SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT
COPLEY SQUARE PLAZA SUPERFUND SITE
COPLEY TOWNSHIP, SUMMIT COUNTY, OHIO

REVISION 2

WORK ASSIGNMENT NO. 243-RICO-05XW

28 November 2006

Prepared for

U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

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INTRODUCTION

This document presents the Screening-Level Ecological Risk Assessment (SLERA) for the Copley Square Plaza site (the Site) in Copley Township, Summit County, Ohio. For the purposes of this report, the term "Copley Square Plaza Property" refers to the specific physical addresses between 2777 and 2799 Copley Road. Additionally, the term "Copley Site" refers to the overall extent of contamination. Weston Solutions, Inc., (WESTON$_{®}$) conducted the remedial investigation at the Copley Site for the United States Environmental Protection Agency (U.S. EPA) in February and March 2006. The SLERA was conducted to evaluate the potential effects of chemical constituents of potential ecological concern (COPEC) on ecological receptors inhabiting the 0.5 acre site and adjacent areas.

U.S. EPA (1996b) defines a SLERA as a preliminary risk assessment that can be conducted with limited site-specific data by defining assumptions for parameters that lack site-specific data. To ensure that sites which may pose an ecological risk are properly identified, values should be consistently biased in the direction of overestimating risk. Without this bias, a screening evaluation could not provide a defensible conclusion for an absence of ecological risk. If the SLERA identifies significant ecological risks, then a baseline environmental risk assessment (BERA) may be prepared for the Site.

The SLERA was performed in accordance with current Superfund ecological risk assessment guidance (*Ecological Risk Assessment Guidance for Superfund [ERAGS], Process for Designing and Conducting Ecological Risk Assessments* [EPA/540-R-97-006] and the *Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments, ECO Update*, [EPA 540/F-01/014]). Additionally, the following guidance and databases were used as appropriate:

- *Framework for Ecological Risk Assessment.* U.S. EPA/63-R-92/001. May 1992.
- *Region 5 RCRA Corrective Action, Ecological Screening Levels.* http://www.epa.gov/Region5/rcraca/edql.htm. Region V, 2003.
- Oak Ridge National Laboratory Risk Assessment Information System (ORNL RAIS), 2004. ORNL RAIS on-line database of ecological benchmarks (http://risk.lsd.ornl.gov/homepage/benchmark.shtml)
- *Ecological Screening Levels.* Office of Solid Waste Emergency Response Directive 9285.7-55, November 2003.

The screening-level approach used for evaluating ecological effects follows Steps 1 and 2 of ERAGS (U.S. EPA, 1997), which include:

- Step 1: Screening-Level Problem Formulation and Screening-Level Ecological Effects Evaluation
- Step 2: Screening-Level Preliminary Exposure Estimate and Risk Calculation

These steps in the SLERA process are provided in the subsequent sections of this document.

SECTION 2

STEP 1: SCREENING-LEVEL PROBLEM FORMULATION AND SCREENING-LEVEL ECOLOGICAL EFFECTS EVALUATION

2.1 SCREENING LEVEL PROBLEM FORMULATION

The screening-level problem formulation step focuses on identifying categories of potential ecological receptors that may exist in the Site's area, identifying contaminants that may pose an unacceptable risk to those receptors, and determining contaminant fate/transport and toxicity mechanisms (U.S. EPA, 1996b). The problem formulation is "the formal process of generating and evaluating preliminary hypotheses about why ecological effects have occurred or may occur from human activities" (U.S. EPA, 1998). It is a planning step that identifies the major factors (*e.g.*, site ecology, extent of contamination, potential ecological receptors) to be considered in the assessment.

2.1.1 Site Characterization

The Site (41° 05' 60"N and 81°37' 08"W) is located at 2777 through 2799 Copley Road in Copley Township, Summit County, Ohio, as shown on Figure 1-1. For the purposes of this report, the term "Copley Square Plaza Property" refers to the specific physical addresses between 2777 and 2799 Copley Road. Additionally, the term "Site" refers to the overall extent of contamination. The Copley Square Plaza property includes the Knight's Hall building and the Danton Dry Cleaners building which includes Dr. P.R. Kaput's dental office, Giuseppe's Hair Center, a youth dance studio, and the former Danton Cleaners facility. The property is bounded on the north by a large open field area and condominium complex, on the west by residential housing and several small commercial businesses, on the south by Copley Road and residential housing, and on the east by the former O'Shux Golf Course which is being redeveloped into residential housing. Prior to development in the late 1956s, the complex was an operating cattle farm. Figure 1-2 shows the detailed site map.

The topography in Summit County has been historically altered through the advance and retreat of glaciers. The topography consists of gently rolling uplands that reach approximately 1,200 feet above mean sea level (AMSL) and broad valleys that vary approximately between 700 and 900 feet AMSL. The Site generally slopes to the east-northeast. Locally, relief in the area is approximately 100 feet moving west to east. Elevation ranges from approximately 1,080 feet AMSL west of Jacoby Road, to approximately 980 feet AMSL near Pigeon Creek and Schocalog Run east of the Site.

The Site lies within a buried glacial valley system in the glaciated portion of the Appalachian Plateau Physiographic Province. The Province is underlain by Paleozoic age consolidated sediments of uncertain thickness that rest unconformably upon a crystalline basement. The Mogadore Till is the primary glacial deposit in the area. Mogadore Till is generally coarse, sandy, stony, and sometimes includes gravel where the till overlies buried kames. Mogadore Till has a general composition of 50% sand, 19% clay, and varying amounts of mixed sediments composing the final 31%. Within Summit County, the Mogadore Till has an average thickness of approximately 16 feet. However, local thickness of the Mogadore Till may be significantly greater. Previous investigations have indicated that glacial deposits in the area can range anywhere from 11 to 60 feet thick and are a composite of silty clay, clayey silt, sand, and gravel.

2.1.2 Site Investigations

The Site was first identified in April 1990 when a nearby property owner submitted a water odor complaint to the Ohio Environmental Protection Agency (OEPA). In response to the citizen complaint, OEPA initiated sampling of two groundwater wells located adjacent to, and immediately east of Danton Cleaners. The analytical results of the groundwater well sampling indicated the presence of Volatile Organic Compounds (VOC) at concentrations above the Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) standards. Of the VOCs detected, the specific

contaminants of concern that were identified and which exceeded the SDWA MCLs include tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride.

Previous investigations and activities have been conducted throughout the Site from 1990 through 2003 (WESTON, 2006). OEPA initiated a site investigation in January 1994 to evaluate the extent of groundwater contamination and characterize the Copley Site's hydrogeology (Hydrogeologic Investigation at the Copley Square Plaza Shopping Center, Earth Tech, June 1995). The U.S. EPA Emergency Response Branch (ERB) conducted an emergency removal action at the Copley Square Plaza Property beginning on 22 August 1994 (On-Scene Coordinator's Report, CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Removal Action, Copley Square Plaza, Copley, Summit County, Ohio, 1996). In 1994, Roy F. Weston, Inc., under the Response Engineering Analytical Contract (REAC), conducted an extent of groundwater contamination evaluation on behalf of U.S. EPA (Final Report, Copley Square Plaza Site, Hydrogeologic Investigation, Copley, Ohio, Roy F. Weston, Inc., May 1996). This investigation was technically a part of the removal action conducted by U.S. EPA. In 1999, Partners Environmental Consulting conducted a site investigation for the proposed Meadows of Copley residential development on the former O'Shux Golf Course property, which is located immediately east of the Copley Square Plaza Property (Site Investigation, Risk Assessment, and Ecological Evaluation of the Former O'Shux Golf Course, Copley, Ohio, Partners Environmental Consulting, December 1999). OEPA conducted a Site Inspection (SI) to evaluate the current state of groundwater contamination at the Copley Site and determine if an ongoing release of VOC contamination was occurring (Site Inspection Report, Copley Square Plaza, a.k.a. Danton Cleaners, Copley, Summit County, Ohio, OEPA, 2002). The SI was conducted between 13 and 15 May 2002, with additional sampling conducted on 6 August 2002. OEPA conducted an Expanded SI (ESI) to provide current data documenting the release of VOC contamination into the environment, specifically to groundwater associated with the Copley Site (Expanded Site Inspection Report, Copley Square

Plaza, a.k.a. Danton Cleaners, Copley, Summit County, Ohio, OEPA, 2003). Most recently, WESTON conducted the remedial investigation at the Site from February through March 2006.

2.1.3 Selection of Constituents of Potential Ecological Concern

Soil and surface water data collected during the RI are evaluated in this SLERA. In addition, surface soil data (less than two feet below ground surface [bgs]) collected during previous investigations was also evaluated because surface soil samples were not collected during the RI. RI soil samples were collected at depths ranging from two to up to 13 feet bgs (Figure 2-1). The RI focused on deeper samples because the contaminant source was eight underground concrete wastewater tanks containing chlorinated solvents. Surface water samples were collected during the RI at the discharge point located in the undeveloped area east of the Copley Square Plaza Cleaners building where a stormwater discharge pipe outlets, as well as downstream from the discharge pipe (Figure 2-2). The surface water investigation was conducted to determine if site contaminants in the storm drainage discharge at the site have impacted the local surface water quality. No sediment samples were collected during the RI.

Data collection activities during the RI are described in the RI Report (WESTON, 2006b). Previous investigations are described in the Historic Data Evaluation Report (WESTON, 2006a). A comparison of maximum reported site concentrations to ecological screening levels was performed to establish the COPECs to be assessed in this SLERA. The following guidelines were used to identify COPECs:

Non-Detected Chemicals — A chemical was excluded as a COPEC for a medium if it was not detected in any samples from that medium. However, chemicals with maximum reporting limits exceeding their applicable risk-based screening value were identified as exceeding, and are discussed in the uncertainty analysis.

Essential Nutrients — Inorganic chemicals that are essential nutrients (*e.g.*, calcium, potassium, magnesium, and sodium) were excluded as COPECs. In addition, aluminum is also excluded because the soluble and toxic forms of aluminum are only present in soil with pH values less than 5.5 (U.S. EPA 2003d). Iron is considered a plant micronutrient (U. S. EPA, 2003e). In well-aerated soils between pH 5 and 8, iron is not expected to be toxic to plants. The typical iron concentrations in soils range from 0.2% to 55% (20,000 to 550,000 mg/kg) (U.S. EPA, 2003e). On-site iron concentrations ranged from 14,600 mg/kg to 57,000 mg/kg. Thus, iron was excluded as a COPEC.

Risk-Based Screening — A chemical in soil was excluded as a COPEC if its maximum detected concentration was below U.S. EPA Ecological Soil Screening Levels (Eco-SSLs) (U.S. EPA, 2003). If an Eco-SSL was not available for a chemical, Region 5 ecological screening levels (ESLs) were used in the screening. The ESLs are Region 5 media-specific values for Resource Conservation and Recovery Act Appendix IX hazardous constituents. ESLs are initial screening levels with which the Copley Site's contaminant concentrations can be compared, helping to focus the investigation on those areas and chemicals that are most likely to pose an unacceptable risk to the environment. ESLs alone are not intended to serve as cleanup levels. A chemical in surface water was excluded as a COPEC if its maximum detected concentration was below Ohio water quality standards for the Ohio River Basin (Ohio River Basin Aquatic Life and Human Health Tier I Criteria and Tier II Values contained in and developed pursuant to Chapter 3745-1 of the Ohio Administrative Code (RAC), Ohio EPA, Division of Surface Water. 7/27/05).

Maximum detected concentrations in soil, historic surface soil, and surface water are compared to screening levels in Tables 2-1, 2-2, and 2-3, respectively. The following chemicals were determined to be COPECs:

- Surface water — copper, lead, fluoranthene, and pyrene.
- Soil — antimony, arsenic, cadmium, cobalt, copper, lead, manganese, nickel, selenium, thallium, zinc, caprolactam, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, Freon-113, cis-1,2-dichloroethene (cis-1, 2-DCE), and tetrachloroethene (PCE).

Bioaccumlative chemicals are retained as COPECs if they are found at a site, regardless of whether they exceed or do not exceed screening levels. No bioaccumulative compounds (e.g., mercury, PCBs) were measured in soil or surface water samples.

2.1.4 Ecological Receptors and Complete Exposure Pathways

Identification of the ecological receptors at, or in the general vicinity of, the Copley Site is another component of the problem formulation. Ecological receptors include ecosystems, habitats, communities, populations, and individual organisms that can be exposed directly or indirectly to a stressor. The Site is located in the Erie/Ontario Drift and Lake Plain Ecoregion (Ecoregions of Indiana and Ohio, http://www.epa.gov/wed/pages/ecoregions/ohin_eco.htm, last updated on Tuesday, 28 February 2006), which is defined as:

> "Once largely covered by a maple-beech-birch forest, much of the Erie Drift Plain is now in farms, many associated with dairy operations. The Eastern Corn Belt Plains, which border the region on the west, are flatter, more fertile, and therefore more agricultural. The glaciated Erie Drift Plain is characterized by low rounded hills, scattered end moraines, kettles, and areas of wetlands, in contrast to the adjacent unglaciated ecoregions to the south and east that are more hilly and less agricultural. Areas of urban development and industrial activity occur locally."

The primary habitats on the Site are the undeveloped open field east of the Copley Plaza buildings and the surface water drainageway that flows east from stormwater discharge pipe, located just east of the building, through the northern half of the open field. There is a small patch of trees directly east of the building.

Wildlife common to urban/suburban areas within northeastern Ohio are expected to inhabit this area. Information on threatened and endangered species that may occur within close proximity of the Site was requested from the Ohio Department of Natural Resources Natural Heritage Program. There are three listed species within the Wadsworth and Akron West Quadrangles in Summit County, including the low umbrella-sedge (*Cyperus diandrus*), potentially threatened; gray birch (*Betula populifolia*), potentially threatened, and the paddlefish (*Polyodon spathula*), threatened. Sightings of these species were at least a mile from the Copley Site (Appendix A).

An exposure pathway describes the general course a constituent takes from its source into the environment and ultimately to a receptor. Determining the potential magnitude of impacts to an organism depends primarily on whether the exposure pathway to that organism is complete or not. Complete pathways represent complete connections between a contaminant and an organism and are thus likely to contribute to potential risks resulting from that exposure. Incomplete pathways represent incomplete connections between a contaminant and an organism and thus do not contribute to potential risks even if exposure to a particular medium is occurring. Birds and mammals can be exposed through dietary ingestion of bioaccumulative constituents in soil, as well as by any incidental ingestion or direct contact that occurs through the diet, through foraging or nesting activities (e.g., dermal contact), inhalation, and through surface water consumption. Soil-dwelling organisms can receive significant exposure through direct contact (including incidental ingestion), and dietary ingestion of bioaccumulative and non-bioaccumulative contaminants in soil. Plants can be exposed through direct contact with constituents in soil. Direct contact for vegetation is assumed to include contact that may occur through uptake of soil contaminants into the plants' root systems, or leaf absorption of contaminants evaporating from the soil. Aquatic organisms can be significantly exposed through direct contact with contaminated surface water. No fish have been observed in the surface water at the Site. Sediment is not considered to be an exposure medium as no sediment samples were collected from the RI because the surface water on the property is a storm drain discharge point.

2.1.5 Assessment and Measurement Endpoints

Assessment and measurement endpoints are needed to focus the risk assessment process. For screening-level ecological assessment, assessment endpoints are any adverse effect on ecological receptors where receptors are plant and animal populations and communities, habitats, and sensitive environments (U.S. EPA, 1997). Many of the screening ecotoxicity values are based on generic assessment endpoints (*e.g.*, protection of aquatic communities from changes in structure and function). The assessment endpoints for this site are:

- Protection of terrestrial plant and animal communities from reproductive or growth impairment from direct exposure to soil as well as preservation of the productivity (taxa richness and abundance) of terrestrial organisms.

- Protection of aquatic organism communities from reproductive or growth impairment from direct exposure to soil as well as preservation of the productivity (taxa richness and abundance) of aquatic organisms.

Measurement endpoints are the measurable environmental characteristics that are predictive of the selected assessment endpoint. Measurement endpoints for the Site include:

- For plants, soil dwelling-organisms, and small mammals and birds directly exposed to COPECs in soil performed by comparing media concentrations to soil benchmarks, a terrestrial community hazard quotient (HQ) evaluation was performed by comparing media concentrations to soil benchmarks.

- For aquatic organisms directly exposed to COPECs in surface water, an aquatic community HQ evaluation was performed by comparing media concentrations to surface water quality benchmarks.

2.1.6 Ecological Conceptual Site Model

The primary objective of the problem formulation is the development of a working Ecological Conceptual Site Model (ECSM), which serves to define how contaminants might affect ecosytems at a site (Norton et al, 1992). Based on the above information on the Site's setting and complete exposure pathways, an ECSM was prepared (Figure 2-3). The ECSM presents the various potential exposure pathways by which ecological receptors may contact on-site compounds in soil, sediment, and surface water.

2.2 SCREENING-LEVEL ECOLOGICAL EFFECTS EVALUATION

The second phase of Step 1 consists of evaluating preliminary ecological effects and establishing chemical exposure levels that represent conservative thresholds for adverse ecological effects. The

conservative thresholds are called screening ecotoxicity values. The following is a list of sources for screening ecotoxicity values:

- Surface water – Statewide water quality criteria for the protection of aquatic life, both outside mixing zone average (OMZA) and outside mixing zone maximum (OMZM).
- Soil – Ecological benchmarks for soil that represent protective levels for plant, soil invertebrate communities, birds, and mammals as target receptors were obtained from ORNL RAIS; U.S. EPA ecological soil screening levels for invertebrates, plants, birds and mammals; and preliminary remediation goals for mammals and birds (Efroymson, et al., 1997).

SECTION 3

STEP 2: SCREENING-LEVEL PRELIMINARY EXPOSURE ESTIMATE AND RISK CALCULATION

3.1 SCREENING-LEVEL EXPOSURE ESTIMATE

In this step, chemical exposure levels are estimated to screen for potential ecological risks. Measured environmental medium concentrations (*e.g.*, soil and surface water) are used for estimating exposure of terrestrial and aquatic wildlife to Site contaminants. For all exposure media, maximum concentrations were used as the exposure point concentrations for ecological receptors No bioaccumulative compounds were measured in site soil and surface water.

3.2 RISK CALCULATION

The screening-level risk characterization integrates information from the screening-level problem formulation, screening-level ecological effects evaluation, and the screening-level exposure estimate to predict the nature and extent of ecological risk or threat, as well as the environmental effects of previous activities. For the screening-level risk calculation, the HQ approach was used. The hazard quotient approach is routinely used by U.S. EPA as the simplest quantitative method for estimating risk to ecological receptors. The HQ shall not exceed one. If the HQ is less than one, no effects on ecological receptors are expected. If the HQ is greater than one, further investigation may be needed.

3.2.1 Soil

The maximum COPEC concentrations in RI soil samples were compared to appropriate, conservative ecotoxicity screening values for soil invertebrates, plants, mammals, and birds (Table 3-1). Of the ecological COPECs, maximum concentrations of manganese and zinc had an HQ greater than one for the protection of invertebrate populations. Arsenic, manganese, nickel, selenium, thallium, and zinc had an HQ greater than one for the protection of plant populations. Arsenic, selenium, and thallium had an HQ greater than one for the protection of mammals. Zinc had an HQ greater than one for the protection of birds. Maximum concentrations of cadmium,

copper, and lead did not exceed screening ecotoxicity values. Ecotoxicity screening values were not available for the organic COPECs.

Historic surface soil samples were also compared to appropriate conservative ecotoxicity screening values for soil invertebrates, plants, mammals, and birds (Table 3-2). Of the ecological COPECs, maximum concentrations of manganese had an HQ greater than one for the protection of invertebrate populations. Arsenic and zinc had an HQ greater than one for the protection of plant populations. Antimony had an HQ greater than one for the protection of mammals. Zinc had an HQ greater than one for the protection of birds.

The maximum concentrations of lead and nickel did not exceed screening ecotoxicity values. Ecotoxicity screening values were not available for the organic COPECs.

While the chemical concentrations of several metals (antimony, arsenic, manganese, nickel, selenium, thallium, and zinc) may pose a potential risk to ecological receptors, the Site's small size and the limited habitat combine to offset the potential for these elevated concentrations to have significant ecological ramifications. These metals may also be present at background levels.

3.2.2 Surface Water

The maximum COPEC concentrations in surface water were compared to Ohio water quality criteria for the protection of aquatic life, both OMZA and OMZM criteria, to develop surface water HQs. Pyrene and lead concentrations did not exceed OMZM criteria. Fluoranthene and copper had HQs exceeding one based on the OMZM criteria (Table 3-3), and are chemicals of ecological concern (COEC) in surface water. However, the surface water feature at the Site is a highly modified surface water drainageways that possess a limited amount of the stream morphology and habitat characteristics necessary to support high-quality aquatic life habitat use. The surface water provides drainage associated with runoff from the Copley Plaza asphalt-covered parking lot, which probably contributes to the elevated metal and SVOC concentrations in the water.

3.2.3 Refinement of COPECs in Soil

The screening level risk characterization found that various COPECs might pose an ecological risk. Because of the conservative assumptions using during the risk screen, refinement of the COPECs (similar to Step 3 of the ERA process) was performed for the Site. An average concentration was used to further evaluate those chemicals in soil with maximum concentrations exceeding screening ecotoxicity values. Background values of metals were compared to site concentrations. No site-specific background levels were available. Background levels for Ohio farm soils (OSU, 2006) and generic background levels for various soils (ORNL, 2006) were used in this comparison.

For the RI soil data, the 95 percent upper confidence limit on the mean (95UCL) concentration (calculated using ProUCL) was used as the representative average concentrations. The 95UCL average concentration of manganese had an HQ greater than one for the protection of invertebrate populations. Selenium and zinc had an HQ greater than one for the protection of plant populations. Selenium had an HQ greater than one for the protection of mammals. Zinc had an HQ greater than one for the protection of birds (Table 3-4). The arithmetic average concentration of manganese did not exceed the mean background concentration. Arithmetic average concentrations of selenium and zinc exceeded the mean background concentration, though the average concentrations of these metals were within the range of background levels. Average concentrations of nickel and thallium did not have HQs greater than one for any receptor group. While screening ecotoxicity values were not available for the organic COPECs, the arithmetic average of detected concentrations of bis(2-ethylhexyl)phthalate, di-n-butylphthalate, cis-1,2-DCE, and PCE (134 micrograms per kilogram [µg/kg], 82 µg/kg, 285 µg/kg, and 4,619 µg/kg, respectively) are below the Region 5 ESLs of 925 µg/kg, 150 µg/kg, 784 µg/kg, and 9,920 µg/kg, respectively. CFC-113 and caprolactam not considered to be COECs because they were infrequently detected in the soil samples (less than ten percent) and they are not expected to bioaccumulate in ecological receptors.

For the historic soil data, the arithmetic average concentration was used as the representative average concentration because only three samples were analyzed for metals and cis-1,2-DCE was detected in only four out of 19 samples. The arithmetic average concentration of manganese had an HQ greater than one for the protection of invertebrate populations (Table 3-2). Arsenic and zinc had an HQ greater than one for the protection of plant populations. Antimony had an HQ greater than one for the protection of mammals. Zinc had an HQ greater than one for the protection of birds. Arithmetic average historic concentrations of manganese and zinc in surface soil were below average background levels of these compounds (Table 3-2). The average concentration of arsenic exceeded the mean background level but detected concentrations were within the range of background levels. Antimony concentrations slightly exceeded the background range. While screening ecotoxicity values were not available for DCE, the average of detected concentration (313 g/kg) is below the Region 5 ESL of 784 g/kg.

Upon refinement of COPEC in soil through determining a representative average concentration, evaluating frequency of detection, and comparing to background, the chemicals of ecological concern (COEC) in soil are: antimony, arsenic, selenium, and zinc.

3.2.4 Uncertainty Assessment

Many uncertainties are associated with estimating exposure and risks to ecological organisms. The uncertainty analysis addresses the major assumptions that affect the degree of confidence in the estimate of risk. Knowing the uncertainties associated with the risk estimates aids the risk manager in making the Scientific/Management Decision at the end of the ecological risk assessment. General and site-specific uncertainties associated with this SLERA include:

- Quantitation limits associated with surface soil and surface water data collected as part of the RI were compared to ECO SSLs and Region 5 ESLs. As shown in the COPEC screening tables, some of the laboratory reporting limits for chemicals measured in these environmental media exceeded their applicable screening benchmark. Chemicals with reporting limits above the benchmarks were not carried forward because the presence of the chemicals in the environmental medium is not

established. This may result in an underestimation of risk because there may be additional COPECs that pose an ecological risk.

- Various types of data qualifiers are attached to analytical data by either the laboratory conducting the analyses or by the person performing data validation. A common data qualifier in data packages analyzed under the EPA Contract Laboratory Program is the "J" qualifier. Data qualified with a J are estimated concentrations reported below the minimum confident sample Quantitation limit. In this SLERA, all data qualified with a J were used the same way as positive data that did not have the qualifier. Sometimes, a level of bias is associated with the J-qualified data, indicating whether the concentration is biased high or low. Other times, the level of bias is unknown. The use of J-qualified data as the reported concentration may result in either an under- or overestimation of the actual concentration.

- The SLERA is based on available data which, based on current practice, are assumed to be adequate. For site-specific risk assessments, as the number of sampling points increase, the uncertainty about the true distributions of values decreases, however, even with a large number of sampling locations, it is impossible to conclude definitively that concentrations above those measured do not exist at the Site.

3.4 RISK DESCRIPTION

A SLERA was conducted at the Site to evaluate whether chemicals detected in soil and surface water pose a potential to adversely affect ecological receptors. The following chemicals were determined to be COPECs:

- Soil — antimony, arsenic, cadmium, cobalt, copper, lead, manganese, nickel, selenium, thallium, zinc, caprolactam, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, Freon-113, cis-1,2-DCE, and PCE.

- Surface water — copper, lead, fluoranthene, and pyrene.

No bioaccumulative chemicals were measured in soil and surface water at the Site. Direct effects on invertebrates, plants, mammals, and birds were evaluated for soil, and direct effects on aquatic organisms were evaluated for surface water by comparison of maximum Site data to screening ecotoxicity values.

The maximum concentrations of several metals (antimony, arsenic, manganese, nickel, selenium, thallium, and zinc) and several organics in soil may pose a potential risk to ecological receptor because they exceeded screening ecotoxicity values or ecotoxicity values were not available. Cadmium, copper, and lead in soil did not exceed screening ecotoxicity values. Refinement of soil COPECs was done through determining a representative average exposure point concentration, evaluating frequency of detection, and comparing to background. It was found that two metals (nickel and thallium) and the organics did not pose a risk to ecological receptors because average concentrations were below screening values and/or the compound was infrequently detected. The average concentration of manganese was below background, thus, manganese is not considered as a COEC. Antimony, arsenic, selenium, and zinc are the COECs in soil.

The COECs in soil (antimony, arsenic, selenium, and zinc) might pose a risk to ecological receptors. Antimony may pose a risk to mammalian receptors. The mammalian screening ecotoxicity value for antimony is less than the range of reported typical background concentrations in U.S. soils, which is 0.5 mg/kg to 1.5 mg/kg. The range of antimony concentrations at the site was 1.5 mg/kg to 1.9 mg/kg. Selenium may pose a risk to plants and mammals. Selenium was detected in 12 of 46 soil samples at concentrations ranging from 1.3 to 2.9 mg/kg. Selenium may favorably or adversely affect growth, survival, and reproduction of algae and higher plants, bacteria and yeasts, crustaceans, molluscs, insects, fish, birds, and mammals (Eisler,1985). Sensitivity to selenium and its compounds is extremely variable in all classes of organisms. There is a comparatively narrow concentration range separating effects of selenium deficiency from those of selenosis (Eisler,1985). Arsenic was found at concentrations that may be toxic to plants. For most plants, a significant depression in crop yields was evident at soil arsenic concentrations of 25 to 85 mg/kg of total arsenic (Eisler, 1988). Arsenic was detected in all soil samples at concentrations ranging from 4.5 mg/kg to 81.7 mg/kg. To be absorbed by plants, arsenic compounds must be in a mobile form in the soil solution (Eisler, 1988). Zinc may pose a risks to plants and avian receptors. Zinc was measured in all soil samples at concentrations ranging from 46.8 mg/kg to 159 mg/kg. The balance between excess and

insufficient zinc is important. Zinc deficiency occurs in many species of plants and animals and has severe adverse effects on all stages of growth, development, reproduction, and survival. Excess levels though are toxic to birds. Sensitive terrestrial plants die when soil zinc levels exceed 100 mg/kg. Uptake of zinc from soils by plants is dependent on soil type; for example, uptake is lower in coarse loamy soils than in fine loamy soils. While several metals in soil may pose a risk to terrestrial ecological receptors, the Site's small size and the limited habitat combine to offset the potential for these elevated concentrations to have significant ecological ramifications.

Concentrations of pyrene and lead in surface water did not exceed OMZM criteria, while concentrations of copper and fluoranthene exceeded OMZM criteria. Since elevated levels of copper and fluoranthene were measured in surface water, these metals are COECs in this medium. Copper is among the most toxic of the heavy metals in freshwater biota and often accumulates and causes irreversible harm to some species at concentrations just above levels required for growth and reproduction (Eisler, 1998). In general, PAHs show little tendency to biomagnify in food chains, despite their high lipid solubility, probably because most PAHs are rapidly metabolized. The higher molecular weight PAHs, such as fluoranthene which contains 4 rings, are significantly less toxic than unsubstituted lower molecular weight compounds with 2 or 3 rings (Eisler, 1987). While fish may accumulate PAHs such as fluoranthene, they also metabolize PAHs extensively and rapidly (Eisler, 1987). The surface water feature on the Site is a highly modified surface water drainageway that possess a limited amount of the stream morphology and habitat characteristics necessary to support high-quality aquatic life habitat use. The surface water provides drainage associated with runoff from the Copley Plaza asphalt-covered parking lot, which probably contributes to the elevated metal and PAHs in the water.

SECTION 4

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TABLES

Table 2-1
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern
Comparison to U.S. EPA
Region 5 Ecological Screening Levels: RI Soils
Copley Square Plaza
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Sample Date of Maximum Detected Concentration	Location of Maximum Detected Concentration	Upper Depth of Maximum Detected Concentration (ft)	Lower Depth of Maximum Detected Concentration (ft)	Ecological Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
VOCs (µg/kg)																	
1,1,1-TRICHLOROETHANE	71-55-6	58	0	58	NA	NA	NA	NA	NA	NA	29800	NA	N	ND	4	2400	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	58	0	58	NA	NA	NA	NA	NA	NA	127	NA	N	ND	4	2400	Y
1,1,2-TRICHLOROETHANE	79-00-5	58	0	58	NA	NA	NA	NA	NA	NA	28600	NA	N	ND	4	2400	N
1,1-DICHLOROETHANE	75-34-3	58	0	58	NA	NA	NA	NA	NA	NA	20100	NA	N	ND	4	2400	N
1,1-DICHLOROETHYLENE	75-35-4	58	0	58	NA	NA	NA	NA	NA	NA	8280	NA	N	ND	4	2400	N
1,2,3-TRICHLOROBENZENE	87-61-6	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
1,2,4-TRICHLOROBENZENE	120-82-1	58	0	58	NA	NA	NA	NA	NA	NA	11100	NA	N	ND	4	2400	Y
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	58	0	58	NA	NA	NA	NA	NA	NA	35.2	NA	N	ND	4	2400	Y
1,2-DIBROMOETHANE	106-93-4	58	0	58	NA	NA	NA	NA	NA	NA	1230	NA	N	ND	4	2400	Y
1,2-DICHLOROBENZENE	95-50-1	58	0	58	NA	NA	NA	NA	NA	NA	2960	NA	N	ND	4	2400	N
1,2-DICHLOROETHANE	107-06-2	58	0	58	NA	NA	NA	NA	NA	NA	21200	NA	N	ND	4	2400	N
1,2-DICHLOROPROPANE	78-87-5	58	0	58	NA	NA	NA	NA	NA	NA	32700	NA	N	ND	4	2400	N
1,4-DICHLOROBENZENE	106-46-7	58	0	58	NA	NA	NA	NA	NA	NA	546	NA	N	ND	4	2400	Y
1,4-DIOXANE	123-91-1	58	0	58	NA	NA	NA	NA	NA	NA	2050	NA	N	ND	80	11000	Y
2-BUTANONE	78-93-3	58	2	56	3	10	3/9/2006	SS16	5	7	89600	1.1E-04	N	BSL	8	4900	N
4-METHYL-2-PENTANONE	108-10-1	58	0	58	NA	NA	NA	NA	NA	NA	443000	NA	N	ND	8	4900	N
ACETONE	67-64-1	58	10	48	3	40	3/9/2006	SS28	3	5	2500	0.016	N	BSL	8	4900	Y
BENZENE	71-43-2	58	0	58	NA	NA	NA	NA	NA	NA	255	NA	N	ND	4	2400	Y
BROMODICHLOROMETHANE	75-27-4	58	0	58	NA	NA	NA	NA	NA	NA	540	NA	N	ND	4	2400	Y
BROMOMETHANE	74-83-9	58	0	58	NA	NA	NA	NA	NA	NA	235	NA	N	ND	4	2400	Y
CARBON DISULFIDE	75-15-0	58	0	58	NA	NA	NA	NA	NA	NA	94.1	NA	N	ND	4	2400	N
CARBON TETRACHLORIDE	56-23-5	58	0	58	NA	NA	NA	NA	NA	NA	2980	NA	N	ND	4	2400	N
CFC-11	75-69-4	58	6	52	0.27	0.78	2/25/2006	SS01	5	7	16400	4.8E-05	N	BSL	4	2400	N
CFC-12	75-71-8	58	0	58	NA	NA	NA	NA	NA	NA	39500	NA	N	ND	4	2400	N
CHLORINATED FLUOROCARBON (FREON 113)	76-13-1	58	2	56	230	320	2/26/2006	SS04	5	7	NA	--	Y	NA	4	2400	N
CHLOROBENZENE	108-90-7	58	0	58	NA	NA	NA	NA	NA	NA	13100	NA	N	ND	4	2400	N
CHLOROBROMOMETHANE	74-97-5	36	0	36	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
CHLORODIBROMOMETHANE	124-48-1	58	0	58	NA	NA	NA	NA	NA	NA	2050	NA	N	ND	4	2400	Y
CHLOROETHANE	75-00-3	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
CHLOROFORM	67-66-3	58	0	58	NA	NA	NA	NA	NA	NA	1190	NA	N	ND	4	2400	Y
CHLOROMETHANE	74-87-3	58	0	58	NA	NA	NA	NA	NA	NA	10400	NA	N	ND	4	2400	N
CIS-1,2-DICHLOROETHENE	156-59-2	58	11	47	0.19	1100	2/28/2006	SS09	10	12	784	1.4	Y	ASL	4	550	N
CIS-1,3-DICHLOROPROPENE	10061-01-5	58	0	58	NA	NA	NA	NA	NA	NA	398	NA	N	ND	4	2400	Y
CYCLOHEXANE	110-82-7	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
DICHLOROMETHANE	75-09-2	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	0.35	2400	N
ETHYLBENZENE	100-41-4	58	0	58	NA	NA	NA	NA	NA	NA	5160	NA	N	ND	4	2400	N
ISOPROPYLBENZENE	98-82-8	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
M,P-XYLENE	179601-23-1	42	0	42	NA	NA	NA	NA	NA	NA	10000	NA	N	ND	4	2400	N
M-DICHLOROBENZENE	541-73-1	58	0	58	NA	NA	NA	NA	NA	NA	37700	NA	N	ND	4	2400	N
METHYL ACETATE	79-20-9	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
METHYL N-BUTYL KETONE	591-78-6	58	0	58	NA	NA	NA	NA	NA	NA	12600	NA	N	ND	8	4900	N
METHYL TERT-BUTYL ETHER	1634-04-4	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
METHYLBENZENE	108-88-3	58	1	57	1	1	3/2/2006	SS31	10	12	5450	1.8E-04	N	BSL	4	2400	N
METHYLCYLOHEXANE	108-87-2	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	4	2400	N
O-XYLENE	95-47-6	42	0	42	NA	NA	NA	NA	NA	NA	10000	NA	N	ND	4	2400	N
STYRENE	100-42-5	58	0	58	NA	NA	NA	NA	NA	NA	4690	NA	N	BSL	4	2400	N
TETRACHLOROETHENE	127-18-4	58	13	45	1.2	39000	2/28/2006	SS09	7	9	9920	3.9	Y	ASL	4	300	N
TRANS-1,2-DICHLOROETHENE	156-60-5	58	0	58	NA	NA	NA	NA	NA	NA	784	NA	N	ND	4	2400	Y
TRANS-1,3-DICHLOROPROPENE	10061-02-6	58	0	58	NA	NA	NA	NA	NA	NA	398	NA	N	ND	4	2400	N
TRIBROMOMETHANE	75-25-2	58	0	58	NA	NA	NA	NA	NA	NA	15900	NA	N	ND	4	2400	N
TRICHLOROETHYLENE	79-01-6	58	9	49	2	3200	3/9/2006	SS16	11	13	12400	0.26	N	BSL	4	300	N
VINYL CHLORIDE	75-01-4	58	0	58	NA	NA	NA	NA	NA	NA	646	NA	N	ND	4	2400	Y

Notes:
NA = Not applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds

COPC Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
ND = Not Detected
NA = No screening level is applicable

(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005); all others are Region V Ecological Screening Levels (U.S. EPA 2003)

(2) Detection limit exceeds Ecological Screening Level.

COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level

Table 2-1
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern
Comparison to U.S. EPA
Region 5 Ecological Screening Levels: RI Soils
Copley Square Plaza
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Sample Date of Maximum Detected Concentration	Location of Maximum Detected Concentration	Upper Depth of Maximum Detected Concentration (ft)	Lower Depth of Maximum Detected Concentration (ft)	Ecological Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
SVOCs (µg/kg)																	
1,1'-BIPHENYL	92-52-4	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
1,2,4,5-TETRACHLOROBENZENE	95-94-3	58	0	58	NA	NA	NA	NA	NA	NA	2020	NA	N	ND	170	280	N
1,2-BENZPHENANTHRACENE	218-01-9	58	1	57	25	25	3/7/2006	SS24	2	4	4730	0.0053	N	BSL	170	280	N
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	58	0	58	NA	NA	NA	NA	NA	NA	19900	NA	N	ND	170	280	N
2,4,5-TRICHLOROPHENOL	95-95-4	58	0	58	NA	NA	NA	NA	NA	NA	14100	NA	N	ND	170	280	N
2,4,6-TRICHLOROPHENOL	88-06-2	58	0	58	NA	NA	NA	NA	NA	NA	9940	NA	N	ND	170	280	N
2,4-DICHLOROPHENOL	120-83-2	58	0	58	NA	NA	NA	NA	NA	NA	87500	NA	N	ND	170	280	N
2,4-DIMETHYLPHENOL	105-67-9	58	0	58	NA	NA	NA	NA	NA	NA	10	NA	N	ND	170	280	Y
2,4-DINITROPHENOL	51-28-5	58	0	58	NA	NA	NA	NA	NA	NA	60.9	NA	N	ND	340	540	Y
2,4-DINITROTOLUENE	121-14-2	58	0	58	NA	NA	NA	NA	NA	NA	1280	NA	N	ND	170	280	N
2,6-DINITROTOLUENE	606-20-2	58	0	58	NA	NA	NA	NA	NA	NA	32.8	NA	N	ND	170	280	Y
2-CHLORONAPHTHALENE	91-58-7	58	0	58	NA	NA	NA	NA	NA	NA	12.2	NA	N	ND	170	280	Y
2-CHLOROPHENOL	95-57-8	58	0	58	NA	NA	NA	NA	NA	NA	243	NA	N	ND	170	280	Y
2-METHYLNAPHTHALENE	91-57-6	58	3	55	8.3	13	3/2/2006	SS20	16	18	3240	4.0E-03	N	BSL	170	280	N
2-METHYLPHENOL	95-48-7	58	0	58	NA	NA	NA	NA	NA	NA	40400	NA	N	ND	170	280	N
2-NITROANILINE	88-74-4	58	0	58	NA	NA	NA	NA	NA	NA	74100	NA	N	ND	340	540	N
2-NITROPHENOL	88-75-5	58	0	58	NA	NA	NA	NA	NA	NA	1600	NA	N	ND	170	280	N
3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	78-59-1	58	0	58	NA	NA	NA	NA	NA	NA	139000	NA	N	ND	170	280	N
3-NITROANILINE	99-09-2	58	0	58	NA	NA	NA	NA	NA	NA	3160	NA	N	ND	340	540	N
4,6-DINITRO-2-METHYLPHENOL	534-52-1	58	0	58	NA	NA	NA	NA	NA	NA	144	NA	N	ND	340	540	Y
4-BROMOPHENYL PHENYL ETHER	101-55-3	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
4-CHLORO-3-METHYLPHENOL	59-50-7	58	0	58	NA	NA	NA	NA	NA	NA	7950	NA	N	ND	170	280	N
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
4-METHYLPHENOL	106-44-5	58	0	58	NA	NA	NA	NA	NA	NA	163000	NA	N	ND	170	280	N
4-NITROPHENOL	100-02-7	58	0	58	NA	NA	NA	NA	NA	NA	5120	NA	N	ND	340	540	N
ACENAPHTHENE	83-32-9	58	0	58	NA	NA	NA	NA	NA	NA	682000	NA	N	ND	170	280	N
ACENAPHTHYLENE	208-96-8	58	0	58	NA	NA	NA	NA	NA	NA	682000	NA	N	ND	170	280	N
ACETOPHENONE	98-86-2	58	20	38	190	280	3/2/2006	SS20	16	18	300000	9.3E-04	N	BSL	170	280	N
ANTHRACENE	120-12-7	58	0	58	NA	NA	NA	NA	NA	NA	1480000	NA	N	ND	170	280	N
ATRAZINE	1912-24-9	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
BENZALDEHYDE	100-52-7	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
BENZO(A)ANTHRACENE	56-55-3	58	1	57	20	20	3/7/2006	SS24	2	4	5210	3.8E-03	N	BSL	170	280	N
BENZO(A)PYRENE	50-32-8	58	1	57	26	26	3/7/2006	SS24	2	4	1520	0.017	N	BSL	170	280	N
BENZO(B)FLUORANTHENE	205-99-2	58	1	57	21	21	3/7/2006	SS24	2	4	59800	3.5E-04	N	BSL	170	280	N
BENZO(G,H,I)PERYLENE	191-24-2	58	0	58	NA	NA	NA	NA	NA	NA	119000	NA	N	ND	170	280	N
BENZO(K)FLUORANTHENE	207-08-9	58	1	57	27	27	3/7/2006	SS24	2	4	148000	1.8E-04	N	BSL	170	280	N
BENZYL BUTYL PHTHALATE	85-68-7	58	13	45	7.4	17	2/26/2006	SS04	5	7	239	0.071	N	BSL	170	280	Y
BIS(2-CHLOROETHOXY)METHANE	111-91-1	58	0	58	NA	NA	NA	NA	NA	NA	302	NA	N	ND	170	280	N
BIS(2-CHLOROETHYL)ETHER	111-44-4	58	0	58	NA	NA	NA	NA	NA	NA	23700	NA	N	ND	170	280	N
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	58	33	25	8.3	3600	2/28/2006	SS08	7	9	NA	--	Y	NA	170	280	N
CAPROLACTAM	105-60-2	58	5	53	8.3	13	2/28/2006	SS22	14	16	NA	--	Y	NA	170	280	N
CARBAZOLE	86-74-8	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
CHLOROPHENOLS	58-90-2	58	0	58	NA	NA	NA	NA	NA	NA	199	NA	N	ND	170	280	Y
DIBENZO(A,H)ANTHRACENE	53-70-3	58	0	58	NA	NA	NA	NA	NA	NA	18400	NA	N	ND	170	280	N
DIBENZOFURAN	132-64-9	58	0	58	NA	NA	NA	NA	NA	NA	NA	NA	N	ND	170	280	N
DIETHYL PHTHALATE	84-66-2	58	0	58	NA	NA	NA	NA	NA	NA	24800	NA	N	ND	170	280	N
DIMETHYL PHTHALATE	131-11-3	58	0	58	NA	NA	NA	NA	NA	NA	734000	NA	N	ND	170	280	N
DI-N-BUTYLPHTHALATE	84-74-2	58	30	28	16	210	3/3/2006	SS32	7	9	150	1.4	Y	ASL	170	280	Y
DI-N-OCTYLPHTHALATE	117-84-0	58	4	54	46	560	3/2/2006	SS20	16	18	709000	7.9E-04	N	BSL	170	280	N
FLUORANTHENE	206-44-0	58	2	56	20	48	3/7/2006	SS24	2	4	122000	3.9E-04	N	BSL	170	280	N
FLUORENE	86-73-7	58	0	58	NA	NA	NA	NA	NA	NA	122000	NA	N	ND	170	280	N
HEXACHLORO-1,3-BUTADIENE	87-68-3	58	0	58	NA	NA	NA	NA	NA	NA	39.8	NA	N	ND	170	280	Y
HEXACHLOROBENZENE	118-74-1	58	0	58	NA	NA	NA	NA	NA	NA	199	NA	N	ND	170	280	Y

Notes:

NA = Not applicable
COPC = Chemical of Potential Concern
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(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005), all others are Region V Ecological Screening Levels (U.S. EPA 2003)

(2) Detection limit exceeds Ecological Screening Level .

COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level.

Table 2-1
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern
Comparison to U.S. EPA
Region 5 Ecological Screening Levels: RI Soils
Copley Square Plaze
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Sample Date of Maximum Detected Concentration	Location of Maximum Detected Concentration	Upper Depth of Maximum Detected Concentration (ft)	Lower Depth of Maximum Detected Concentration (ft)	Ecological Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
SVOCs (µg/kg)																	
HEXACHLOROCYCLOPENTADIENE	77-47-4	58	0	58	NA	NA	NA	NA	NA	NA	755	NA	N	ND	170	280	N
HEXACHLOROETHANE	67-72-1	58	0	58	NA	NA	NA	NA	NA	NA	596	NA	N	ND	170	280	N
INDENO(1,2,3-CD)PYRENE	193-39-5	58	0	58	NA	NA	NA	NA	NA	NA	109000	NA	N	ND	170	280	N
NAPHTHALENE	91-20-3	58	4	54	7.8	11	3/2/2006	SS20	16	18	99.4	0.11	N	BSL	170	280	Y
NITROBENZENE	98-95-3	58	0	58	NA	NA	NA	NA	NA	NA	1310	NA	N	ND	170	280	N
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	58	0	58	NA	NA	NA	NA	NA	NA	544	NA	N	ND	170	280	N
N-NITROSODIPHENYLAMINE	86-30-6	58	0	58	NA	NA	NA	NA	NA	NA	545	NA	N	ND	170	280	N
P-CHLOROANILINE	106-47-8	58	0	58	NA	NA	NA	NA	NA	NA	1100	NA	N	ND	170	280	N
PENTACHLOROPHENOL	87-86-5	58	1	57	54	54	3/3/2006	SS33	10	12	119	0.45	N	BSL	340	540	Y
PHENANTHRENE	85-01-8	58	5	53	8.4	28	2/28/2006	SS08	9.5	11.5	45700	0.0006	N	BSL	170	280	N
PHENOL	108-95-2	58	0	58	NA	NA	NA	NA	NA	NA	120000	NA	N	ND	170	280	N
P-NITROANILINE	100-01-6	58	0	58	NA	NA	NA	NA	NA	NA	21900	NA	N	ND	340	540	N
PYRENE	129-00-0	58	2	56	33	41	3/9/2006	SS17	11	13	78500	0.0005	N	BSL	170	280	N
PCBs (µg/kg)																	
AROCLOR-1016	12674-11-2	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1221	11104-28-2	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1232	11141-16-5	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1242	53469-21-9	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1248	12672-29-6	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1254	11097-69-1	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1260	11096-82-5	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1262	37324-23-5	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
AROCLOR-1268	11100-14-4	58	0	58	NA	NA	NA	NA	NA	NA	0.332	NA	N	ND	34	54	Y
INORGANICS (mg/kg)																	
ALUMINUM	7429-90-5	58	58	0	7100	18700	2/26/2006	SS04	5	7	NA	--	N	NA	NA	NA	N
ANTIMONY	7440-36-0	58	0	58	NA	NA	NA	NA	NA	NA	0.27	NA	N	ND	6.6	7.5	Y
ARSENIC	7440-38-2	58	58	0	7.1	81.7	2/26/2006	SS06	11	13	18	4.5	Y	ASL	NA	NA	N
BARIUM	7440-39-3	58	58	0	27.5	203	3/9/2006	SS16	11	13	330	0.6	N	BSL	NA	NA	N
BERYLLIUM	7440-41-7	58	46	12	0.39	1.3	2/27/2006	SS09	7	9	21	0.1	N	BSL	0.55	0.59	N
CADMIUM	7440-43-9	58	53	5	0.06	0.53	3/2/2006	SS15	14	16	0.36	1.5	Y	ASL	0.57	0.61	Y
CALCIUM	7440-70-2	58	58	0	934	29700	3/3/2006	SS07	11	13	NA	--	N	NUT	NA	NA	N
CHROMIUM	7440-47-3	58	58	0	9.8	26.4	3/9/2006	SS18	7	9	26	1.0	N	BSL	NA	NA	N
COBALT	7440-48-4	58	58	0	3	19.8	3/3/2006	SS29	2	4	13	1.5	Y	ASL	NA	NA	N
COPPER	7440-50-8	58	58	0	15.3	38.2	3/9/2006	SS16	11	13	28	1.4	Y	ASL	NA	NA	N
IRON	7439-89-6	58	58	0	21200	57000	3/3/2006	SS29	7	9	NA	--	N	NA	NA	NA	N
LEAD	7439-92-1	58	58	0	6.9	31.3	3/2/2006	SS31	7	9	11	2.8	Y	ASL	NA	NA	N
MAGNESIUM	7439-95-4	58	58	0	2310	7740	3/9/2006	SS17	5	7	NA	--	N	NUT	NA	NA	N
MANGANESE	7439-96-5	58	58	0	100	1660	3/7/2006	SS24	2	4	NA	--	Y	NA	NA	NA	N
NICKEL	7440-02-0	58	58	0	17.1	54.9	2/26/2006	SS06	11	13	13.6	4.0	Y	ASL	NA	NA	N
POTASSIUM	7440-09-7	58	58	0	1180	3210	3/2/2006	SS30	9	11	NA	--	N	NUT	NA	NA	N
SELENIUM	7782-49-2	58	12	46	1.3	2.9	3/9/2006	SS28	3	5	0.0276	105	Y	ASL	3.9	4.3	Y
SILVER	7440-22-4	58	0	58	NA	NA	NA	NA	NA	NA	4.04	NA	N	ND	1.1	1.2	N
SODIUM	7440-23-5	58	18	40	53.7	428	3/9/2006	SS18	7	9	NA	--	N	NUT	554	615	N
THALLIUM	7440-28-0	58	45	13	0.44	3.3	2/25/2006	SS01	5	7	0.0569	58	Y	ASL	2.8	3	Y
VANADIUM	7440-62-2	58	58	0	17	40.4	3/2/2006	SS33	10	12	78	0.5	N	BSL	NA	NA	N
ZINC	7440-66-6	58	58	0	49.6	159	3/9/2006	SS17	7	9	6.62	24	Y	ASL	NA	NA	N

Notes:
NA = Not applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds

COPC Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
ND = Not Detected
NA = No screening level is applicable

(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005); all others are Region V Ecological Screening Levels (U.S EPA 2003)
(2) Detection limit exceeds Ecological Screening Level..
COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level.

Table 2-2
Selection of Chemicals of Potential Ecological Concern
Comparison to Region 5 Ecological Screening Levels - Historic Surface Soils
Copley Square Plaza Site
Copley, Ohio

Field Sample ID	Ecological Screening Level (1)	COPC Screening HQ	SB-1(ET)/S-1	SB-4(ET)/S-1	SB-4(ET)/S-2	SB-5(ET)/S-1	SB-5(ET)/S-2	SB-6(ET)/S-1	SO-01-ESI	SO-02-ESI	SO-03	SO-03-ESI	SO-04-ESI	SO-05	SO-05-ESI	SO-06	SO-06-ESI	SO-07-ESI	SO-08	SO-08-ESI	SO-09-ESI
Sample Date			3/13/1994	3/13/1994	3/13/1994	3/13/1994	3/13/1994	3/13/1994	8/1/2003	8/1/2003	5/14/2002	8/1/2003	8/1/2003	5/14/2002	8/1/2003	5/14/2002	8/1/2003	8/1/2003	5/15/2002	8/1/2003	8/1/2003
Depth Interval			0 .8- 0.8	1- 1	1.8- 1.8	0 .3- 0.3	2- 2	0 .8- 0.8	-	1.5- 2.5	1.5- 2.5	-	-	-	-	-	-	-	-	-	-
Organics (ug/kg)																					
CIS-1,2-DICHLOROETHENE	784	1 4	10 U	20	96	1100	10 U	37	12 U	11 U	11 U	12 U	11 U	12 U	12 U	11 U	13 U	11 U	12 U	11 U	12 U
TETRACHLOROETHENE	9920	0.036	10 U	100	10 U	56	150	360	12 U	11 U	11 U	12 U	11 U	12 U	12 U	11 U	13 U	11 U	12 U	11 U	12 U
TRICHLOROETHYLENE	12400	0 003	10 U	20	10 U	130	10 U	39	12 UJ	11 UJ	11 U	12 UJ	11 UJ	12 U	12 UJ	11 U	13 UJ	11 UJ	12 U	11 UJ	12 U
VINYL CHLORIDE	646	--							12 U	11 U	11 U	12 U	11 U	12 U	12 U	11 U	13 U	11 U	12 U	11 U	12 U
Metals (mg/kg)																					
ALUMINUM	NA	--												6040 J		6710 J			5350 J		
ANTIMONY	0.27	7												1.5 J		1.6 J			1.9 J		
ARSENIC	18	1.7												4.5 J		5 9 J			31.3 J		
BARIUM	330	0.5												101		151			54.9		
BERYLLIUM	21	0.04												0.69 J		0.76 J			0 51 J		
CADMIUM	0.36	--												0.15 U		0 13 U			0 13 U		
CALCIUM	NA	--												5990		1280			6820		
CHROMIUM	26	0 5												10 9		12.9			9 7		
COBALT	13	0.9												12.3		12.3			9.4		
COPPER	28	0.9												10		13 8			25 9		
CYANIDE	1 33	--												0 22 U		0 19 U			0 2 U		
IRON	NA	--												14900 J		16100 J			27000 J		
LEAD	11	2.5												12.4		11.1			27.6		
MAGNESIUM	NA	--												2730		2660			3630		
MANGANESE	NA	--												431		174			705		
MERCURY	0.1	--												0.13 U		0 1 U			0.1 U		
NICKEL	13.6	1.7												21.8		20.9			23		
POTASSIUM	NA	--												1020 J		1130 J			888 J		
SELENIUM	0 0276	--												1 U		0 85 U			0 89 U		
SILVER	4 04	0.09												0 35 J		0 23 UJ			0 25 UJ		
SODIUM	NA	--												319		118 U			123 U		
THALLIUM	0 0569	--												1 4 U		1 2 U			1 2 U		
VANADIUM	78	0.2												14 9		17.9			13 8		
ZINC	6.62	17												46.8 J		53.6 J			112 J		

Notes:
NA = Not applicable
U - The analyte was analyzed for, but was not detected above the sample quantitation Limit
J - The result is an estimated quantity. The associated numerical value is an approximate concentration of the analyte in the sample
UJ - The analyte was analyzed for, but was not detected. The reported quantitation Limit is approximate and may be inaccurate or imprecise
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
COPC = Constituent of potential concern
HQ = Hazard quotient
Bold indicates Ecological Screening Level was exceeded.
COPC Screening HQ = Maximum detected concentration divided by Ecological Screening Level.
-- Not available.
(1) Lowest EPA Ecological soil screening level (Eco-SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA, 2005); all others are Region V Ecological Screening Levels (U.S. EPA 2003)

Table 2-3
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern,
Surface Water
Copley Square Plaze
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration	Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
VOCs (µg/L)														
1,1,1-TRICHLOROETHANE	71-55-6	2	1	5	NA	NA	SW01	76	NA	N	BSL	0.5	1.6	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	2	0	2	NA	NA	NA	260	NA	N	ND	0.5	1.6	N
1,1,2-TRICHLOROETHANE	79-00-5	2	0	2	NA	NA	NA	740	NA	N	ND	0.5	1.6	N
1,1-DICHLOROETHANE	75-34-3	2	0	2	NA	NA	SW01	NA	NA	N	NA	0.5	1.6	N
1,1-DICHLOROETHYLENE	75-35-4	2	1	1	0.43	0.43	SW02	NA	--	N	NA	0.5	1.6	N
1,2,3-TRICHLOROBENZENE	87-61-6	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
1,2,4-TRICHLOROBENZENE	120-82-1	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
1,2-DIBROMOETHANE	106-93-4	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
1,2-DICHLOROBENZENE	95-50-1	2	0	2	NA	NA	NA	23	NA	N	ND	0.5	1.6	N
1,2-DICHLOROETHANE	107-06-2	2	0	2	NA	NA	NA	2000	NA	N	ND	0.5	1.6	N
1,2-DICHLOROPROPANE	78-87-5	2	0	2	NA	NA	NA	520	NA	N	ND	0.5	1.6	N
1,4-DICHLOROBENZENE	106-46-7	2	0	2	NA	NA	NA	9.4	NA	N	ND	0.5	1.6	N
1,4-DIOXANE	123-91-1	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
2-BUTANONE	78-93-3	2	1	1	2.5	2.5	SW01	NA	--	N	NA	5	16	N
4-METHYL-2-PENTANONE	108-10-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	16	N
ACETONE	67-64-1	2	2	0	9.7	17	SW02	NA	--	N	NA	5	5	N
BENZENE	71-43-2	2	0	6	NA	NA	NA	160	NA	N	ND	0.5	1.6	N
BROMODICHLOROMETHANE	75-27-4	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
BROMOMETHANE	74-83-9	2	0	2	NA	NA	NA	16	NA	N	ND	0.5	1.6	N
CARBON DISULFIDE	75-15-0	2	0	2	NA	NA	NA	15	NA	N	ND	0.5	1.6	N
CARBON TETRACHLORIDE	56-23-5	2	0	2	NA	NA	NA	240	NA	N	ND	0.5	1.6	N
CFC-11	75-69-4	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CFC-12	75-71-8	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CHLORINATED FLUOROCARBON (FREON 113)	76-13-1	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CHLOROBENZENE	108-90-7	2	0	2	NA	NA	NA	47	NA	N	ND	0.5	1.6	N
CHLOROBROMOMETHANE	74-97-5	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CHLORODIBROMOMETHANE	124-48-1	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CHLOROETHANE	75-00-3	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CHLOROFORM	67-66-3	2	0	2	NA	NA	NA	140	NA	N	ND	0.5	1.6	N
CHLOROMETHANE	74-87-3	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
CIS-1,2-DICHLOROETHENE	156-59-2	2	2	0	2	37	SW02	NA	--	N	NA	5	5	N
CIS-1,3-DICHLOROPROPENE	10061-01-5	2	1	1	0.33	0.33	SW02	NA	--	N	NA	0.5	1.6	N
CYCLOHEXANE	110-82-7	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
DICHLOROMETHANE	75-09-2	2	1	1	0.36	0.36	SW02	1900	1.9E-04	N	BSL	0.5	1.6	N
ETHYLBENZENE	100-41-4	2	0	2	NA	NA	NA	61	NA	N	ND	0.5	1.6	N
ISOPROPYLBENZENE	98-82-8	2	0	2	NA	NA	NA	4.8	NA	N	ND	0.5	1.6	N
M,P-XYLENE	179601-23-1	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
M-DICHLOROBENZENE	541-73-1	2	0	2	NA	NA	NA	22	NA	N	ND	0.5	1.6	N
METHYL ACETATE	79-20-9	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
METHYL N-BUTYL KETONE	591-78-6	2	0	2	NA	NA	NA	NA	NA	N	ND	5	16	N
METHYL TERT-BUTYL ETHER	1634-04-4	2	1	1	0.15	0.15	SW01	730	2.1E-04	N	BSL	0.5	1.6	N
METHYLBENZENE	108-88-3	2	0	2	NA	NA	NA	62	NA	N	ND	0.5	1.6	N
METHYLCYLOHEXANE	108-87-2	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
O-XYLENE	95-47-6	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
STYRENE	100-42-5	2	0	2	NA	NA	NA	32	NA	N	ND	0.5	1.6	N
TETRACHLOROETHENE	127-18-4	2	2	0	6.7	18	SW02	53	0.34	N	BSL	5	5	N
TRANS-1,2-DICHLOROETHENE	156-60-5	2	1	1	0.39	0.39	SW02	NA	--	N	NA	0.5	1.6	N
TRANS-1,3-DICHLOROPROPENE	10061-02-6	2	0	2	NA	NA	NA	NA	NA	N	ND	0.5	1.6	N
TRIBOMOMETHANE	75-25-2	2	0	2	NA	NA	NA	230	NA	N	ND	0.5	1.6	N
TRICHLOROETHYLENE	79-01-6	2	2	0	0.51	7.1	SW02	220	0.03	N	BSL	5	5	N
VINYL CHLORIDE	75-01-4	2	2	0	0.44	2.1	SW01	930	0.002	N	BSL	0.5	5	N

Notes:

NA = Not applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds

COPC Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
ND = Not Detected
NA = No screening level is applicable

(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005); all others are Region V Ecological Screening Levels (U.S. EPA 2003)

(2) Detection limit exceeds Ecological Screening Level..

COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level

Table 2-3
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern,
Surface Water
Copley Square Plaza
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration	Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
SVOCs (µg/L)														
1,1'-BIPHENYL	92-52-4	2	0	2	NA	NA	NA	6.5	NA	N	ND	5	5	N
1,2,4,5-TETRACHLOROBENZENE	95-94-3	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
1,2-BENZPHENANTHRACENE	218-01-9	2	2	0	3	5	SW02	NA	--	N	NA	NA	NA	N
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
2,4,5-TRICHLOROPHENOL	95-95-4	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
2,4,6-TRICHLOROPHENOL	88-06-2	2	0	2	NA	NA	NA	4.9	NA	N	ND	5	5	Y
2,4-DICHLOROPHENOL	120-83-2	2	0	2	NA	NA	NA	11	NA	N	ND	5	5	N
2,4-DIMETHYLPHENOL	105-67-9	2	0	2	NA	NA	NA	15	NA	N	ND	5	5	N
2,4-DINITROPHENOL	51-28-5	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
2,4-DINITROTOLUENE	121-14-2	2	0	2	NA	NA	NA	44	NA	N	ND	5	5	N
2,6-DINITROTOLUENE	606-20-2	2	0	2	NA	NA	NA	81	NA	N	ND	5	5	N
2-CHLORONAPHTHALENE	91-58-7	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
2-CHLOROPHENOL	95-57-8	2	0	2	NA	NA	NA	32	NA	N	ND	5	5	N
2-METHYLNAPHTHALENE	91-57-6	2	0	2	NA	NA	NA	NA	NA	N	NA	5	5	N
2-METHYLPHENOL	95-48-7	2	0	2	NA	NA	NA	67	NA	N	ND	5	5	N
2-NITROANILINE	88-74-4	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
2-NITROPHENOL	88-75-5	2	0	2	NA	NA	NA	73	NA	N	ND	5	5	N
3,3'-DICHLOROBENZIDINE	91-94-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	78-59-1	2	0	2	NA	NA	NA	920	NA	N	ND	5	5	N
3-NITROANILINE	99-09-2	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
4,6-DINITRO-2-METHYLPHENOL	534-52-1	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
4-BROMOPHENYL PHENYL ETHER	101-55-3	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
4-CHLORO-3-METHYLPHENOL	59-50-7	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
4-METHYLPHENOL	106-44-5	2	0	2	NA	NA	NA	53	NA	N	ND	5	5	N
4-NITROPHENOL	100-02-7	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
ACENAPHTHENE	83-32-9	2	1	2	NA	NA	NA	15	NA	N	BSL	5	5	N
ACENAPHTHYLENE	208-96-8	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
ACETOPHENONE	98-86-2	2	1	1	0.6	0.6	SW01	NA	--	N	NA	5	5	N
ANTHRACENE	120-12-7	2	0	2	NA	NA	NA	0.02	NA	N	ND	5	5	Y
ATRAZINE	1912-24-9	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
BENZALDEHYDE	100-52-7	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
BENZO(A)ANTHRACENE	56-55-3	2	2	0	2	2	SW01/SW02	NA	--	N	NA	NA	NA	N
BENZO(A)PYRENE	50-32-8	2	2	0	2	3	SW01	NA	--	N	NA	NA	NA	N
BENZO(B)FLUORANTHENE	205-99-2	2	2	0	3	5	SW01	NA	--	N	NA	NA	NA	N
BENZO(G,H,I)PERYLENE	191-24-2	2	2	0	2	4	SW01	NA	--	N	NA	NA	NA	N
BENZO(K)FLUORANTHENE	207-08-9	2	2	0	3	6	SW02	NA	--	N	NA	NA	NA	N
BENZYL BUTYL PHTHALATE	85-68-7	2	0	2	NA	NA	NA	23	NA	N	ND	5	5	N
BIS(2-CHLOROETHOXY)METHANE	111-91-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
BIS(2-CHLOROETHYL)ETHER	111-44-4	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	2	2	0	3	4	SW01	8.4	0.48	N	BSL	NA	NA	N
CAPROLACTAM	105-60-2	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
CARBAZOLE	86-74-8	2	2	0	0.7	0.8	SW02	NA	--	N	NA	NA	NA	N
CHLOROPHENOLS	58-90-2	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
DIBENZO(A,H)ANTHRACENE	53-70-3	2	2	0	0.6	0.8	SW02	NA	--	N	NA	5	5	N
DIBENZOFURAN	132-64-9	2	0	2	NA	NA	NA	4	NA	N	ND	5	5	Y
DIETHYL PHTHALATE	84-66-2	2	0	2	NA	NA	NA	220	NA	N	ND	5	5	N
DIMETHYL PHTHALATE	131-11-3	2	0	2	NA	NA	NA	1100	NA	N	ND	5	5	N
DI-N-BUTYLPHTHALATE	84-74-2	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
DI-N-OCTYLPHTHALATE	117-84-0	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
FLUORANTHENE	206-44-0	2	2	0	6	7	SW01	0.8	8.75	Y	ASL	NA	NA	N
FLUORENE	86-73-7	2	0	2	NA	NA	NA	19	NA	N	BSL	5	5	N
HEXACHLORO-1,3-BUTADIENE	87-68-3	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N

Notes:

NA = Not applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds

COPC Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
ND = Not Detected
NA = No screening level is applicable

(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005), all others are Region V Ecological Screening Levels (U.S. EPA 2003)

(2) Detection limit exceeds Ecological Screening Level..

COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level.

Table 2-3
Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern,
Surface Water
Copley Square Plaze
Copley, Ohio

Analyte	CAS Number	Number of Samples Analyzed	Number of Detections	Number of Non-Detections	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration	Screening Level Criteria (1)	COPC Screening HQ	COPC Flag	Rationale for Contaminant Deletion or Selection	Minimum Detection Limit	Maximum Detection Limit	COPC Flag (2)
SVOCs (µg/L)														
HEXACHLOROBENZENE	118-74-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
HEXACHLOROCYCLOPENTADIENE	77-47-4	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
HEXACHLOROETHANE	67-72-1	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
INDENO(1,2,3-CD)PYRENE	193-39-5	2	2	0	2	4	SW01	NA	--	N	NA	NA	NA	N
NAPHTHALENE	91-20-3	2	0	2	NA	NA	NA	21	NA	N	BSL	5	5	N
NITROBENZENE	98-95-3	2	0	2	NA	NA	NA	380	NA	N	ND	5	5	N
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
N-NITROSODIPHENYLAMINE	86-30-6	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
P-CHLOROANILINE	106-47-8	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
PENTACHLOROPHENOL	87-86-5	2	0	2	NA	NA	NA	NA	NA	N	NA	10	10	N
PHENANTHRENE	85-01-8	2	2	0	2	2	SW01/SW02	2.3	0.87	N	BSL	NA	NA	N
PHENOL	108-95-2	2	0	2	NA	NA	NA	NA	NA	N	ND	5	5	N
P-NITROANILINE	100-01-6	2	0	2	NA	NA	NA	NA	NA	N	ND	10	10	N
PYRENE	129-00-0	2	2	0	4	5	SW01	4.6	1.1	Y	ASL	NA	NA	N
PCBs (µg/L)														
AROCLOR-1016	12674-11-2	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1221	11104-28-2	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1232	11141-16-5	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1242	53469-21-9	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1248	12672-29-6	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1254	11097-69-1	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1260	11096-82-5	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1262	37324-23-5	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
AROCLOR-1268	11100-14-4	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
INORGANICS (µg/L)														
ANTIMONY	7440-36-0	2	0	0	NA	NA	NA	190	NA	N	ND	2	2	N
ARSENIC	7440-38-2	2	2	0	3.5	5.3	SW01	150	0.035	N	BSL	NA	NA	N
BARIUM	7440-39-3	2	2	0	87.8	98.6	SW01	200	0.493	N	BSL	NA	NA	N
BERYLLIUM	7440-41-7	2	0	2	0.067	0.067	NA	11	0.006	N	BSL	1	1	N
CADMIUM	7440-43-9	2	0	2	0.09	0.09	NA	2.5	0.036	N	BSL	1	1	N
CHROMIUM	7440-47-3	2	2	0	5.7	11.5	SW01	74	0.16	N	BSL	NA	NA	N
COBALT	7440-48-4	2	2	0	1.4	2	SW02	24	0.083	N	BSL	NA	NA	N
COPPER	7440-50-8	2	2	0	18.2	40.8	SW02	9.3	4.4	Y	ASL	2	2	N
LEAD	7439-92-1	2	2	0	18.9	19	SW02	5.1	3.7	Y	ASL	1	1	N
MANGANESE	7439-96-5	2	2	0	607	732	SW02	NA	--	N	NA	NA	NA	N
NICKEL	7440-02-0	2	2	0	5	5.8	SW02	52	0.11	N	BSL	NA	NA	N
SELENIUM	7782-49-2	2	0	2	NA	NA	NA	4.6	NA	N	BSL	5	5	Y
SILVER	7440-22-4	2	0	2	NA	NA	NA	NA	NA	N	ND	1	1	N
THALLIUM	7440-28-0	2	0	2	NA	NA	NA	17	NA	N	ND	1	1	N
VANADIUM	7440-62-2	2	2	0	3.7	5.4	SW02	44	0.12	N	BSL	1	1	N
ZINC	7440-66-6	2	2	0	2.9	78.2	SW01	120	0.65	N	BSL	NA	NA	N

Notes:

NA = Not applicable
COPC = Chemical of Potential Concern
µg/L = micrograms per liter
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds

COPC Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
ND = Not Detected

(1) Lowest EPA Ecological Soil Screening Level (Eco- SSL) for antimony, arsenic, barium, beryllium, cadmium, chromium , cobalt, copper, lead, and vanadium (U.S. EPA 2005); all others are Region V Ecological Screening Levels (U.S. EPA 2003)
(2) Detection limit exceeds Ecological Screening Level..
COPC Screening Hazard Quotient (HQ) = Maximum detected concentration divided by Ecological Screening Level.

Table 3-1
Risk Characterization for RI Soil Samples - Maximum Concentrations
Copley Square Plaza
Copley, Ohio

COPEC	Soil Background Levels		RI Soil Minimum Detected Concentration	RI Soil Maximum Detected Concentration	Location of Maximum Detected Concentration	Upper Depth of Maximum Detected Concentration (ft)	Lower Depth of Maximum Detected Concentration (ft)	Invertebrates and Microbes Soil Screening Benchmark	Invertebrate Hazard Quotient	Plants Soil Screening Benchmark	Plant Hazard Quotient	Mammals Soil Screening Benchmark	Mammal Hazard Quotient	Avian Soil Screening Benchmark	Avian Hazard Quotient
	Mean (SD)	Range													
VOCs (µg/kg)															
CHLORINATED FLUOROCARBON (FREON 113)	--		230	320	SS04	5	7	NA --	--	NA	--	NA	--	NA	--
CIS-1,2-DICHLOROETHENE	--		0.19	1100	SS08	9.5	11.5	NA --	--	NA	--	NA	--	NA	--
TETRACHLOROETHENE	--		1.2	39000	SS08	9.5	11.5	NA --	--	NA	--	NA	--	NA	--
SVOCs (µg/kg)															
CAPROLACTAM	--		8.3	13	SS09	7	9	NA --	--	NA	--	NA	--	NA	--
BIS(2-ETHYLHEXYL)PHTHALATE	--		8.3	3600	SS08	7	9	NA --	--	NA		NA		NA	
DI-N-BUTYLPHTHALATE	--		16	210	SS15	4	6	NA --	--	200000 c	0.001	NA	--	NA	--
INORGANICS (mg/kg)															
ARSENIC	7	1 - 93.2 b	7.1	81.7	SS29	2	4	100 c, microbes	0.8	18 d	4.5	46 d	1.8	102 c	0.8
CADMIUM	0.2 (0.3)	BDL - 2.9 a	0.06	0.53	SS29	2	4	140 d	0.004	32 d	0.02	6 c	0.1	4.2 c	0.1
COBALT	10.5	3 - 50 b	3	19.8	SS04	14	15	1000 c, microbes	0.02	20 c	1.0	230 d	0.1	120 d	0.2
COPPER	19 (5)	11 - 37 a	15.3	38.2	SS18	7	9	100 c, microbes	0.4	100 c	0.4	370 c	0.1	515 c	0.1
LEAD	19 (5)	9 - 39 a	6.9	31.3	SS29	2	4	1700 d	0.02	120 d	0.3	740 d	0.04	40.5 c	0.8
MANGANESE	490	20 - 3000 b	100	1660	SS16	5	7	100 c, microbes	16.6	500 c	3.3	NA	--	NA	--
NICKEL	18 (5)	9 - 38 a	17.1	54.9	SS18	5	7	200 c, inverts	0.3	30 c	1.8	246 e	0.2	121 e	0.5
SELENIUM	0.31	<0.1 - 4.0 b	1.3	2.9	SS18	7	9	100 c, microbes	0.03	1 c	2.9	0.21 e	13.8	420 e	0.01
THALLIUM	--	0.02 - 2.8 a	0.44	3.3	SS29	2	4	NA	--	1 c	3.3	2.1 e	1.6	NA	--
ZINC	75 (15)	47 - 138 a	49.6	159	SS09	14	15.5	100 c, inverts, microbes	1.6	50 c	3.2	1600 e	0.1	8.5 e	19

Notes:
NA = Not applicable
COPEC = Chemical of Potential Ecological Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
RI = Remedial Investigation
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds
NA = No screening level is applicable
BDL = Below detection limit.
SD = Standard deviation
a = Background levels of heavy metals in Ohio Farm Soils, Research Circular 275-83. http://ohioline.osu.edu/rc275/rc275_3.html
b = Oak Ridge National Laboratory, Generic Soil Background Values, various soils. Risk Assessment Information System 2004. http://risk.lsd.ornl.gov/
c = Oak Ridge National Laboratory, Risk Assessment Information System Ecological Benchmarks, 2004. http://risk.lsd.ornl.gov/
d = EPA Ecological Soil Screening Levels (EPA, 2005).
e = Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Receptors. Oak Ridge National Laboratory. ES/ER/TM-162/R2.

Table 3-2
Risk Characterization for Historic Surface Soils
Copley Square Plaze
Copley, Ohio

COPEC	Soil Background Levels Mean (SD)	Soil Background Levels Range		Shallow Soil Minimum Detected Concentration	Shallow Soil Maximum Detected Concentration	Location of Maximum Detected Concentration	Arithmetic Average	Invertebrates and Microbes Soil Screening Benchmark		Invertebrate Hazard Quotient	Plants Soil Screening Benchmark		Plant Hazard Quotient	Mammals Soil Screening Benchmark		Mammal Hazard Quotient	Avian Soil Screening Benchmark		Avian Hazard Quotient
INORGANICS (mg/kg)																			
ANTIMONY	--	0.25 - 0.6	b	1.5	1.9	SO-08	1.7	78	d	0.02	5	c	0.4	0.27	d	7.0	NA		--
ARSENIC	7	1 - 93.2	b	4.5	31.3	SO-8	13.9	100	c, microbes	0.3	18	d	1.7	46	d	0.7	102	e	0.3
LEAD	19 (5)	9 - 39	a	11.1	27.6	SO-08	17.0	1700	d	0.02	120	d	0.2	740	d	0.04	40.5	e	0.7
MANGANESE	490	20 - 3000	b	174	705	SO-08	436.7	100	c, microbes	7.1	500	c	1.4	NA		--	NA		--
NICKEL	18 (5)	9 - 38	a	20.9	23	SO-08	21.9	200	c, inverts	0.1	30	c	0.8	246	e	0.1	121	e	0.2
ZINC	75 (15)	47 - 138	a	46.8	112	SO-08	70.8	100	c, inverts, microbes	1.1	50	c	2.2	1600	e	0.1	8.5	e	13
VOCs (µg/kg)																			
CIS-1,2-DICHLOROETHENE	--			20	1100	SB-5(ET)/S-1	313	NA	--	--	NA		--	NA		--	NA		--

Notes
NA = Not applicable
COPEC = Chemical of Potential Ecological Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds
SD = Standard deviation.
NA = No screening level is applicable
BDL = Below detection limit.
a = Background levels of heavy metals in Ohio Farm Soils, Research Circular 275-83. http://ohioline.osu.edu/rc275/rc275_3.html
b = Oak Ridge National Laboratory, Generic Soil Background Values, various soils. Risk Assessment Information System 2004. http://risk.lsd.ornl.gov/
c = Oak Ridge National Laboratory, Risk Assessment Information System Ecological Benchmarks, 2004. http://risk.lsd.ornl.gov/
d = EPA Ecological Soil Screening Levels (EPA, 2005).
e = Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Receptors. Oak Ridge National Laboratory. ES/ER/TM-162/R2.

Table 3-3
Risk Characterization for Surface Water
Copley Plaza
Copley, Ohio

COPEC	Maximum Detected Concentration	Statewide-Criteria for Protection of Aquatic Life[a]		Hazard Quotient	
		OMZA	OMZM	OMZA	OMZM
SVOCs (µg/L)					
FLUORANTHENE	7	0.8	3.7	9	1.9
PYRENE	5	4.6	42	1.1	0.1
INORGANICS (µg/L)					
COPPER*	40.8	9.3	14	4.4	2.9
LEAD*	19	6.4	120	3.0	0.2

Notes:

COPEC = Chemical of Potential Ecological Concern

µg/L = micrograms per liter

SVOCs = Semivolatile Organic Compounds

* Based on total recoverable metals and a hardness of 100 mg/L.

OMZA = Outside mixing zone average.

OMZM = Outside mixing zone maximum.

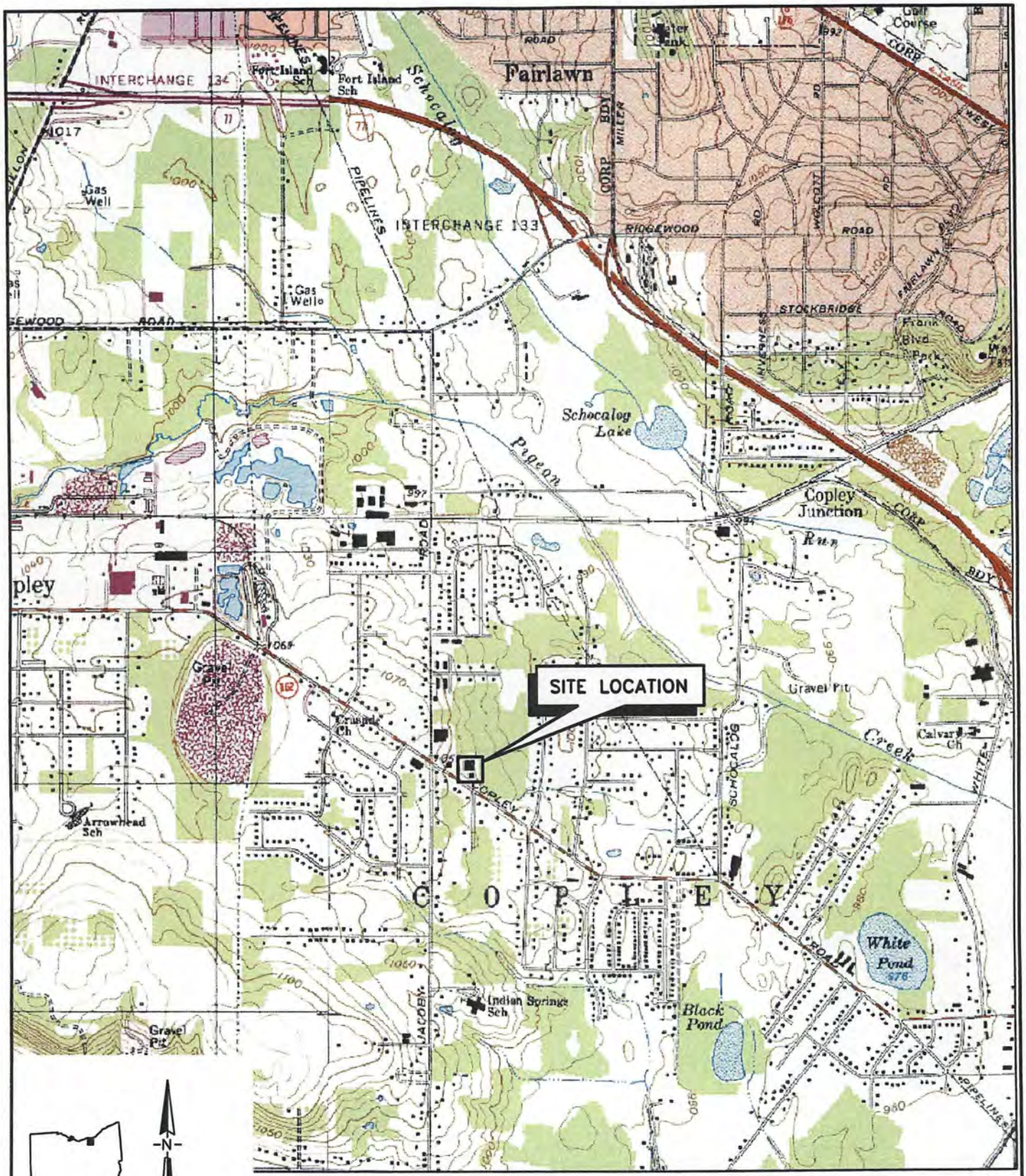
[a] Ohio River Basin Aquatic Life and Human Health Tier I Criteria and Tier II Values contained in and developed pursuant to Chapter 3745-1 of the Ohio Administrative Code (OAC), Ohio EPA, Division of Surface Water. 7/27/05).

Table 3-4
Risk Characterization for RI Soil Samples - 95UCL Concentrations
Copley Square Plaze
Copley, Ohio

COPEC	Soil Background Levels Mean (SD)	Soil Background Levels Range	RI Soil Arithmetic Mean Concentration	RI Soil 95UCL Concentration	95 UCL Basis	Invertebrates and Microbes Soil Screening Benchmark	Invertebrate Hazard Quotient	Plants Soil Screening Benchmark	Plant Hazard Quotient	Mammals Soil Screening Benchmark	Mammal Hazard Quotient	Avian Soil Screening Benchmark	Avian Hazard Quotient
ARSENIC	7	1 - 93.2 b	18.7	21.9	H-UCL	100 c, microbes	0.2	18 d	1.2	46 d	0.5	102 e	0.2
MANGANESE	490	20 - 3000 b	470	681	95% Chebeshev (Mean, SD) UCL	100 c, microbes	6.8	500 c	1.4	NA	--	NA	--
NICKEL	18 (5)	9 - 38 a	29.6	31.2	H-UCL	200 c, inverts	0.2	30 c	1.0	246 e	0.1	121 e	0.3
SELENIUM	0.31	<0.1 - 4.0 b	1.77	1.82	Student's t-UCL	100 c, microbes	0.02	1 c	1.8	0.21 e	8.7	420 e	0.004
THALLIUM	--	0.02 - 2.8 b	1.23	1.32	Student's t-UCL	NA	--	1 c	1.3	2.1 e	0.6	NA	--
ZINC	75 (15)	47 - 138 a	81	85.5	Approximate Gamma-UCL	100 c, inverts, microbes	0.9	50 c	1.7	1600 e	0.1	8.5 e	10

Notes:
NA = Not applicable
COPEC = Chemical of Potential Ecological Concern
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds
NA = No screening level is applicable
BDL = Below detection limit.
SD = Standard deviation.
95UCL = 95th percentile upper confidence limit on the mean, calculated using ProUCL version 3.
a = Background levels of heavy metals in Ohio Farm Soils, Research Circular 275-83. http://ohioline.osu.edu/rc275/rc275_3.html
b = Oak Ridge National Laboratory, Generic Soil Background Values, various soils. Risk Assessment Information System 2004. http://risk.lsd.ornl.gov/
c = Oak Ridge National Laboratory, Risk Assessment Information System Ecological Benchmarks, 2004. http://risk.lsd.ornl.gov/
d = EPA Ecological Soil Screening Levels (EPA, 2005).
e = Efroymson et al , 1997. Preliminary Remediation Goals for Ecological Receptors. Oak Ridge National Laboratory. ES/ER/TM-162/R2.

FIGURES



SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS.
AKRON WEST, OHIO QUADRANGLE.

FIGURE 1-1

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 243-RICO-05XW
DOCUMENT CONTROL No. RFW243-2A-AWHE

SITE LOCATION MAP
SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT
COPLEY SQUARE PLAZA
Copley, Ohio

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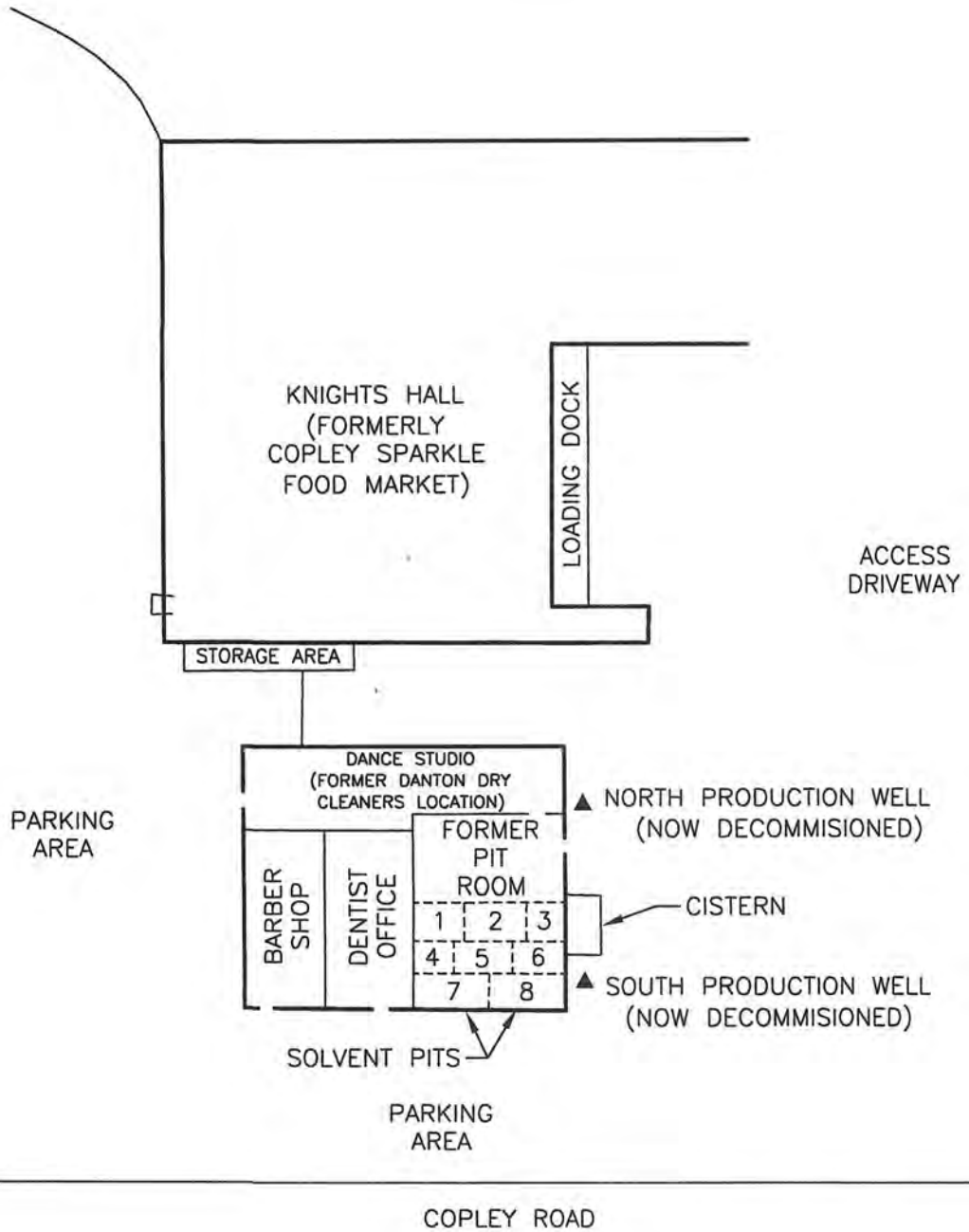

FIGURE 1-2

RESPONSE ACTION CONTRACT	SITE DETAIL MAP
U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 243-RICO-05XW DOCUMENT CONTROL No. RFW243-2A-AWHE	SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT COPLEY SQUARE PLAZA Copley, Ohio

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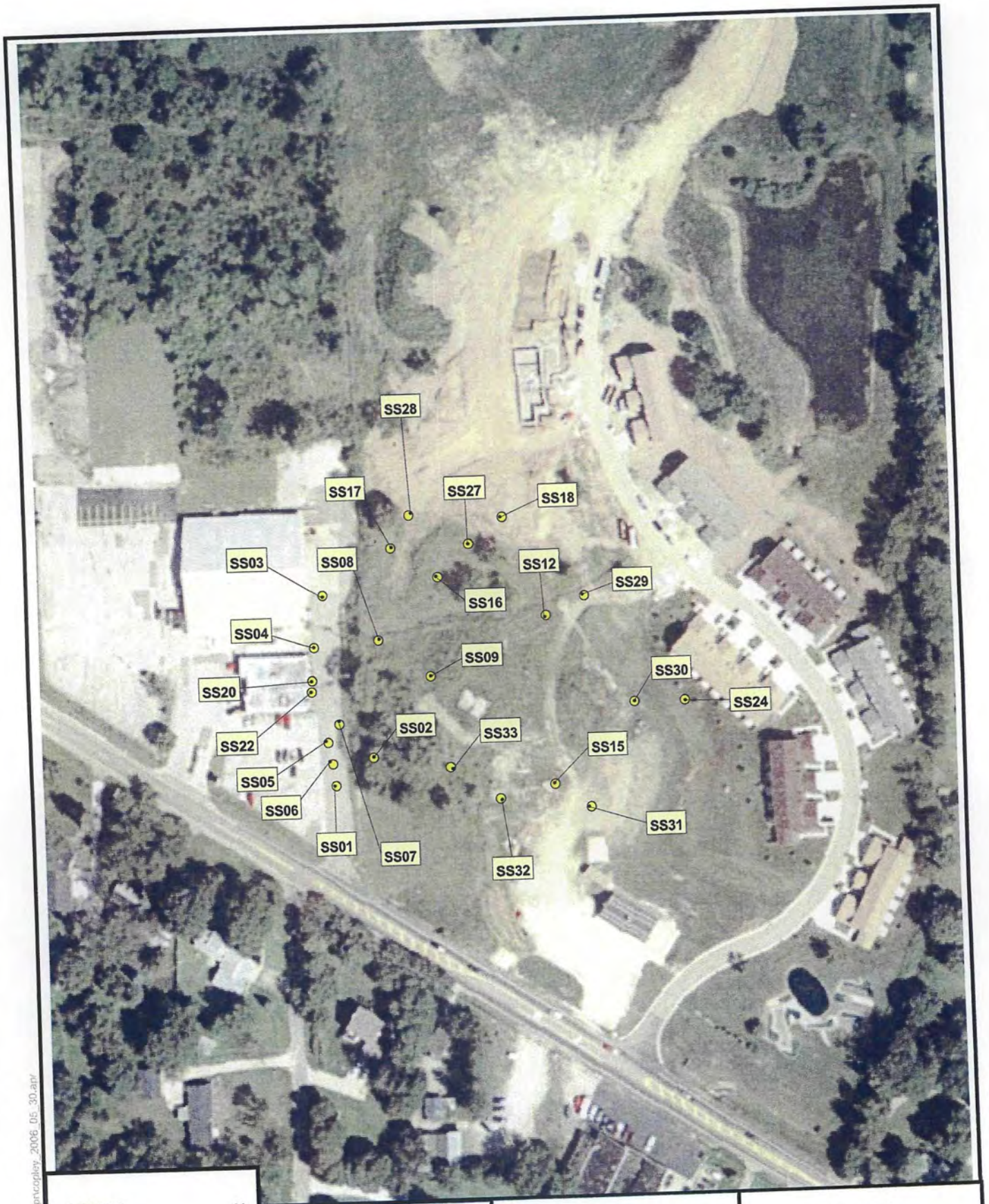

LEGEND

○ Soil Sample Locations

N

0 150 Feet

Contract No. 68-W7-026
Work Assignment No. 243-RICO-05XW
Document Control No. RFW243-2A-AWHE

Weston Solutions, Inc.
750 E. Bunker Ct.
Suite 500
Vernon Hills, IL 60061

Figure 2-1
Soil Sample Locations
Copley Square Plaza Site
Copley, Ohio

NJK D:\Copley_GIS\arc\copley_2006_05_30.apr

LEGEND

○ Surface Water Sample Locations

N

0 150 Feet

Contract No. 68-W7-026
Work Assignment No. 243-RICO-05XW
Document Control No. RFW243-2A-AWHE

Weston Solutions, Inc.
750 E. Bunker Ct.
Suite 500
Vernon Hills, IL 60061

Figure 2-2
Surface Water Sample Locations
Copley Square Plaza Site
Copley, Ohio

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Figure 2-3

Preliminary Ecological Conceptual Site Model
Copley Square Plaza
Copley, Ohio

Exposure Medium	Exposure Route	Birds	Mammals	Plants	Soil-dwelling Organisms	Aquatic Organisms
Soil	Ingestion	X	X	X	X	–
	Dermal contact	O	O	O	X	–
	Inhalation	O	O	O	X	–
	Biota	X	X	X	X	–
Surface Water	Ingestion	O	O	O	--	X
	Dermal contact	O	O	O	--	X
	Inhalation	O	O	O	--	X
	Biota	O	O	O	--	X

X = Potential exposure route determined to be significant for this receptor.
O = Potential exposure route determined to be insignificant or cannot be quantified for this receptor.
-- = Potential exposure route not of concern for this receptor.

APPENDIX A

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR — SAMUEL W. SPECK, DIRECTOR

Division of Natural Areas and Preserves
Tom Linkous, Chief
2045 Morse Rd., Bldg. F-1
Columbus, OH 43229-6693
Phone: (614) 265-6453; Fax: (614) 267-3096

August 9, 2006

Marissa Pihl
Weston Solutions, Inc.
20 N. Wacker Dr., Suite 1210
Chicago, IL 60606

Dear Ms. Pihl:

I have reviewed our Natural Heritage maps and files for the Copley Square Plaza Remedial Investigation project area, including a two mile radius, at 2777-2799 Copley Rd. in Copley Township, Summit County, Ohio, and on the Wadsworth and Akron West Quads (contract # 68-W7-0026; work assignment # 243-RICO-05XW; document control # RFW243-2E-AUKL; USEPA ID # OH0000563122). The numbers/letters on the list below correspond to the areas marked on the accompanying map. Common name, scientific name and status are given for each species.

Wadsworth/Akron West Quads

1. *Cyperus diandrus* - Low Umbrella-sedge, potentially threatened
2. *Betula populifolia* - Gray Birch, potentially threatened
3. *Polyodon spathula* - Paddlefish, threatened

There are no existing or proposed state nature preserves or scenic rivers at the project site. We are also unaware of any unique ecological sites, geologic features, breeding or non-breeding animal concentrations or state parks, forests or wildlife areas in the project vicinity.

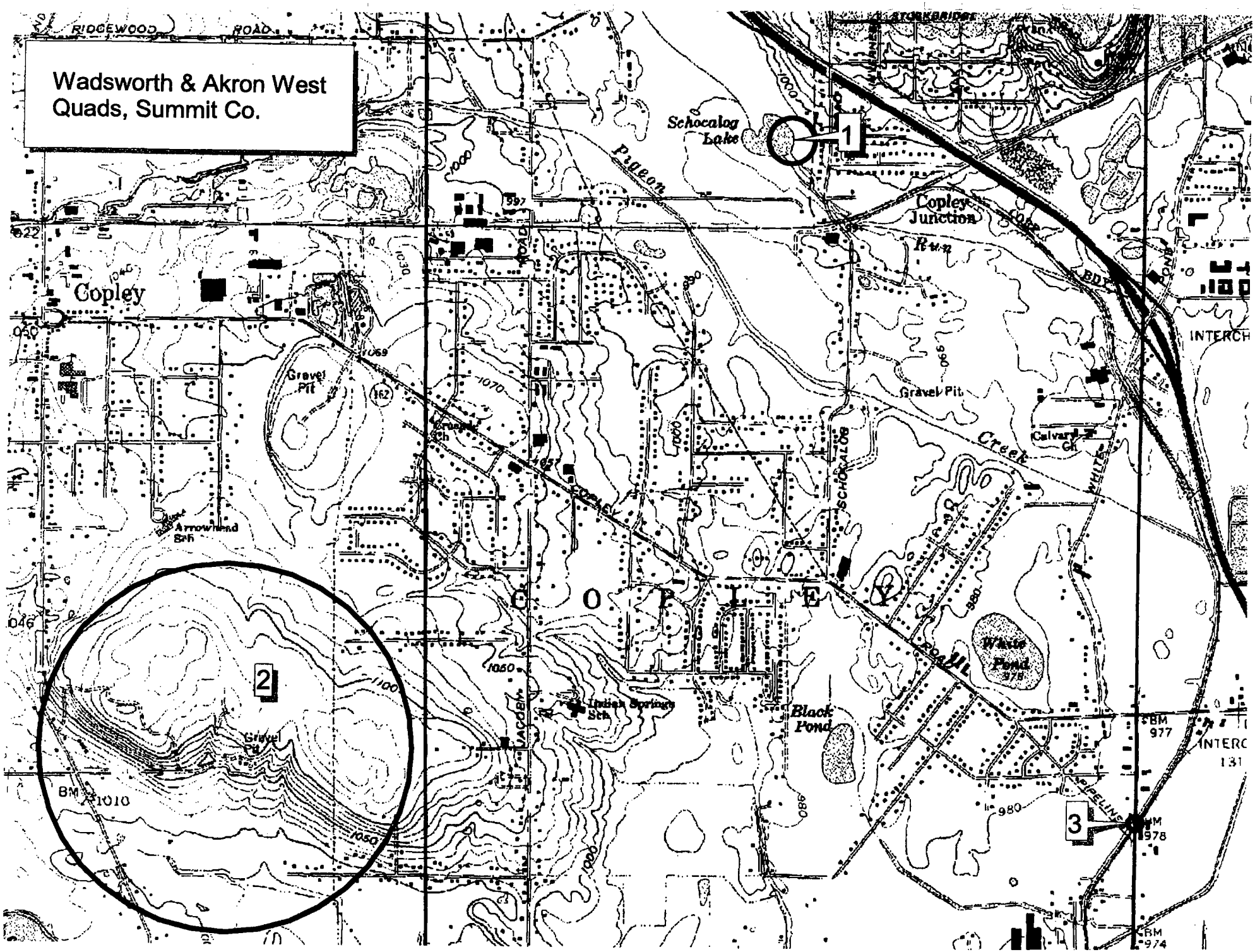
Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Please note that although we inventory all types of plant communities, we only maintain records on the highest quality areas. Also, we do not have data for all Ohio wetlands. For National Wetlands Inventory maps, please contact Madge Fitak in the Division of Geological Survey at 614-265-6576.

Please contact me at 614-265-6818 if I can be of further assistance.

Sincerely,

Debbie Woischke

Debbie Woischke, Ecological Analyst
Natural Heritage Program


Wadsworth & Akron West Quads, Summit Co.
RIDGEWOOD ROAD
Schocalog Lake
Pigeon Run
Copley Junction
Copley
Gravel Pit
Arrowhead Sch
Gravel Pit
Gravel Pit
Calvary Ch
Creek
COPLEY
Waste Pond
Black Pond
Indian Springs Sch
BM 1010
BM 977
BM 978
BM 974
1
2
3