extent to which they are and will be enforced. EPA will not rule out the possibility that additional land use controls may be needed; this will be decided during the RD/RA process.

COMMENT 5o: The PRPs indicate that EPA should eliminate the confusion that may arise because EPA's preferred alternative was FS Alternative 3f, with a modified RAL for the recreational flood plain areas.

EPA RESPONSE: EPA agrees with this comment. This is clarified in the ROD.

COMMENT 5p: The PRPs indicate that the title description of some of the alternatives in the Proposed Plan is confusing because CUGs and RALs are used in the same sentence without drawing a clear distinction between them.

EPA RESPONSE: EPA agrees with this comment. This is clarified in the ROD.

APPENDIX B- ADMINISTRATIVE RECORD INDEX

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE MISSISSINEWA SITE
UNION CITY, RANDOLPH COUNTY, INDIANA

MARCH 16, 2001

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	11/17/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Little Mississinewa River Site	111
2	03/22/01	Simes, W., U.S. EPA	Muno, W., U.S. EPA	Enforcement Action Memorandum: Determination of Need to Conduct a Time-Critical Removal Action at the Little Mississinewa Site	14

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE MISSISSINEWA RIVER SITE
UNION CITY, RANDOLPH COUNTY, INDIANA

ORIGINAL
FEBRUARY 28, 2002

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	08/27/86	Anderson, K., A.O. Smith Electrical Products Company	Holmes, L., IDEM	Letter re: Preliminary Report Describing the Polychlorinated Biphenyl Evaluation and Remediation at the A.O. Smith Electrical Products Company	18
2	10/16/87	Roberts, T., Process Engineering Group, Inc.	Peterson, B. *Ice, Miller, Donadio and Ryan*	Letter re: Environmental Issues at the Westinghouse Facility in Union City	7
3	08/28/91	Wood, A., Westinghouse Electric Corporation	Schwartzel, F., Frank Miller Lumber Company	Agreement for Sale re: WEC's Property in Union City	34
4	12/02/91	IDEM	U.S. EPA	Screening Site Inspection Report for A.O. Smith Motor Company (Westinghouse)	250
5	06/22/94	Anselment, K., A.O. Smith Corporation	Schwebke, P., U.S. EPA	Letter re: A.O. Smith's Response to U.S. EPA's May 19,1994 Information Request for the Former Westinghouse Plant in Union City	3
6	06/28/94	McHugh, L., *Barnes & Thornsburg*	Schwebke, P., U.S. EPA	Letter re: J.& M. Mathias' Response to U.S. EPA's May 19, 1994 Information Request for the Former Westinghouse Plant in Union City	13
7	07/22/94	Anselment K., A.O. Smith Corporation	Schwebke, P., U.S. EPA	Fax Transmission re: A.O. Smith's Supplemental Response to U.S. EPA's May 19, 1994 Information Request for the Former Westinghouse Plant in Union City	8

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
8	08/01/94	Serlin, L., Rollins Environmental Services, Inc.	Schwebke, P., U.S. EPA	Letter re: RES' Response to U.S. EPA's May 19, 1994 Information Request for the Former Westinghouse Plant in Union City	8
9	02/06/96	IDEM	U.S. EPA	Expanded Site Inspection Report for A.O. Smith (Westinghouse) in Union City	200
10	06/09/97	IDEM	U.S. EPA	Integrated Assessment Report (SI Equivalent)for the Sheller Globe Facility (aka: United Technology Automotive) in Union City	200
11	06/23/98	IDEM	File	Expanded Site Inspection Report Addendum for A.O. Smith (Westinghouse) in Union City	300
12	10/21/99	Secor International Incorporated	IDEM	Engineering Evaluation/ Cost Analysis (EE/CA) for the Little Mississinewa River Site	100
13	11/17/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Little Mississinewa River Site	111
14	03/22/01	Muno, W., U.S. EPA	Gutman, M., *Babst, Calland, Clements & Zomnir*	Administrative Order by Consent re: the Little Mississinewa River Site w/ Cover Letter	25
15	07/17/01	Secor International Incorporated	U.S. EPA	Removal Action Work Plan for the Little Mississinewa River Site	500
16	07/26/01	Secor International Incorporated	U.S. EPA	Work Plan for the Little Mississinewa River Removal Action Investigation Area	200
17	10/23/01	IDEM	File	Aerial Map re: PCB Sample Results for the Little Mississinewa River Site	3

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE MISSISSINEWA RIVER SITE
UNION CITY, RANDOLPH COUNTY, INDIANA

UPDATE #1
MARCH 30, 2004

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	01/10/02	Davis, S., IDEM	Distribution List	E-Mail Transmission re: Fish Samples from the Little Mississinewa River Site	1
2	05/14/02	Muno, W., U.S. EPA	Respondents	Administrative Order on Consent for the RI/FS at the Little Mississinewa River Site w/Attachments and Cover Letter	62
3	07/05/02	Schrowe, L., IDEM	Union City Resident	Letter re: PCB Results of Sediment Samples from the Little Mississinewa River	3
4	07/16/02	Atkinson, H., IDEM	Nachowicz, L., U.S. EPA	Letter re: Sediment Sample Results from the Little Mississinewa River w/ Attachment	3
5	07/26/02	Bradley, B., U.S. EPA	Riddle, S., IDEM	Letter re: U.S. EPA's Responses to IDEM's Comments to the RI/FS Work Plan for the Little Mississinewa Site	6
6	07/30/02	Nachowicz, L., U.S. EPA	Atkinson, H., IDEM	Letter re: IDEM's Request to Continue a Time-Critical Removal Action at the Little Mississinewa River Site	2
7	08/05/02	Barquest, B., Secor International, Inc.	Bradley, B., U.S. EPA	Letter re: Formal Notification of the Start of Remedial Investigation Field Activities at the Little Mississinewa River Site	1
8	10/01/02	SECOR International, Inc.	U.S. EPA	Final Work Plan for the RI/FS for the Little Mississinewa River Site w/ Revised QAPP and Cover Letter	1147
9	11/18/02	Barquest, B., SECOR International, Inc.	Bradley, B., U.S. EPA	Letter re: Revised RI/FS Schedule and Additional Sampling at the Little Little Mississinewa River Site	6

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
10	12/04/02	Barquest, B., SECOR International, Inc.	Bradley, B., U.S. EPA	Letter Report re: Supplemental Remedial Investigation Floodplain Sampling Activities at the Little Mississinewa River Site w/Attachments	10
11	12/04/02	SECOR International, Inc.	U.S. EPA	Diagrams re: Excavation Depths and PCB Concentra-ions at the Little Mississinewa River Site	9
12	12/09/02	Bradley, B., U.S. EPA	Barquest, B., SECOR International, Inc.	Letter re: U.S. EPA's Approval of the Revised RI/FS Schedule and Additional Sampling at the Little Mississinewa River Site	1
13	07/17/03	Bradley, B., U.S. EPA	Lenkensdofer, D., Randolph County Commissioner	Letter re: 08/25/03 Remedy Review Board Meeting for the Little Mississinewa River Site	1
14	07/28/03	Bradley, B., U.S. EPA	Addressees	Letters re: 08/25/03 Remedy Review Board Meeting for the Little Mississinewa River Site	3
15	08/18/03	Palin, B., IDEM	Bradley, B., U.S. EPA	Letter re: Review of Proposed Remedy at the Little Mississinewa River Site	1
16	09/03/03	Barquest, B., SECOR International, Inc.	Bradley, B., U.S. EPA	Letter re: Request for a Submittal Extension for the Revised RI/FS/BRA Reports for the Little Mississinewa River Site	1
17	09/04/03	Bradley, B., U.S. EPA	Barquest, B., SECOR International, Inc.	Letter re: U.S. EPA's Approval of a Submittal Extension for the Revised RI/FS/BRA for the Little Mississinewa River Site	1
18	09/15/03	Riddle, S., IDEM	Bradley, B., U.S. EPA	Letter re: U.S. EPA's Review Board Comments on the Little Mississinewa River Site Remedy	2
19	09/23/03	Riddle, S., IDEM	Bradley, B., U.S. EPA	Facsimile Transmission re: Surface Water Sampling at Little Mississinewa River Site	6

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
20	09/24/03	Barquest, B., SECOR International, Inc.	Bradley, B., U.S. EPA	Submittal of Respondent Responses to U.S. EPA Comments to the RI/FS/BRA for the Little Mississinewa River Site	35
21	10/08/03	Griffith, J., U.S. EPA	Muno, W., U.S. EPA	Memorandum re: National Remedy Review Board Recommendations on the Proposed Cleanup Action at the Little Mississinewa River Site	4
22	12/05/03	Barquest, B., SECOR International, Inc.	Bradley, B., U.S. EPA	Evaluation Summary of the Little Mississinewa River Channel Scour Potential and its Association with the Little Mississinewa River Site	5
23	12/05/03	SECOR International, Inc.	U.S. EPA	Tables re: the Little Mississinewa River Channel Sediment and Estimated PCB Mass	3
24	12/11/03	Riddle, S., IDEM	Bradley, B., U.S. EPA	Letter re: Potential ARARs for the Little Mississinewa River Site	2
25	01/13/04	Bowers, T., Gradient Corporation	Bradley, B., U.S. EPA	Memorandum re: Summary of PCB Concentrations in the Robin Foraging Areas of the Little Mississinewa River Floodplain	7
26	01/30/04	Gradient Corporation	U.S. EPA	Baseline Risk Assessments Little Mississinewa River, Randolph County, Indiana (Revision 2) Floodplain Risk Assessment and Sediment Risk Assessment	308
27	02/00/04	U.S. EPA	Public	Fact Sheet: EPA Proposes Cleanup Plan for PCB Contamination at the Little Mississinewa River Site	8
28	02/00/04	U.S. EPA	Public	Public Notice: Meeting/Comment Period for the Little Mississinewa River Site to be Re-scheduled	1
29	02/02/04	SECOR International Incorporated	U.S. EPA	Remedial Investigation Report (Final) for the Little Mississinewa River Site	207

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
30	02/02/04	SECOR International, Incorporated	U.S. EPA	Feasibility Study Report (Final) for the Little Mississinewa River Site	447
31	02/05/04	Chapman, J. U.S. EPA	Bradley, B., U.S. EPA	Memorandum re: Terrestrial Ecological Risk Addendum To the Baseline Risk Assessments for the Little Mississinewa River Floodplain	34
32	03/26/04	Karl, R., U.S. EPA	Griffith, J., U.S. EPA	Memorandum re: Region 5's Responses to the National Remedy Review Board's Recommendations for the Proposed Cleanup Action at the Little Mississinewa River Site w/Attachments	58
33	00/00/00	U.S. EPA	File	Tier 1 Sediment Consultation for the Little Mississinewa River Site w/ Attachments	50

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE MISSISSINEWA RIVER SITE
UNION CITY, RANDOLPH COUNTY, INDIANA

UPDATE #2
JUNE 29, 2004

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	02/19/04	Union City Resident	U.S. EPA	EPA Comment Sheet re: Recommended Cleanup Option for the Little Mississinewa River Site	2
2	04/06/04	U.S. EPA	Public	Transcript of Proceedings of the April 6, 2004 Public Meeting for the Little Mississinewa River Site Proposed Plan	92
2	04/12/04	Union City Resident	U.S. EPA	EPA Comment Sheet re: Recommended Cleanup Option for the Little Mississinewa River Site	2
3	05/03/04	Randolph County Drainage Board	Bradley, B., U. S. EPA	Letter re: Endorsement of Removal of Contaminated Sediment from the Little Mississinewa River Channel W/Attachment	3
4	05/05/04	Nunn, D., M. Gutman, *Eastman & Smith LTD.*	Bradley, B., J. Munoz, U.S. EPA	Comments on U.S. EPA's Proposed Plan for the Little Mississinewa River Site w/Attachments	99
5	05/06/04	Riddle, S., IDEM	Bradley, B., U.S. EPA	Letter re: Comments to the Proposed Plan for the Little Mississinewa River Site	3

APPENDIX C- STATE NONCONCURRENCE LETTER

IDEM

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We make Indiana a cleaner, healthier place to live.

Joseph E. Kernan
Governor

Lori F. Kaplan
Commissioner

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July 13, 2004

Mr. Brad Bradley
USEPA
Mail Code SR 6J
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Re: Record of Decision for the Little
Mississinewa River (LMR) Sediment Site
Union City, IN

Dear Mr. Bradley:

Staff of the Indiana Department of Environmental Management (IDEM) have reviewed the Record of Decision (ROD) for the polychlorinated biphenyl (PCB) cleanup of the LMR and surrounding floodplains. Our previous comments on the Proposed Plan have been addressed in the Responsiveness Summary of the ROD, and there is only one remaining issue.

As you are aware, one of the issues that has arisen is whether Indiana's water quality criteria for PCBs should be considered applicable or relevant and appropriate requirements (ARARs) that have to be achieved after the remediation is completed. EPA has proposed in the ROD to list the PCB water quality criteria only as ARARs for any water that is generated from the remedial activities (such as dewatering of excavated soils and sediments) that is ultimately discharged back to the LMR (ROD, sec. 10.2.1, p. 51). Regarding application to the LMR after the remedial activities are completed, EPA has stated its belief that water quality standards are not ARARs and therefore not a threshold criterion for selection of an alternative for the site.

It is IDEM's determination that Indiana's water quality criteria are ARARs and need to be met after the remediation is completed in addition to applying to any point source discharges that occur during the remediation activity. Under Indiana law, the state's water quality standards apply to all waters at all times, regardless of whether a point source discharge is occurring. Indiana's PCB water quality criteria do not have a more stringent federal counterpart; were properly promulgated by the Indiana Water Pollution Control Board; are of general applicability; and are legally enforceable under Title 13 of the Indiana Code. Therefore, the PCB water quality criteria should be considered ARARs at all times.

While EPA is correct in stating that Indiana does not have regulations that specify how to determine sediment quality criteria, this does not preclude the state's water quality standards from applying after a sediment remediation is completed. In addition, IDEM has not requested specific sediment quality criteria in this case; even if IDEM had, EPA does not have regulations specifying that risk-based cleanup numbers should be used in lieu of sediment quality criteria derived from water quality standards using equilibrium partitioning or any other method (nor could IDEM find support for this in EPA's 1990 Superfund PCB guidance).

Because of IDEM's position on the state's WQC, concurrence on the ROD is not possible. IDEM requests that the state's PCB water quality criteria be considered ARARs after the remediation is completed as well as during the remediation. IDEM believes it would be more appropriate for EPA to pursue a waiver under 42 USC § 9621(d)(4), if EPA believes grounds for invoking one of the waivers exists, than simply concluding that water quality criteria are not ARARs. If you have any questions, please call me at (317) 233-6591 or Stephanie Riddle at (317) 234-0358. Legal questions and concerns can be directed to Barb Lollar at (317) 233-5942.

Sincerely,

Bruce H Palin

Bruce H Palin
Deputy Assistant Commissioner
Office of Land Quality

BHP:BL:SR:tr
cc: Rex Osborn, IDEM
Bruce Oertel, IDEM
Barb Lollar, IDEM