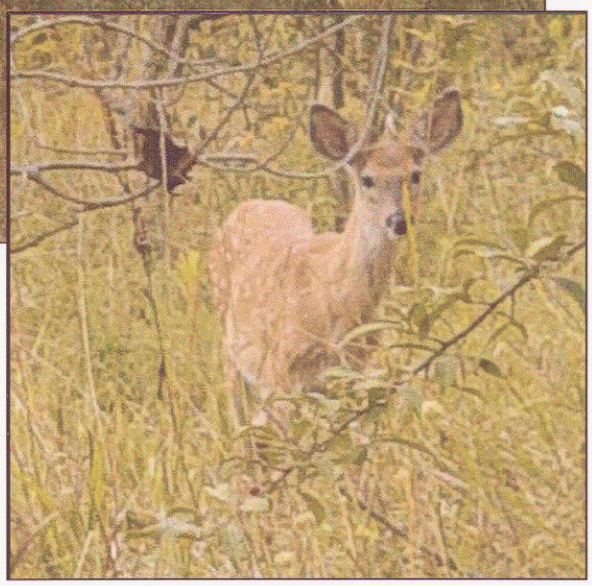
REMEDIAL DESIGN PLAN

for the

Industrial Excess Landfill (IEL) Site



September 22, 2003

Submitted by: The Responding Companies

BRIDGESTONE/FIRESTONE, INC.
THE GOODYEAR TIRE & RUBBER COMPANY
THE B.F. GOODRICH COMPANY
GENCORP

REMEDIAL DESIGN PLAN

for the

Industrial Excess Landfill (IEL) Site
Uniontown, Ohio

September 22, 2003

Submitted on behalf of
The Responding Companies:
The Goodyear Tire & Rubber Company
Bridgestone/Firestone, Inc.
BFGoodrich Company
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SHARP AND ASSOCIATES, INC.
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EXECUTIVE SUMMARY

REMEDIAL DESIGN PLAN for the Industrial Excess Landfill (IEL) Site

EXECUTIVE SUMMARY

REMEDIAL DESIGN PLAN STRATEGY

This remedial design plan for the IEL Site has been developed to meet the requirements detailed in the *Statement of Work for the Remedial Design at Industrial Excess Landfill, Stark County, Uniontown, Ohio,* (SOW) as issued by USEPA in association with the *Unilateral Administrative Order for Remedial Design at the Industrial Excess Landfill Site Uniontown, Ohio.* The SOW requires the following activities be implemented as part of the remedial design:

1. Site Security: Maintain a fence at the Site to prevent access and vandalism to the Site. Signs are to be posted with a telephone number to call for further information.
2. Submittal of a Remedial Design for Implementing the Remedy Selected in the September 2002 Record of Decision (ROD) Amendment: This Remedial Design Plan (Plan) outlines how the IEL remedy will be implemented.
3. Design of a Vegetative Cover for Remedial Action: This Plan describes the process for designing the elements included in the remedy, as required by the 2002 ROD.
4. Design of a Monitoring Program for Remedial Action: This Plan includes the design of a long-term monitoring program for groundwater and the gas extraction system in accordance with the 2002 ROD.

Sharp and Associates, Inc., (SHARP) has prepared this remedial design plan on behalf of the Responding Companies (The Goodyear Tire & Rubber Company, Bridgestone/Firestone, Inc., The B.F. Goodrich Company, GenCorp) to address environmental issues related to the IEL Site. This remedy has been designed to incorporate community preferences for a solution that:

- Protects Human Health and the Environment;
- Provides a Long-term Commitment to the Remedy by the Responding Companies that Includes Long-Term Monitoring and an Effective Contingency Plan;
- Maintains Greenspace and Fits into the Regional Site Setting;
- Enhances the Existing Diverse Wildlife Habitat;
- Allows for Local Future Land-use Control; and
- Promotes a Positive Community Image

This approved remedy, a biodiverse enhanced natural attenuation remedy builds on the current Site conditions that include:

- Confirmed natural attenuation of on-site landfill-derived hazardous constituents;
- No exposure to site-derived hazardous constituents nor indications of potential future off-site migration;
- No indication of any on-site exposure under current or anticipated future uses;
- A thriving and diverse ecosystem (wetlands, grassland, forest edge, and woodlands);
- Diverse wildlife (fox, deer, rabbits, hawks, northern orioles, frogs butterflies, turkeys, etc.);

- Diverse flora (locust, poplar, willow, sumac, phragmite, milkweed, green ash, apple, maple, wildflowers, etc.)

This document outlines the path forward for the IEL Site that will blend environmental requirements with community preferences to provide a holistic remedy that includes:

- Enhancement of the existing vegetative cover to manage the Site for habitat biodiversity and minimize the potential for exposure to landfilled materials;
- Maintenance of site security measures that minimize the potential for direct contact exposure;
- Modification of the existing groundwater monitoring network to ensure that detection of any migration from the Site of constituents of concern via groundwater;
- Confirmation of the performance of the remedy by groundwater sampling and analysis;
- Monitoring of the rates of production of methane; continuing the operation of the Methane Venting System (MVS) to ensure protection of human health and the environment; and
- Additional design studies: 1. A Risk Assessment to enable decision-making regarding future site land use; and 2. An evaluation of the MVS system.

REMEDIAL DESIGN PLAN OUTLINE

This Design Plan is organized into the following sections:

Section 1. Introduction, Including A Discussion of the Site History and Current Site Setting. This section details the elements of the site history and current site setting that have an impact on the approach to and implementation of the remedial design.

Section 2. Performance Standards and Specifications. The performance standards for the overall remedy are designed to verify that the site presents no unacceptable threat to human health or the environment. The groundwater monitoring and MVS monitoring results will be used to verify the overall remedy performance. Other specifications associated with remedy implementation are also included in this section.

Section 3. Site Security Issues. The Responding Companies will maintain the existing chain link fence as needed to protect human health and the environment and secure the site from unwanted intruders. The vegetated soil cover is designed to limit direct contact with any site wastes. Other security-related issues (signage, deed restrictions, etc.) are included in this section.

Section 4. Design of a Vegetative Cover. This section describes plans to augment the vegetative cover at the Site to best manage it for its purpose of limiting direct contact with waste, providing erosion protection, and promoting wildlife diversity.

Section 5. Design of a Monitoring Program. The site monitoring program includes revisions to the existing groundwater monitoring network and a groundwater monitoring program that extends until the potential for threats to human health and the environment from site-related constituents in groundwater are demonstrated to be below levels of regulatory concern. In addition, an MVS monitoring program is provided to monitor the performance of the system.

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SECTION ONE

REMEDIAL DESIGN PLAN for the Industrial Excess Landfill (IEL) Site

SECTION ONE: INTRODUCTION

The Responding Companies (The Goodyear Tire & Rubber Company, Bridgestone/Firestone, Inc., The B.F. Goodrich Company, GenCorp) have prepared this Remedial Design Plan (Design Plan) for the IEL Site (Site) that is protective of human health and the environment and incorporates site-specific characteristics into a holistic, sustainable remedy that addresses stakeholder remedial goals.

This Design Plan outlines the path forward for the remedial actions at the IEL Site that will blend environmental requirements with community preferences in accordance with the SOW, the Site Record of Decision (2002 ROD), USEPA Superfund Remedial Design Guidance, and other potentially-relevant guidance.

The remedy elements include:

- Augmenting the existing vegetative cover with selected planting of trees and other plants at the site;
- Natural attenuation of ground water contaminants both offsite and onsite;
- Monitoring of groundwater and landfill gas;
- Perimeter fencing;
- Deed Restrictions;
- Maintenance of Alternate Water Supply; and
- Additional Design Studies

1.1 SITE DESCRIPTION

The IEL site is located in a rural residential area in Lake Township, Stark County, Ohio approximately 10 miles southeast of Akron. See **Figure 1.** The site includes a ~30-acre closed landfill located approximately 0.4 mile south of the intersection of Cleveland Avenue and State Route 619 at 12646 Cleveland Avenue, N.W., in Uniontown, Ohio. The landfill was closed under Ohio law pursuant to a court order in 1980. USEPA purchased several adjoining properties such that the total site area now measures approximately 47 acres. The site is bounded by Cleveland Avenue to the west, Metzger's Ditch to the east, vacant land to the south, and residences to the north.

The site is situated in an area of rolling topography influenced by preglacial bedrock and glacial deposits. The landfill disposal area, which is enclosed by a fence, is approximately 1,100 feet in an east-west direction and 1,200 feet north-south. The landfill area slopes to the east and south at approximately 4 percent near the northwest and up to 20 percent in the south and east. Most surface water drainage from the site discharges directly or indirectly into Metzger Ditch along the eastern boundary of the site, which flows toward the south along the IEL site boundary. There are several ponded areas along the eastern border of the site near Metzger Ditch.

The landfill is currently covered by diverse grasses, shrubs, and trees. Based on site reconnaissance, several types of wildlife habitats are well-established. Three vacant buildings and their associated structures were removed in 2001 and replaced with a bed of wildflowers.

An active methane venting system (MVS) with 12 gas extraction wells is in-place and functioning in the western sector of the landfill, along the western half of the northern border of the site and along the western quarter of the southern border of the site. A facility for central collection blowers and gas flaring is present over the disposal area in the northwestern portion of the site.

The site has a network of monitoring wells that are used to monitor on-site and off-site groundwater quality. A map of the site that includes the locations of the existing monitoring well network is provided as **Figure 2.**

1.2 SITE HISTORY

Between 1956 and 1961, the IEL site was known as the Summit Sand and Gravel Pit and used as an open borrow pit to mine sand and gravel. Sand and gravel mining ceased when the water table was encountered in the excavations.

Mr. Charles Kittenger purchased the property in 1966 and initially used the site for flyash disposal. In September 1966, Mr. Kittenger obtained conditional licenses from the Lake Township Board of Zoning Appeals to operate the site as a landfill from 1966 until 1968; and in 1968, he received additional licenses to allow a variety of solid waste materials to be deposited at the site. The site became known by various names, including Kittenger's Landfill, Kittenger Industrial Landfill, and the Industrial Excess Landfill. Disposal was initially limited to inert materials. In 1968, disposal was expanded to include industrial waste. Liquids were deposited at the landfill between 1968 and 1971. In the early 1970's, municipal, residential and commercial waste disposal occurred. After 1971, hospital wastes and a variety of residential wastes were accepted at the site, including domestic putrescible and septic tank wastes. Two fires in the liquid waste lagoons at the landfill are believed to have resulted in the destruction of a significant quantity of liquids. Following the fires, the landfill was not permitted to receive liquids and was then used for the disposal of a variety of solid waste, including household waste and trash.

Coal ash was one of the first wastes disposed at the site and was placed in topographic depressions to reclaim flooded areas of the site, such as the area in the northwestern portion of the landfill. Ash was also mixed with other wastes and placed throughout the landfill. Liquid wastes are believed to have been disposed into a lagoon located in the north-central portion of the site. A common practice was to mix fly ash with the liquid wastes in the lagoon. This process reportedly increased evaporation and inhibited infiltration through the bottom of the lagoon by creating a lower permeability layer of residuum. This procedure was approved by the Ohio Department of Health in 1971. In 1980, pursuant to the requirements of the Stark County Common Pleas Court, the landfill was closed under the requirements of Ohio law with a soil cover.

USEPA and Ohio EPA concerns with the potential for methane migration from the landfill led to the installation of 13 passive gas vents in 1984. In October 1984, the IEL site was proposed for the National Priorities List (NPL) in response to concerns of local residents regarding the migration of landfill gas from the site, and possible groundwater contamination. The USEPA initiated a Remedial Investigation/Feasibility Study (RI/FS) and began field work in September 1985. The methane venting system was subsequently installed by the USEPA at the landfill to mitigate potential methane hazards.

A ROD was issued in 1987 to provide an alternate water supply to approximately 100 homes located to the west of the landfill. In July 1989, the USEPA issued a "final" ROD for a site remedy. The final ROD for the site was amended and reissued in 2000.

Subsequent to the November 14, 2000, *Petition to Change the Remedy for the Industrial Excess Landfill (IEL) Site, Uniontown, Ohio,* the USEPA conducted a Focused Feasibility Study that supported another ROD amendment. The September 2002 ROD Amendment calls for a remedy with the following components:

- Augmenting the existing vegetative cover with selected planting of trees and other plants at the site;
- Natural attenuation of ground water contaminants both offsite and onsite;
- Monitoring of groundwater and landfill gas;
- Perimeter fencing;
- Deed Restrictions;
- Maintenance of Alternate Water Supply; and
- Additional Design Studies

This Design Plan describes how The Responding Companies intend to implement 2002 ROD as required by the SOW.

1.3 ADDITIONAL INFORMATION AND FIELD SAMPLING RESULTS THAT SUPPORT THE REMEDIAL DESIGN

Groundwater monitoring wells were installed in the vicinity of the Site beginning in 1987. This monitoring network has been expanded over the years to the network presented in Figure 2. These wells have been sampled since 1988.

1.3.1 Groundwater Monitoring Results

Since August 2000, the Responding Companies have been conducting regular groundwater monitoring at the Site under an agreement with Lake Township and under the supervision of the USEPA, OhioEPA, and the Township's consultant.. Results from these events are tabulated and summarized in reports. These reports document that the only apparent impacts to site groundwater from the IEL Site are sporadic detections of low part-per-billion (ppb)

concentrations of Volatile Organic Compounds (VOCs). Current and historic VOC results from each well in the monitoring well network are summarized in the Appendix. These results show:

- Groundwater flows east-to-west in the vicinity of the site. The groundwater gradient flattens beneath the site but maintains its general east-to-west flow pattern.
- Off-site groundwater is NOT currently affected by constituents from the IEL site at concentrations that cause the groundwater to exceed USEPA drinking water standard maximum contaminant limits (MCLs) for any parameter.
- Modern, low-flow sampling techniques have documented that there is no evidence of any migration of metals from the IEL Site at levels that cause any off-site well to exceed MCLs for any metal.
- Some VOCs are typically detected in low-ppb concentrations in a few ***on-site*** wells. Only three of these VOCs are present at levels that exceed their respective MCLs.
- Although MCLs have been historically used for comparison to monitoring well sample analyses, this comparison is extremely conservative because no one in the downgradient vicinity of the IEL Site is using groundwater for drinking water purposes. Also, monitoring wells samples do not replicate the concentrations that would be generated by a drinking water extraction well at the same location.
- Double-cased wells installed through the landfill exhibit no detections of benzene or any other VOC contaminants.
- Single cased wells installed through the landfill show evidence of compromised completions – potentially acting as a source(s) for the on-site VOC results.
- Intra-well comparisons of on-site well results show that the number and concentrations of VOCs detected in Site groundwater continue to decrease.

In summary, there is no threat to human health or the environment from migration of constituents from the IEL Site via a groundwater pathway under current conditions. Site groundwater conditions continue to improve over time.

1.3.2 Aerial Photography Documenting Revegetation at IEL

A 1997 photograph of IEL is presented as **Figure 3.** This photograph shows that significant revegetation of the site has occurred since the landfill was closed in 1980. The site fence and site boundary are added to Figure 3 to yield **Figure 4** to show major site elements. This photo has been used as a base for several figures, including those attached to the *Petition to Change the Remedy for the Industrial Excess Landfill (IEL) Site, Uniontown, Ohio.*

An August 2000 photograph of IEL is presented as **Figure 5.** This photograph shows that substantial incremental revegetation has occurred between 1997 and 2000. The site fence and site boundary are added to Figure 5 to create **Figure 6.**

1.3.3 Field Sampling: Color Infrared Photography

Figure 7 provides a color infrared photograph of the IEL Site and surrounding land in April of 1991. This image is a false color image, with display colors of red, green, and blue (RGB) assigned to near-infrared, red, and green light reflected off surface materials, respectively.

Healthy vegetation in this scene is shown by the color red. Bare soil and sparsely vegetative areas are shown by a tan/gray color. Standing water and shadows are shown in black, while the asphalt has a gray color.

The site fence and site boundary are added to Figure 7 to yield **Figure 8.** As evident in Figures 7 and 8, the IEL site had a sparse vegetative cover in 1991. A few groves of healthy vegetation (groves of emerging deciduous trees) are evident in the interior portions of the site. Also visible are areas of standing water in the northeastern and western portions of the site. The interpretation of the photograph is consistent with anecdotal reports of the appearance of the site during that time frame.

In conjunction with the aerial photography conducted in August 2000, a color infrared photograph of the site was taken. **Figure 9** shows the IEL Site using color infrared photography as it appears in August 2000. Figure 9 shows that the IEL site is nearly completely covered with a vegetative coverage that is vigorous and healthy. The only large non-vegetated areas on the site are associated with the access road to the MVS or with the properties located along Cleveland Avenue. These properties along Cleveland Avenue were demolished subsequent to August 2000 and wildflowers were planted in this area. The site fence and site boundary are added to Figure 9 to make **Figure 10.**

Note: the double line "roads" that are apparent in Figures 5, 6, 9, and 10 are actually the result of matting of grasses that resulted from the use of an all-terrain vehicle to access monitoring wells for sampling in August 2000. The "roads" are fully vegetated; the much greater intensity of the other areas in the photo illustrates just how vigorous the vegetative cover is.

The areal extent of healthy vegetation is much greater in the 2000 scene than it was in the 1991 scene. This aerial view is consistent with the results of the Wildlife Habitat Council and the agronomic investigations completed in 2000.

The United States Geologic Service (USGS) has provided the following write-up that accompanies color infrared photographs to aid in interpretation.

1.3.3.1 THE INTERPRETATION OF COLOR INFRARED AERIAL PHOTOGRAPHY

Color infrared photography, often called 'false color photography', is widely used for the interpretation of natural resources. Due to the subjected degrees of degradation in handling before exposure and the use of high speed film in color infrared photography, aerial photographs can and do vary in overall color tone. This variability may cause complications within the interpretation of colors between each unique photograph. The following guidelines are provided for our customers to aid them in their interpretations of this particular type of photography.

Knowledge of vegetation vigor and density is important in the interpretation of the various red shades within aerial photography. The color red is frequently associated with live vegetation. Very intense shades of red indicate dense vegetation that is growing quite vigorously. An irrigated alfalfa field would be an example of such vegetation. An

evergreen forest, which also may be quite vegetatively dense, would not appear in a similar red tone since its level of growth activity is less compared to the irrigated alfalfa field.

As the amount of vegetation density and vigor decreases, the different red tones may change to more lighter red and pink colors. When the plant density activity becomes too low, the faint red coloring is overcome by the stronger colors representing the soil on which the plants have been growing. For instances such as these, the ground area would appear in shades of white, blue, or green, depending on the soil type and moisture content. When the plant vigor decreases, the vegetation would show as paler shades of red and pink, various shades of green, and possibly even tan in color. Dead vegetation, wheat stubble for example, would often be portrayed in tints of green or tan.

Bare soils appear as patches of white, blue, or green in most agricultural regions. Generally speaking, the moister the soil, the darker the soil color. Soil composition affects all color ranges shown on aerial photographs. Dry, sandy land will appear white in color. With the addition of moisture to this land, the white coloring turns into light gray or light tan. Soils composed of clay are darker in color than the sandy areas as well as tending toward more blue-green tones. Clay soils holding extreme moisture would resemble darker shades of the same colors. These identical soils, when high in organic matter, such as silt or loam, would be viewed darkest in the same corresponding color scheme.

In aerial photography, man-made features correlate their colors to the materials with which they were constructed. For example, asphalt (whose coloring ranges from dark to light) and concrete roads (whose coloring ranges from light to dark) vary in intensity on opposite ends of the color spectrum depending on their age. Gravel or dirt roads are shown as less intense colors due to their variations in soil make-up and composition. A town's streets and buildings could be considered similar to the above examples with their color also relying on their material textures.

Water, as expected, appears through various shades of blue ranging from nearly black to very pale. Pristine water has a black appearance. With the increase of sediment deposits in beds of water, the aerial photography colors turn slowly to lighter blue tones. Shallow water would reflect the material present in its stream bottom. For example, a shallow creek, bottom included, would be viewed as a white color in order to mirror the high levels of built-up sand.

Aerial photographs on degraded film cast an overall blue or green shadow on their images. When this occurs, the interpreter must consider how the overall cast has affected the original rendition of the photograph and therefore alter his or her scenic view.

1.3.4 July 31, 2003, Site Visit

SHARP visited the Site on July 31, 2003, to document any changes to site conditions that might have occurred since August 2000. In general, SHARP found the Site to be much more-heavily-

vegetated than noted in August 2000. Although the increase in density of vegetation is dramatic, the Uniontown area had received more than 14" of rain in the 2-3 week period preceding the site visit – potentially accounting for some of the density of vegetation. The Appendix contains annotated photos from the July 2003 site visit.

The western side of the site (outside of the fence, along Cleveland Ave.) looked well-vegetated. Wildflowers were in bloom (where they had been planted after demolition of the buildings) and the entire area was covered with either wildflowers or grass [see photos presented in the Appendix (Pictures 52-54)]. Sweet peas were blooming on both sides of the driveway leading onto the site (Picture 55).

We used a grid mapping system to note the location of any bare spots or unusual occurrences inside the fence (formerly landfilled area). The site was visually divided into 25 grids (each grid was approximately 200 feet by 200 feet). The grid sections on the map were numbered starting at the entrance and proceeding east to west. We walked each grid section and noted any unusual occurrences (bare spots, downed fence, etc.). **Figure 11** presents the gridded site map with major observed features summarized.

In general, the site looked healthy. There is abundant vegetation / shrubs / trees / grasses. Plants were large and the grass was high. Everything looked healthy; there were many large trees. The first bare spot we came across was in grid section #2. It was a small spot measuring ~5 feet by 5 feet, located about 100 feet from the north fence (Pictures 4 and 5).

The northeast corner of the site was very woody and dense. There was an area on the slope that is washed out and requires attention to eliminate further erosion. A few trees were noted to be down in this area. Some of the downed trees fell on the perimeter fence and the fence itself was downed (Pictures 12 and 13). There were sections of downed fence on the northeastern portion of the site, a small section on the southern portion of the fence, and a small section on the western portion of the fence. To maintain the existing fence, approximately 300 feet of fence will need to be replaced. The remainder of the fence was intact and secure. The man gates on the north side fence looked fine.

A second large bare spot was observed between grids #10 and #15 on the eastern slope. The bare spot measured ~50 feet by 20 feet and was approximately 130 feet from the east side fence. This bare spot had no vegetation growing in it (Picture 14). The third major bare spot was in grid #8 at the top of the slope (Picture 17). This spot measured ~20 feet by 20 feet. This bare spot also had no vegetation growing in it.

Although there were quite a few thin spots on the eastern and southern ***slopes*** of the site, these thin spots had tall vegetation growing around the area and were thin of topsoil but nevertheless had sparse vegetation growing. These areas tended to be gravelly (Pictures 23, 27) but appeared to be in the process of revegetation. The largest thin spot found was ~20 feet by 10 feet.

We observed lots of birds and saw a male cardinal. There were many butterflies and insects and we heard frogs in the swamp area. We saw deer droppings. Overall, we observed a wide variety of wildlife on the site.

On the eastern side of the site (at the fence line) there was standing water and the surrounding area was very wet.

We observed occasional debris throughout the site. The debris mainly consisted of items apparently left over from the construction/maintenance of the methane collection system. Items included flexible black tubing, rebar stakes, and white PVC piping. On the southern portion of the site, there were some guardrail / handrail pieces that were lying on the ground. These items were difficult to see because the vegetation/grass was so tall. Other than the debris apparently left over from the methane collection system activities, we found very little evidence of dumping of debris.

1.3.5 August 15, 2003, Site Visit

SHARP returned to the IEL Site to evaluate the need for vegetative cover enhancements. Subsequent to the July 31, 2003, visit, the MVS contractor had performed a mowing event where he mowed:

- all non-treed areas outside the fence on the west side of the Site;
- the vicinity of the MVS; and
- paths to the MVS wells.

The results of the Site visit are summarized below and detailed in photos presented in the Appendix. In the visit to the Site, SHARP found:

- Much greater site visibility (portions of MVS visible) after mowing the wildflower area planted at the former Uniontown Tire (Picture 1).
- Heavy vegetation that is nearly impenetrable except where mowed (Pictures 2,3).
- Emerging forested islands in former (circa. 2000) grassland areas (Pictures 4, 5, 6)
- Grassland areas showing evidence of succession to forest (trees) but few shrubs (Pictures 7,8,9,10,11, 12, 14).
- Some forested islands that are further along in succession (Pictures 13, 15).
- The lower-lying grassland areas that are not populated by grasses but by wildflower and other ground cover (Pictures 2, 15).
- Mowing has significant impact on visibility and site appearance (Pictures 1, 16).

In summary, there has been significant additional emergence of trees on the site since August 2000. There are few, if any, areas within the fence that need any trees planted to achieve the planned future ecological regimes. There are emerging forested islands that have sufficient trees but may need some shrubs planted. The site should be mowed to establish/maintain edge environments (see next section). Some trees/shrubbery may need to be planted to adjust visibility of the fence/Site equipment.

1.3.6 Wildlife Habitat Council Investigation / Recommendations

The Responding Companies invited the Wildlife Habitat Council (WHC) to evaluate the habitats present at the Industrial Excess Landfill Site and develop a plan to enhance the site habitats that would be consistent with community preferences yet within the range of activities that could be accommodated at the IEL Site at present or in the future. The resulting report on the investigation: *Opportunities for Wildlife Habitat Enhancement at the Industrial Excess Landfill* (See Appendix) details a menu of potential habitat enhancement projects for IEL. The WHC Report should be considered in developing the specification for the construction work associated with the remedy implementation, as updated based upon more recent information.

1.3.7 ANS Site Investigation Report / Recommendations

Applied Natural Sciences (ANS) conducted an agronomic site investigation in the summer of 2000. The full ANS report is presented in the Appendix. The ANS report, as updated based upon more recent information, will be used to develop a specification for the remedy implementation. Elements of the potential habitat enhancement include the development of forested islands (**Figure 13**) through selected plantings and edge environments through rotational mowing (**Figure 12**).

1.4 CURRENT AND FUTURE ECOLOGICAL REGIMES PROPOSED IN PETITION

Based on the information available in November 2000 and the recommendations of the ANS and WHC Reports, the Responding Companies petitioned the USEPA to modify the remedy to one that would allow the site to migrate from the current ecological regimes presented in **Figure 14** (Figure 1 of the Petition) through tree planting as noted in **Figure 15** (Figure 2 of the Petition) to the future ecological regimes presented in **Figure 16** (Figure 3 of the petition).

Information collected since November 2000 shows a site that is rapidly reforesting such that little tree/shrub planting is required to establish forested islands in the "tree planting areas" noted on Figure 15.

SECTION TWO. PERFORMANCE STANDARDS AND SPECIFICATIONS

The Responding Companies have designed a remedy to maintain protectiveness of human health and the environment. This is the principal remedy performance standard. The remedy has also been designed to incorporate stakeholder goals for habitat biodiversity and creation / maintenance of green space.

2.1 DESIGN ASSUMPTIONS

Assumptions inherent in the design and parameters relevant to the design are summarized below:

Assumptions:

1. Current conditions at the Site do not pose an immediate threat to human health or the environment.
2. No changes to Site use will be made until the potential impacts of those changes have been evaluated and shown to allow the remedy to remain protective.
3. The remedial design addresses areas of the site located within the footprint of the historic landfill. Final decisions on modifications to areas both inside and outside the fence will be addressed based on future evaluations.
4. USEPA will retain control of Site access until all construction-related elements of the remedy have been implemented and a risk assessment study has been completed to determine what types of future uses and site access restrictions are protective of human health. Access to the Site is currently controlled by the USEPA under the Superfund program.
5. The groundwater at the Site will be monitored until remedial goals (MCLs) are met throughout the site or otherwise addressed.
6. Work plans for the Site will be modified and submitted to USEPA for review and approval as needed to perform the remedial design implementation.

2.2 REMEDIATION GOALS AND THEIR ATTAINMENT

The performance standard for the remedy will be to maintain protectiveness of human health and the environment under current and future Site uses. The protectiveness of the remedy under current conditions depends in part upon minimizing contact with landfilled constituents, including contact with groundwater located beneath the Site. Although no future use of groundwater beneath the site is planned, USEPA policy considers this groundwater to be a potential drinking water resource. As a result, USEPA drinking water standard Maximum Contaminant Levels (MCLs) are considered remedial goals. Future use scenarios under consideration minimize the potential for contact with the landfill contents using engineering and administrative controls.

Maintenance of the performance standard and progress toward achieving remedial goals will be achieved through:

- Maintaining the current fencing until a risk assessment is completed;
- Confirming that access control is sufficient to prevent unacceptable exposures at the site until a risk assessment study has been completed to determine what types of future uses and site access restrictions are protective of human health;
- Augmenting the existing vegetative cover with selected planting of trees and other plants at the site;
- Monitoring groundwater to confirm that human health and the environment continue to be adequately protected from site-related constituents of concern in groundwater; and
- Evaluating monitored natural attenuation to determine progress toward meeting cleanup goals (MCLs);
- Monitoring landfill gas concentrations to confirm that human health and the environment continue to be adequately protected from landfill gas emanating from site, and also to determine what if any modifications should be made to the existing methane gas venting system.

Attainment of Remediation Goals will be determined through:

- Confirmation that site vegetation is sufficient to prevent erosion or contact with landfill constituents that would constitute a threat to human health and the environment;
- Results of groundwater monitoring (See Section 5); and
- Results of landfill gas monitoring (See Section 5).

2.3 DISCUSSION OF ARARS

Applicable or Relevant and Appropriate Requirements (ARARs) are those environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or potentially relevant and appropriate for a Superfund site or action.

Applicable requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a Superfund site.

Relevant and Appropriate requirements are requirements that, while not legally "applicable" to circumstances at a particular Superfund site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited.

To be Considered (TBC): In addition to legally binding laws and regulations, many Federal and State environmental and public health programs also develop criteria, advisories, guidance, and proposed standards that are not legally binding, but that may provide useful information or recommended procedures.

2.3.1 Types of ARARs

There are three categories of ARARs for Superfund remedial actions:

- Chemical-Specific;
- Action-Specific; and
- Location-Specific.

Chemical-Specific ARARs are typically health-based numerical criteria which are used to establish acceptable concentrations or amounts of a chemical that may be discharged to or present in the environment. Chemical-specific ARARs for IEL include USEPA Drinking Water Standard Maximum Contaminant Levels (MCLs). MCLs are examples of chemical-specific ARARs that are applicable (at the tap) to public drinking water supply systems that have at least 15 service connections or are used by at least 25 people.

MCLs are not directly applicable for the IEL Site because there is no drinking water supply system affected by groundwater from the IEL Site. MCLs are considered to be relevant and appropriate to groundwater near IEL because this groundwater is still considered (by USEPA) to be a potential drinking water source.

Action-Specific ARARs are requirements that pertain to the particular remedial actions that are proposed at the site (e.g., monitored natural attenuation, landfill gas control, etc.). The following are examples of action-specific ARARs for IEL:

- Worker protection requirements under 29CFR 1910.120 are applicable to the IEL Site remedial activities.
- The "EPA Guidance on MNA at Superfund Sites, RCRA Corrective Action, and UST sites," April 1999: OSWER Directive 9200.4-17P is a TBC for the IEL Site.

No changes are currently planned to the operation of the MVS system. As a result, all current action-specific ARARs for the MVS system will continue to be complied with.

Location-Specific ARARs are restrictions placed on a remedy because of the Site location. Examples include regulations that apply to flood plains or historic sites. The USEPA has identified issues related to the former landfilling operations as location-specific. Thus, location-specific ARARs for the IEL Site include landfill gas monitoring requirements. **Table 5** lists ARARs for the IEL Site Remedial Design and a discussion of their potential relevance.

2.4 OUTLINE OF REQUIRED SPECIFICATIONS

Elements of the remedy include construction and monitoring. The remedy construction specifications are included in a specification and bid package presented in Appendix 7. Other specifications related to monitoring or maintenance of the site will be presented in the activity-specific work plan to be developed.

2.5 REAL ESTATE, EASEMENT, AND PERMIT REQUIREMENTS

All activities shall be conducted in accordance with local, state, and federal requirements, guidelines, and ordinances. Access to the Site is currently under the control of the USEPA. This

condition is expected to persist through the remedy implementation. Thus, any conveyance of real estate is beyond the scope of this remedial design. According to the Stark County Auditor's tax maps, the Site is currently owned by at least 3 entities, as follows:

- Industrial Excess Landfill, Inc., currently owns 29.86 acres of the historically landfilled portion of the property including the access road.
- Hybud Equipment Corp. currently owns 1.5 acres along the west side of Cleveland Avenue extending into the fence indent at the IEL Site.
- The United States of America owns approximately 12 acres of properties in the vicinity of the Site.

While there are no currently-recognized needs for any real estate easements, acquisitions, or conveyances, USEPA (or any successor entities that assume control of the Site access and/or management), has the authority to manage these issues, should they arise. The Responding Companies will provide recommendations for future site use restrictions based upon risk assessment.

As necessary for remedy implementation or continued operation and maintenance, the Responding Companies (or their designated representatives) will obtain any state and local permits necessary to do planned work. Details on required permits, etc., shall be included in the Work Plan for the specific activity.

2.6 FINAL PERFORMANCE STANDARD VERIFICATION PLAN

Performance standards and their verification, including contingency plans are included with the two monitoring programs presented in Section 5. Thus, no separate Performance Standard Verification Plan will be submitted.

2.7 FINAL CONSTRUCTION QUALITY ASSURANCE PLAN

A final construction quality assurance plan will be developed prior to mobilization for remedial construction at the Site. The plan will be designed to verify that the remedy implementation has occurred in accordance with the approved Remedial Design Plan and related requirements.

2.8 MAINTENANCE OF ALTERNATE WATER SUPPLY

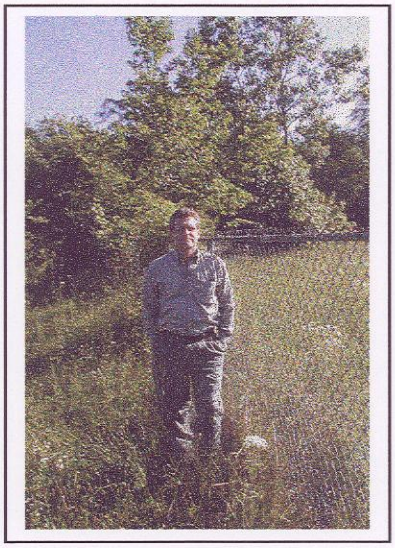
The Responding Companies provided a grant to the local water authority to establish the alternate supply. Although the maintenance of alternate water supply is identified in the 2002 ROD as a required element of the remedy, the Responding Companies have no control over this activity. Maintenance of the supply is not part of the Responding Companies' scope of remedy implementation.

SECTION THREE

SECTION THREE. SITE SECURITY

3.1 SITE FENCE

The Responding Companies will maintain the existing 5'-high chain link fence for site security for site security purposes (prevent unauthorized vehicle access and limit unwanted trespassers). The July 31, 2003, Site visit detailed no evidence of any trespass. The July 2003 photo below illustrates the existing fence.



The existing fence has been damaged by downed trees or is otherwise not intact in a few places (<300' = ~6% of fence length). The damaged areas are largely associated with inaccessible areas of the site. Because the principal value of the fencing is to prevent vehicle access that might damage the vegetative cover, the integrity of the fence in inaccessible areas is not a time-critical issue. Fence repair will be performed contemporaneously with other site remedy construction activities. As needed, fence repair of the western and northern boundaries (the more accessible areas) will be completed as soon as practical.

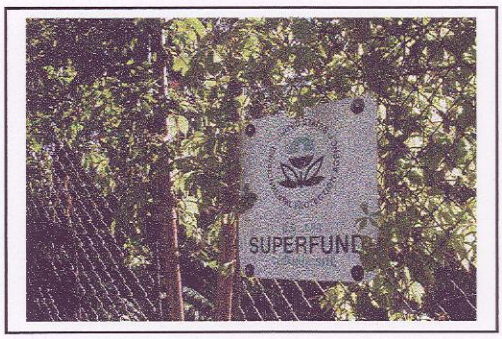
To be consistent with stakeholder goals, the remedial design envisions allowing existing vegetation to grow amongst the fencing. This vegetated condition enhances its ability to limit Site access without impairing the natural appearance of the site desired by many stakeholders.

There have been some "future use" discussions concerning moving the east side of the fence. In addition, future uses may incorporate an outer decorative fence to mark walking trails, etc. Decisions on future use elements (fence moving, outer fencing, etc.) will be based on the results of the risk assessment.

3.2 WARNING SIGNS

The remedial design plan envisions installing four new warning signs, attached to the fence, one on each of the four sides. These signs will replace the single sign located at the main gate (reproduced in the following photograph).

The new signs will include the following information, at a minimum:



This is the Industrial Excess Landfill Superfund Site.
This site is managed by the U. S. EPA.
For information about this site, please call:

Timothy Fischer, Remedial Project Manager
(312) 886-5787 or

Dave Novak, Community Involvement Coordinator
(312) 886-7478

3.3 DEED AND FUTURE USE RESTRICTIONS

Through implementation of the remedy, Site access will be restricted in a manner that maintains protectiveness of human health and the environment. Any deed conveyance and / or future use restrictions for the site are beyond the scope of the remedy implementation, because USEPA (or any successor entities that assume control of the Site access and/or management), has the authority to manage these issues. The Responding Companies will make recommendations on future use restrictions based upon the results of the risk assessment.

This Remedial Design is intended to enable potential future uses that are consistent with stakeholder goals, to provide valuable wildlife habitat, and greenspace. Future use scenarios will be evaluated under the additional design studies. This evaluation will consider the potential for risks from contact with the landfill contents using a risk assessment. The results of the risk assessment will determine under what conditions limited site access remains protective of human health and the environment.

3.4 OPERATION AND MAINTENANCE ISSUES ASSOCIATED WITH SITE SECURITY

The IEL site security will be maintained using the existing fencing. Where the fence has deteriorated, it will be repaired/upgraded as needed within the remedial goals of protecting human health and the environment. Site security will be periodically inspected in conjunction with other site operations and maintenance plans, by observing the following:

- Structural integrity of fencing and fence posts.
- Operability of gates.
- Any holes in fencing or signs of unauthorized entry.
- Integrity of locks.
- Integrity of signs.

If the inspector finds any evidence of a Site security breach, appropriate actions will be taken to address the breach.

The Operations and Maintenance Plan for the site will be developed to include specifics on the frequency of inspection, action triggers, etc.

SECTION FOUR

SECTION FOUR. DESIGN OF A VEGETATIVE COVER

This section describes plans for enhancement of the existing vegetative cover to prevent erosion and promote a diverse ecology while maintaining a site that is protective of human health and the environment. This remedy addresses environmental impacts from historic landfilling operations and potential plans for areas outside the historic landfill. The vegetative and habitat enhancements described in this plan will be reviewed and modified as necessary to incorporate stakeholder goals based on recommendations of the Community Action Group (CAG), USEPA, OhioEPA, and The Responding Parties.

4.1 WHC AND ANS REPORTS USED AS BASELINE

The WHC and ANS reports describe (in 2000) a vision for future ecological regimes that is not very different from the existing (2003) site conditions. These reports and successor investigations that better describe *current* conditions will be used as guides to implementing the remedy. As necessary, additional detailed design studies of the vegetative cover using the WHC, ANS, and CAG recommendations will be conducted to support meeting stakeholder goals.

4.2 APPROACH TO HABITAT ENHANCEMENT

As detailed in the specification, the remedy implementation will include retaining a wildlife biologist (or equivalent) to determine how best to implement the habitat diversity projects. The remedy construction is expected to include:

- Mowing to establish edge environments;
- Selected tree and shrub planting to improve forested islands; and
- Installations of nest boxes and raptor perches, etc.

4.3 PROPOSED SITING/LOCATIONS OF PROCESSES/CONSTRUCTION ACTIVITY

Construction activities shall be staged from the area located near the MVS system, located near the current main gate. To the extent practical, construction activity staging shall be conducted within the fenced area.

4.4 PRELIMINARY PLANS, DRAWINGS, AND SKETCHES, INCLUDING DESIGN CALCULATIONS

See specification included with the Appendix. The specification includes preliminary details of implementation of the enhancements. The actual implemented enhancements will be based upon the mutually-agreed upon plans developed by merging stakeholder visions.

4.5 DEBRIS REMOVAL

As part of the remedy implementation and the operations and maintenance activities, visible debris shall be removed from the site and placed in a container maintained near the MVS. As needed, the contents of the container shall be properly disposed of off-site.

4.6 SPECIFICATION

The specification details the construction-related elements required for the IEL Site remedy implementation. It includes:

- Fence repair and signage;
- Vegetative cover enhancement and management for habitat diversity;
- Debris removal and disposal; and
- Rework of the groundwater monitoring well network.

SECTION FIVE

SECTION FIVE. DESIGN OF A MONITORING PROGRAM.

Site groundwater and MVS monitoring programs are summarized in this section. The overall monitoring program has been designed to ensure that implementation of the Remedy complies with the 2002 ROD Amendment for IEL. Elements of the monitoring program include:

Groundwater:

- Updating of the existing groundwater-monitoring network based on the current knowledge of Site groundwater and Site monitoring goals.
- Monitoring groundwater elevations and constituents of concern in groundwater until cleanup levels are achieved or such time as it is determined that further groundwater monitoring is not necessary to protect human health and the environment.

MVS:

- Evaluation of the MVS system performance to determine any need for modifications;
- Evaluation of areas of the landfill that are not currently covered by the MVS to determine if expansion/upgrading of the MVS is necessary;
- Continuation of the Methane Venting System (MVS) monitoring program until such time as it is determined that the MVS system is no longer necessary to protect human health and the environment.

5.1 ASSESSMENT OF THE GROUNDWATER MONITORING NETWORK

In the more than 18 years of groundwater monitoring and study at the IEL site, numerous groundwater-monitoring wells have been installed and a thorough understanding of groundwater conditions has been achieved. The goal of the groundwater monitoring component of this remedy is to ensure that there is no threat to human health and the environment from site-related hazardous constituents in groundwater. Toward this goal, the groundwater monitoring system has been redesigned to provide information useful in making that determination in as clear, concise, accurate, and efficient a manner as possible. In addition, the monitoring program has as a goal, demonstrating that natural attenuation will continue to be effective and that remedial goals will be met throughout the site.

The wells in the current monitoring network were installed at various times and as parts of multiple investigations conducted by numerous investigating entities. The product of this highly varied history of methods, technical approaches, and interpretations has been the creation of a system of groundwater monitoring wells that is neither wholly representative of the uppermost continuous groundwater aquifer nor the proper vehicle for extended monitoring of the performance of the Site remedy. There are numerous cases of deteriorated surficial well installations and questionable subsurface well completions. Normal physical deterioration, subsidence, frost heave, and mass movement have affected several wells, particularly those completed within the bounds of the former landfill. Any of these physical means of deterioration provide potential conduits for contaminants into the uppermost continuous groundwater unit.

Figure A-2, which is reproduced from the *Summary Report on an Assessment of Individual Groundwater Monitoring Wells at the Industrial Excess Landfill (IEL) Site and the Regional Hydrogeologic Setting, December 12, 2000, (Revised August 2003)* [Well Evaluation Report] permits a visual comparison of monitoring well completion intervals, elevations, and stratigraphy with respect to historically-defined "shallow, intermediate, and deep" designations. In addition, Figure A-2 provides identification of those wells that have historically not detected any VOCs.

To address the inadequacies of the present monitoring well system, the Site's 58 monitoring wells were evaluated using both current and historic information that includes:

- The physical, field documented condition of the well;
- The well's analytical groundwater results;
- The appropriateness of each wells completion depth; and
- The applicability of the well location to the purpose of monitoring the uppermost continuous groundwater aquifer at the Site.

5.2 REDESIGN OF THE MONITORING WELL NETWORK

There are fifty-eight (58) monitoring well installations associated with IEL. These wells have their locations shown on **Figure 17**. Of these 58 wells, 23 have been identified as being more representative of the uppermost continuous groundwater aquifer (See Well Evaluation Report and **Table 6**). The Well Evaluation Report allowed grouping of types of wells that gave rise to a tiered well-designation scheme that is being used as part of the current Four Year Groundwater Monitoring Plan which was initiated in August 2000. The 58 wells and their existing tier designations are listed in **Table 7.** The tiered approach allowed targeting of the sampling program to maximize the value of the collected data by collecting samples from those wells that give the most information about any changes to Site conditions.

A similar process has been followed to identify criteria upon which to develop the future monitoring well network. Each well was evaluated to determine whether that individual well provides information to evaluate Site groundwater in the uppermost continuous groundwater unit. Some wells were determined to be not useful for these purposes and designated for proper abandonment, as follows:

Decision Rules for the Abandonment of Selected Site Monitoring Wells:

1. Monitor wells that are completed within the Carlisle Muck will be abandoned because they do not provide useful information on the uppermost continuous groundwater unit water quality.
2. Monitoring wells identified as "broken", either at their surface completion or within their subsurface construction will be abandoned because they do not provide useful information

since it is impossible to determine whether they can yield samples that are representative of groundwater quality.

3. Existing monitoring wells located within the area of fill that are not of double-cased construction will be abandoned because they do not provide useful information since it is impossible to determine whether they can yield samples that are representative of groundwater quality. Per the RI/FS (Section 4, Page 85 of 128): "MW07S, which is partially completed in waste" will be properly abandoned. Although the well log for MW-7S does not indicate the presence of significant waste, the well is apparently acting as a landfill gas vent and potential conduit to groundwater, in part because it is screened across the water table. Using the decision rules included herein, this well should be abandoned to eliminate the potential for migration to groundwater and because the well does not provide information that is representative of the uppermost continuous groundwater unit.
4. Some monitoring wells in which no detectable levels of contaminants have been identified for greater than 10 years, do not provide useful information since it has already been demonstrated that the zones they monitor are not affected by site constituents; therefore further information from them is superfluous. Other wells in which no contaminants have been detected for greater than 10 years will be retained to insure appropriate areal coverage of the Site's groundwater monitoring network.
5. Some monitoring wells that are not currently needed will nevertheless be retained as contingency wells in case monitoring results show the need to monitor these areas.

To evaluate the relevance of existing well placements and to identify where additional monitoring wells may be necessary, previously published quarterly potentiometric maps of the uppermost continuous groundwater unit were reviewed. A potentiometric map using water level measurements collected on July 18, 2003, is included as **Figure 18.** This figure demonstrates the east-to-west groundwater flow beneath the Site and the dominant influence of the buried bedrock valley located immediately west of IEL.

This groundwater flow, in the uppermost continuous groundwater aquifer, has remained consistent through many years of measurement. Groundwater flow and concentration trends are also well understood. Many years of site groundwater monitoring data demonstrate that some existing wells are redundant and/or irrelevant to the groundwater monitoring of IEL.

An inventory of the existing IEL monitoring wells is provided **(Table 8)** with recommendations for the proposed fate of each well. Also included on the table is the supporting rationale.

Located at the bottom of Table 8 are recommendations for five new wells:

- MW-17 New to replace, in part, MW-17s and MW-17d (but at a location slightly upgradient and beyond the limits of the landfill);
- MW-16 New to replace, in part, MW-16 but at a location beyond the limits of the landfill to provide perimeter coverage to the north;
- MW-29 and MW-31, located downgradient of MW-13i New, MW-14i New, and the "15 series"; and
- MW-30, located upgradient of the Site (at the sod farm).

The product of these assessments and recommendations concerning the IEL groundwater monitoring network produces a network consisting of 30 wells that better characterize and protect the upper continuous groundwater unit and any potential downgradient receptors. This network is presented on **Figure 19 and Figure A-3.** As can be seen in these two figures, the resulting network includes:

- Wells that encircle the Site in all the compass directions;
- Wells screened in the uppermost continuous groundwater unit – a sand and gravel matrix – at elevations between 1040' and 1105' (National Geodetic Vertical Datum, 1929).
- Wells at the western and southern perimeter screened both above and below the uppermost continuous groundwater unit.
- Elimination of duplicate wells at the same location, where possible
- Elimination of some deep bedrock wells that have never shown any contamination and some very shallow wells that exhibit water perched above the uppermost continuous groundwater unit.

5.3 GROUNDWATER MONITORING NETWORK MODIFICATIONS

5.3.1 Well Abandonment

Site monitoring wells (and any other wells or monitoring points) identified as needing abandonment will be properly abandoned in accordance with an approved well-abandonment plan using procedures that are in accordance with the *State of Ohio Technical Guidance for Sealing Unused Wells*, developed by the State Coordinating Committee on Groundwater. Well abandonment activities will be performed by a driller licensed in the State of Ohio.

5.3.2 Well Network Tier Designations.

The value of information collected from sampling and analysis of the monitoring well network will vary depending upon the wells sampled. As in any monitoring well network, information from some wells is more valuable than others. With this network, a set of Tier designations has been developed to maximize the value of the monitoring program. These tiers are detailed below and summarized on **Table 9**.

Tier Summary

Tier Designation	Well Description	Monitoring Purpose / Approach
Sentinel Wells: 8 wells: 1s, 1i, 7i, 21s, 11s, 11i, 29, 31	Located along western boundary of landfill	Will detect migration downgradient from landfill if it occurs
On-Site Wells: 2 wells: 13i and 14i	Double-cased new wells installed through waste	Provide early indications of migration from landfill contents
Background: 2 wells: 12i, 30	Upgradient.	Identify regional changes; monitor naturally-occurring constituents
Perimeter Wells: 7 Wells: 3i, 18i, 18s, 22i, 16, 17, 23s	Along landfill perimeter but cross-gradient	Provide coverage of uppermost aquifer in all compass directions
Downgradient Wells: 5 24i, 25s, 26s, 27i, 10i	Further downgradient than sentinel wells	Allow measurement of extent should sentinel wells show detects
Contingency Wells: 6 9i, 1d, 20s, 11d, 21i, 7d	Western/southern boundary wells retained	Sampled only if results in 1i, 11i, 21s, 7i, and 30 warrant
New Wells: 5 16, 17, 29, 30, 31	Replacement: 16, 17 Background: 30 Sentinel 29, 31	Northside boundary coverage Better sentinel well coverage Better background location

Wells located on the downgradient portion of the Site (i.e., sentinel wells) are given the highest priority and sampled most frequently. Wells that have never shown any contamination, wells located upgradient or cross-gradient of the Site and background wells are given lower priorities.

Although background wells can provide valuable information when addressing naturally-occurring site constituents of concern, they have little value when the site constituents of concern are VOCs (like at IEL) because there is no "background" contribution. This tiered well designation was used to develop a groundwater monitoring program that focuses on collecting the most important groundwater quality information.

5.4 GROUNDWATER MONITORING PROGRAM

The groundwater-monitoring program has been developed as required by the 2002 ROD Amendment to ensure detection of changes in the chemical concentration of contaminants in the groundwater beneath and adjacent to the site. The purpose of the groundwater protection monitoring plan is to document that Site remedial goals continue to be met; i.e., that the Site does not pose an unacceptable threat to human health or the environment as a result of migration of constituents from the IEL Site, that natural attenuation continues to occur at an acceptable rate, and that progress continues until remedial goals (MCLs) are met throughout the site. In addition, the monitoring program has been designed to elucidate trends or other information that may demonstrate the permanence of the remedy.

Groundwater data collected to date will be used in conjunction with that already collected as part of the Groundwater Monitoring Program to establish groundwater trend analyses. Monitoring will continue before, during, and after implementation of the remedy – eventually phasing into less frequent monitoring as the monitoring shows improving trends.

As appropriate, groundwater-monitoring data will be evaluated with statistical methods consistent with USEPA guidance. However, as most site wells show no detects or only a few detections of near-detection-limit concentrations, the ultimate proof of remedy performance will be non-detects of all VOC constituents.

Data will be routinely analyzed to ensure that decreasing trends continue and no increasing trends are discovered that indicate a threat to human health or the environment.

5.4.1 Statistical Analysis Methodology

The statistical methods proposed to assess and demonstrate attainment are consistent with the guidance documents: Methods for Evaluating the Attainment of Cleanup standards - Volume 2: Groundwater (USEPA 1992) and The Lognormal Distribution in Environmental Applications (USEPA, ORD-OSWER, 1997). Because existing data exhibit no unacceptable threat to human health or the environment, the data will be primarily evaluated to ensure that no statistically increasing trends exist.

Data from the previous and current monitoring programs will be tabulated and summarized graphically. Once sufficient data have been collected (as defined by EPA's Methods for Evaluating the Attainment of Cleanup Standards) a statistical evaluation will be performed. As part of this statistical evaluation, a determination will be made as to whether sufficient data are available. Subsequently, no statistical treatment may be needed as long as concentrations continue to decrease. As needed, statistical analysis will be performed to confirm no increasing trends.

For those parameters where there are a limited number of non-detected results, averages and standard deviations for the concentrations of each parameter will be calculated for each year of monitoring, and a grand average and standard deviation will be calculated for these yearly values for the entire monitoring period. For those parameters where a large number of non-detected concentrations are measured, the 90th percentile concentration will be determined for the entire monitoring period. The comparison to the cleanup standard will be based on using this 90th-percentile concentration.

As described in the USEPA 1992 technical guidance document, the statistical evaluation will determine if the grand average or the 90-th percentile concentration is less than the cleanup standard. Once this has been demonstrated, it is necessary to determine if sufficient data are available to conclude that the attainment had been reached considering false positive and negative error rates of 10 percent. If data are deemed insufficient based on this analysis, then monitoring will continue for another year or for as long as necessary to acquire sufficient data to demonstrate attainment. If data are sufficient, a trend analysis will be performed to demonstrate that the data do not exhibit a statistically increasing trend at the 90-percent significance rate.

For these types of analyses, the samples must be collected in each well for each sampling event, and thus the same number of samples will be collected from all wells within the group. The population mean or upper percentile calculated for the group on an annual basis will be the

statistical parameter used to assess attainment. For wells with non-detectable concentrations of COCs reported, the method detection limit will be used in the calculations of the mean.

References:
United States Environmental Protection Agency, 1992, Methods for Evaluating the Attainment of Cleanup Standards, Volume 2, Groundwater.
USEPA, ORD-OSWER, 1997, The Lognormal Distribution in Environmental Applications

5.5 GROUNDWATER MONITORING FREQUENCY

Groundwater monitoring will be conducted in accordance with Table 9 and Table 10. The proposed schedule for monitoring incorporates the following information:

- VOCs are the constituents of greatest potential concern for groundwater. Groundwater concentrations of Metals and SVOCs have not been shown to be affected by migration from the IEL Site.
- Site monitoring using the existing monitoring well network has been conducted for more than 16 years; this monitoring provides a baseline that obviates the need for extensive quarterly monitoring.
- USEPA requested 5 years of quarterly sampling prior to the CERCLA 5-year review. In response to that request, the Responding Companies have designed a program that will provide a total of 18 monitoring events (from August 2000 through May 2006) that are completed before the next CERCLA 5-year review.
- Newly-installed wells will be sampled for all parameters for four consecutive events to provide a baseline.
- All wells in the network (except the contingency wells) will be sampled in each of the next 4 events.
- The groundwater monitoring program will be re-evaluated with the next CERCLA five-year review.

5.6 ISSUES ASSOCIATED WITH GROUNDWATER MONITORING.

5.6.1 Work Plan Development

As part of the development of this groundwater-monitoring program, The Responding Companies will update the approved Site Sampling and Analysis Plan and Quality Assurance Project Plan as needed to incorporate the agreed-upon approach.

5.6.2 Contingency Plan Development

As part of the development of this groundwater-monitoring program, The Responding Companies will prepare and submit for approval, a Contingency Plan to address the process that will be followed should groundwater monitoring indicate a potential threat to human health or the environment. A draft copy of the Contingency Plan is included with the Appendix.

5.6.3 Maintenance Issues Related to the Groundwater Monitoring Program

Access and integrity of the Site monitoring well network will be maintained as detailed in a Site-wide operations and maintenance plan for the Site to be developed.

5.7 MVS Monitoring Program

The MVS operations, maintenance, and monitoring program will continue in exactly the same form (detailed in Table 11) until the MVS system evaluation is complete. As a result of the MVS system evaluation conducted as an additional design study, modifications to the MVS system or operations will be proposed. See Section 6.2.

SECTION SIX

SECTION SIX. ADDITIONAL DESIGN STUDIES

Additional design studies will be performed as needed to implement the remedy. The current SOW envisions two additional design studies, as follows:

6.1 A RISK ASSESSMENT FOR EXPOSURE TO SITE SOILS AND LANDFILL GASES

This section describes the planned evaluation of risks associated with exposure to site soils and landfill gases using realistic potential ***future*** use assumptions. This evaluation will build on the Baseline Risk Assessment (BRA) and the Supplemental Baseline Risk Assessment (SBRA) conducted for the IEL site. The BRA was conducted in 1995 according to USEPA guidelines and was updated in 1999 with the SBRA using revised risk assessment methodologies enacted by the USEPA, revised toxicity criteria, and updated groundwater data collected using low-flow sampling techniques. In general, the BRA and SBRA show no unacceptable threats to human health or the environment for the current exposure pathways; however, because the potential future exposure pathways may change based on future uses. additional exposure pathways will be evaluated in the planned risk assessment.

The Revised Supplemental Baseline Risk Assessment (RSBRA) for the IEL site will be developed, as follows:

1. Identify reasonable future use assumptions associated with a park/nature preserve setting.
2. Evaluate the Methane Venting System data and historic landfill gas monitoring data to identify trends and verify historic sampling of reasonable worst-case conditions.
3. Establish a grid for ambient air sampling program for the landfill, collect ambient air samples and analyze.
4. Revise the SBRA to include new exposure pathways (park/nature preserve) and the ambient air data.
5. If no unacceptable exposures are identified in the RSBRA (that uses the historic RI soils and sediments data and the low-flow groundwater data) then risk-related actions (moving the fence, installing overlooks, etc.) may be considered.
6. If unacceptable exposures are identified, selected additional surface soil, sediment, air, or groundwater sampling and/or modeling may be conducted on those media/parameters that provide the risk drivers.
7. If some additional access is shown to be safe, a sensitivity analysis will be conducted to estimate the boundary conditions that may trigger additional analysis.

Some additional discussion of risk assessment elements follows:

Data

- Historic samples were taken during the RI/FS from both surface soils (50 locations) and sub-surface soils (35 locations). Samples were also collected from surface water (8 locations in Metzger's Ditch, 4 on-site ponds, and 9 off-site ponds) and sediments (17 locations, all off-site). Data from these samples were evaluated and used in the BRA, although the RI

concluded that much of the contamination detected in these samples (at least in the soils and sediments) was not attributable to the IEL site.

Exposure Pathways

- New remedial actions for the site could allow exposure to site soils and groundwater in ways that differ from those originally evaluated in the BRA and SBRA (the only on-site exposures to soils were to short-term trespassers aged 9-14). The RSBRA should evaluate exposures to on-site recreational users and trespassers that would come into contact with soils and volatile gasses emanating from the landfill during site visits. The exposure pathways would be developed to evaluate both the "normal" recreational receptor (stays on improved trails), and the "trespasser" recreational user (off-road bikers and hikers who venture off the improved trails). These scenarios will also be expanded to include evaluations of both the adult and child receptors.
- The RSBRA will need to expand the volatile gas evaluation conducted in the BRA to include on-site receptors discussed above (includes methane evaluation).

Exposure Assumptions

- The BRA and SBRA used the standard USEPA methodology of evaluating the "most likely exposed" (MLE) and "reasonably maximally exposed" (RME) individuals for all exposure pathways. Exposure assumptions were developed using the USEPA's Exposure Factors Handbook. The RSBRA will also use this methodology to evaluate or revise any exposure pathways evaluated under the current future land-use assumptions.

6.2 MVS EVALUATION

As part of the additional design studies, the Responding Companies will conduct an evaluation of the need for continued operation of the MVS and propose any needed modifications. A tentative Gas Monitoring Program outline is presented below. This program is designed to:

- Investigate the current flux of methane generation and the current gas composition and parameters that will allow projection of future rates of methane generation.
- Estimate future gas generation rates.
- Evaluate the potential for migration of landfill gases and the migration pathways and fluxes under current and proposed MVS operating frequencies.
- Estimate the amount of through-surface methane release.
- Review historic information on the methane generation at the site, including:
  - An evaluation of the frequency of operation of the current system;
  - An evaluation of the historic methane investigations at the site;
  - A comparison of current/historic generation rates to the Scholl Canyon Gas Generation model-predicted outputs provided by the USEPA Office of Research and Development and Office of Air Quality Planning and Standards. Based on the age of IEL, current methane generation rates should be about 1/3 of the maximum rates produced by the site.
- Assess the current MVS system performance and identify whether the current methane destruction / venting system is adequate.
- Sample subsurface areas of the site that have the potential for migration (eastern boundary).

Once this evaluation is complete, a program for augmentation or phaseout of the MVS will be developed based on the results.

DRAFT OUTLINE OF THE GAS MONITORING PROGRAM FOR THE IEL SITE:

1. **INTRODUCTION**
2. **EVALUATION OF EXISTING GAS VENTING SYSTEM**
   - 2.1. Process Description
   - 2.2. Assessment of Current System
     - 2.2.1. Extraction and Monitoring Wells
     - 2.2.2. Piping and Headers
     - 2.2.3. Alarm System
     - 2.2.4. Exhauster Station
     - 2.2.5. Automatic Operation
     - 2.2.6. Manual Operation
   - 2.3. Potential System Modifications
3. **ELEMENTS OF GAS MONITORING PROGRAM**
   - 3.1. Compliance with ARARs
   - 3.2. Operations and Maintenance
     - 3.2.1. Inspection and Frequency
       - 3.2.1.1. Gas Extraction Wells
       - 3.2.1.2. Header Pipes
       - 3.2.1.3. Moisture Traps
       - 3.2.1.4. Gas Monitoring Wells
       - 3.2.1.5. Gas Exhauster
       - 3.2.1.6. Flame Arrestor
       - 3.2.1.7. Ground Flare
       - 3.2.1.8. Valves
       - 3.2.1.9. Propane Generator
   - 3.3. Maintenance
     - 3.3.1. Routine
     - 3.3.2. Non-Routine
   - 3.4. Monitoring
     - 3.4.1. Monitoring Parameters
       - 3.4.1.1. Methane Content
       - 3.4.1.2. Oxygen Content
       - 3.4.1.3. Carbon Dioxide Content
       - 3.4.1.4. Gas Temperature
       - 3.4.1.5. Vacuum/Pressure
       - 3.4.1.6. Valve Settings
       - 3.4.1.7. Flow Rates
       - 3.4.1.8. Ambient Conditions
     - 3.4.2. Monitoring Frequency
       - 3.4.2.1. Routine
       - 3.4.2.2. Troubleshooting/Verification/Assessment

3.4.3. Monitoring Procedures
3.4.3.1. Equipment
3.4.3.2. Reporting
3.4.3.3. Data Validation

4. LONG TERM GAS VENTING SYSTEM EVALUATION

4.1. Baseline Study
4.1.1. Estimate of Current Gas Generation Rates/Rebound Study
4.1.2. Characterization of Current Gas Composition
4.1.3. Determination of Potential Future Explosive Gas Formation
4.1.4. Evaluation of Potential Hazard to Occupied Structures
4.1.5. Evaluation of Potential Migration Pathways

4.2. Shut Down of Gas Venting System
4.2.1. Compliance with ARARs
4.2.2. Abandonment of Permanent Monitoring Points
4.2.3. Decommissioning of Active Gas Venting System
4.2.4. Long Term Monitoring
4.2.5. Contingency Plan

6.3 ADDITIONAL GAS MIGRATION EVALUATION

As described above and in Appendix 6, migration of landfill gases away from the Site through the subsurface at the eastern boundary and concentrations of landfill gases in ambient air in the interior of the landfill will be evaluated. An investigation work plan will be developed and submitted to USEPA and OhioEPA for review and approval.

6.4 DRAFT MVS O&M PLAN

The MVS operations, maintenance, and monitoring program will continue in exactly the same form (detailed in Table 11) until the MVS system evaluation is complete. As a result of the MVS system evaluation, modifications to the MVS system or operations will be proposed and a draft O&M plan will be submitted at that time. See Section 6.2.

6.5 WORK PLAN REVISIONS

As needed to implement the remedy and monitoring programs, work plans will be revised. These may include the Site Operations and Maintenance Plan, Sampling and Analysis Plan, Site Specific Health and Safety Plan, and Quality Assurance Project Plan.

SECTION SEVEN

SECTION SEVEN. PROJECT COST AND SCHEDULE ESTIMATES

This section includes a revision to the project cost estimate based on the work anticipated in the Remedial Design. It also includes a proposed schedule for implementation.

7.1 REMEDY IMPLEMENTATION, CAPITAL COST

A capital cost estimate to implement the remedy is provided in Table 12. This estimate updates the capital cost estimate detailed in the Focused Feasibility Study for the Site, March, 2002, using available information. Detailed below are notes that provide backup for the information presented on the cost estimate.

Notes/Assumptions Concerning the Updated Capital Cost Estimate for the IEL Remedy:

1. Capital Costs include all activities expected to be performed through Calendar 2004 with a few additions. Capital costs incurred through Calendar 2004 are considered to be "2003 $$$". The CERCLA 5-year reviews are included with the Capital Costs even though they will not be performed until September 2006 and 2011. The MVS demolition is estimated as occurring in 2012, depending upon monitoring results.
2. Capital costs for the interim action (providing alternate water supply) are included in Year 0 (both in actual dollars and 2003 $$).
3. Tasks 2, 3, and 4 are complete (demolition of Uniontown Tire, Uniontown Station Antiques and warehouse and associated structures).
4. Two new double-cased wells (portion of Task 5) have been installed in 2002.
5. Well installation and abandonment to be complete by July 2004.
6. No fence *relocation* included with estimate.
7. No capital dollars have been set aside for MVS well abandonment. The MVS system will be decommissioned once the monitoring program and the methane study demonstrate that the system can be safely shut down. This shutdown is expected to occur in 2012. The need for additional gas well abandonment will be evaluated once the system has been decommissioned.

7.2 REMEDY IMPLEMENTATION, OPERATIONS, MAINTENANCE, AND MONITORING COST

An O&M cost estimate is provided as Table 13. This estimate updates the estimate provided in the Focused Feasibility Study for the Site. The capital and O&M costs are collected and subjected to net present value analysis according to USEPA guidelines. This information is summarized in Table 14.

7.3 REMEDY IMPLEMENTATION SCHEDULE

A remedy implementation schedule (capital activities) is presented in Figure 21. It details remedy implementation tasks dating to October 2000 (Pre-demo) through December 2004. Tasks to be conducted post-2004 are included with Operations and Maintenance Activities.

TABLES

Table 1. Wildlife Noted During the WHC Visit

Type	Common Name	Scientific Name
Plants	box elder	*Acer negundo*
	silver maple	*Acer saccharinum*
	milkweed	*Asclepias syriaca*
	field mustard	*Brassica rapa*
	teasel	*Dipsacus sylvestris*
	horsetail	*Equisetum fistulosum*
	green ash	*Fraxinus pennsylvanica*
	English ivy	*Hedera helix*
	rush	*Juncaceae Family*
	Eastern red cedar	*Juniperus virginiana*
	apple	*Malus sylvestris*
	Autumn olive	*Oleaceae Family*
	switch grass	*Panicum virgatum*
	Phragmites	*Phragmites communis*
	phlox	*Polemoniaceae Family*
	big-toothed aspen (poplar)	Populus *grandidentata*
	black cherry	*Prunus serotina*
	scrub oak	*Quercus ilicifolia*
	staghorn suma	*Rhus typhina*
	common locust	*Robinia pseudoacacia*
	raspberry	*Rubus occidentalis*
	black willow	*Salix nigra*
	little bluestem	*Schizachyrium scoparium*
	poison ivy	*Toxicodendron pubescens*
	red clover	*Trifolium pratense*
	rock elm	*Ulmus thomasii*
Birds	red tailed hawk	*Buteo jamaicensis*
	cardinal	*Cardinalis cardinalis*
	turkey vulture	*Cathartes aura*
	chimney swift	*Chaetura pelagica*
	American crow	*Corvus brachyrhynchos*
	gray catbird	*Dumetella carolinensis*
	northern oriole	*Icterus galbula*
	American robin	*Turdus migratorius*
Reptile	painted turtle	*Chrysemys picta*
Mammal	white-tailed deer	*Odocoileus virginianus*
	muskrat	*Ondatra zibethica*
	red fox	*Vulpes fulva*
Amphibian	green frog	*Rana clamitans*

Table 2. Native Plants for Wildflower Meadow

Type	Common Name	Scientific Name
Grasses	little bluestem	Andropogon scoparius
	broom sedge	Andropogon virginicus
	side-oats grama	Bouteloua curtipendula
	purple love grass	Eragrostis spectabilis
	Indian rice grass	Oryzopsis hymenoides
	switch grass	Panicum virgatum
Wildflowers	columbine	Aquilegia canadensis
	Verbena stricta	Asclepias syriaca
	butterfly weed	Asclepias tuberosa
	New England aster	Aster novae-angliae
	wild indigo	Baptisima tinctoria
	purple coneflower	Echinacea purpurea
	fireweed	Epilobium angustifolium
	saw-toothed sunflower	Helianthus grosseserratus
	thyme leaved pinweed	Lechea minor
	round-headed bush clover	Lespedeza capitata
	cardinal flower	Lobelia cardinalis
	wild lupine	Lupinus perennis
	wild bergamot	Monarda fistulosa
	horsemint	Monarda punctata
	common evening primrose	0enothera biennis
	tall cinquefoil	Potentilla arguta
	Canada goldenrod	Solidago canadensis
	hoary vervain	Verbena stricta

Table 3. Native Vegetation for Hedgerows and Forested Islands

Type	Common Name	Scientific Name
Grass	switch grass	Panicum virgatum
	needlegrass	Stipa spartea
	June grass	Koeleria cristata
Shrubs	Jerseytea	Ceanothus americanus
	common buttonbush '	Cephalanthus occidentalis
	silky dogwood	Cornus amomum
	gray dogwood	Cornus racemosa
	American filbert	Corylus americana
	shrubby Saint John's wort	Hypericum prolificum
	common winterberry flex	verticillata
	common spicebush	Lindera benzoin
	American black currant	Ribes americanum
	Allegany blackberry	Rubus allegheniensis
	blackcap raspberry	Rubus occidentalis
Trees	box elder	Acer negundo -
	black maple	Acer nigrum
	red maple	Acer rubrum
	common pawpaw	Asimina triloba
	bitternut hickory	Carya cordiformis
	shagbark hickory	Carya ovata
	common hackberry	Celtis occidentalis
	frosted hawthorn	Crataegus pruinosa
	dotted hawthorn	Crataegus punctata
	green ash	Fraxinus pennsylvanica
	common witchhazel	hamamelis virginiana
	red mulberry	Morus rubra
	American plum	Prunus americana
	black cherry	Prunus serotina
	northern red oak	Quercus borealus
	smooth sumac	Rhus glabra
	staghorn sumac	Rhus typhina

Table 4. Native Vine Species

Common Name	Scientific Name
common trumpetcreeper	Campis radicans
American bittersweet	Celastrus scandens
virginsbower	Clematis virginiana
common moonseed	menispermum canadense
Virginia creeper	Parthenocissus quinquefolia
common greenbrier	Smilax rotundifolia

Table 5. List of Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds (TBCs) for the IEL Site

ARAR OR TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARAR's in the Context of the Remedy
I. CHEMICAL-SPECIFIC				
A. Water				
1. Safe Drinking Water Act	42 U.S.C.§§ 300f et seq			
Maximum Contaminant Levels (MCLs)	40 C.F.R. §§ 141.11-12 and 141.61-62	Relevant and Appropriate	MCL's are enforceable standards for public drinking water supply systems which have at least 15 service connections or are used by at least 25 persons. These requirements are not directly applicable to IEL because there is no public water supply system using this groundwater. Although there are no plans to use affected groundwater in the vicinity of IEL and the downgradient groundwater is not being used as a potable source, the groundwater is still considered a potential groundwater resource.	MCLs are used for comparison purposes with site groundwater data to help identify any threat or potential threat to human health or the environment. Comparisons to MCLs are very conservative. The Site remedy is protective of human health and the environment under current conditions. Ensuring that this condition persists is a goal of the remedial action. Another goal of the remedial action is to achieve MCLs for all constituents in all wells.
2. Ohio Administrative Code (OAC) governing MCLs for organic and inorganic contaminants of concern	OAC 3745-81-11-(A), (B), & ©, 3745-81-12(A), (B) & (C)	Relevant and Appropriate	3745-81-11 (A), (B), & (C): Maximum contaminant levels for inorganics; 3745-81-12 (A), (B), & (C): Maximum contaminant levels for organics.	Same as above
3. EPA-developed risk-based preliminary remediation goals (PRGs)	EPA-Region 9 Preliminary Remediation Goals (PRGs) Updated 10/1/99	To Be Considered	Risk-based tools for evaluating contaminated groundwater. However, no affected groundwater has a completed exposure pathway. Thus, these are not applicable nor relevant and appropriate.	Will be used for comparison purposes in a manner similar to MCLs.
II. ACTION-SPECIFIC				
1. Monitoring of Landfill				
State reqmts for general landfill closure, applicable performance stds. Assocated with landfill closure and post-closure care	OAC 3745-57-10(a) & (B), 3745-55-11(A)-(c) and 3745-55-17(B)	To Be Considered	3745-27-10(A) & (B): State standards for closure and post-closure care for landfill, incl. Final cover & maintenance; 3745-55-11 (A)-(C); Requires that all haz waste facilities be close in a manner that minmizes need for further maintenance and controls: 3745-55-17(B); Specifies post-closure requirements, incl. maintenance, monitoring, and post-closure use of property.	Landfill properly closed under state law in effect at the time; therefore not applicable. Post closure and monitoring requirements are TBCs.
2. Monitored Natural Attenuton (MNA)				
Use of monitored natural attenuation at Superfund, RCRA, Corrective Action, and Underground Storage Tank Sites, April 1999	OSWER Directive 9200.4-17P	To Be Considered	This policy provides gudiance for evaluating and approving monitored natural attenuation remedies	This policy shall be considered during implementation of chosen remedy for IEL.

Table 7. Tier and Sampling Summary, Current Well Network, 2003

#	Well ID	Tier	Location	Dedicated Pump?	Notes (Well not sampled / reason, comments)
1	MW-01D	LP	ON-SITE	NO	
2	MW-01I	S	ON-SITE	YES	
3	MW-01S	LP	ON-SITE	NO	
4	MW-02D	S	ON-SITE	YES	
5	MW-02S	LP	ON-SITE	NO	
6	MW-03D	LP	ON-SITE	NO	
7	MW-03I	LP	ON-SITE	NO	
8	MW-03S	LP	ON-SITE	NO	
9	MW-04S	LP	OFF-SITE	NO	
10	MW-05S	LP	OFF-SITE	NO	
11	MW-06S	LP	OFF-SITE	NO	
12	MW-07D	LP	ON-SITE	NO	
13	MW-07I	S	ON-SITE	YES	
14	MW-07S	OW	ON-SITE	YES	
15	MW-09D	LP	ON-SITE	NO	
16	MW-09I	LP	ON-SITE	NO	
17	MW-09S	LP	ON-SITE	NO	
18	MW-10D	LP	OFF-SITE	NO	
19	MW-10I	LP	OFF-SITE	YES	
20	MW-10S	D	OFF-SITE	YES	
21	MW-11D	LP	ON-SITE	NO	
22	MW-11I	S	ON-SITE	YES	
23	MW-11S	LP	ON-SITE	NO	
24	MW-12D	B	OFF-SITE	YES	
25	MW-12I	B	OFF-SITE	YES	
26	MW-13S	OW	ON-SITE	NO	
27	MW-13I	OW/A4	ON-SITE	NO	
28	MW-13iNew	OW/A4	ON-SITE	YES	Replacement well installed, 2002
29	MW-14iNew	OW/A4	ON-SITE	YES	Replacement well installed, 2002
30	MW-14I	OW/A4	ON-SITE	NO	
31	MW-14S	OW	ON-SITE	YES	
32	MW-15I	OW	ON-SITE	NO	
33	MW-15S	OW	ON-SITE	YES	
34	MW-16I	OW	ON-SITE	YES	
35	MW-17D	OW	ON-SITE	YES	
36	MW-17S	OW	ON-SITE	YES	
37	MW-18I	LP	ON-SITE	NO	
38	MW-18S	S	ON-SITE	YES	
39	MW-19S	D	OFF-SITE	YES	
40	MW-20D	LP	OFF-SITE	NO	
41	MW-20I	LP	OFF-SITE	YES	
42	MW-20S	B	OFF-SITE	YES	
43	MW-21I	LP	ON-SITE	NO	
44	MW-21S	S	ON-SITE	YES	
45	MW-22I	S	ON-SITE	YES	
46	MW-23D	LP	OFF-SITE	NO	
47	MW-23I	LP	OFF-SITE	NO	
48	MW-23S	D	OFF-SITE	YES	
49	MW-24I	LP	OFF-SITE	YES	
50	MW-24S	D	OFF-SITE	NO	
51	MW-25I	LP	OFF-SITE	YES	
52	MW-25S	D	OFF-SITE	NO	
53	MW-26I	LP	OFF-SITE	YES	
54	MW-26S	D	OFF-SITE	NO	
55	MW-27D	LP	OFF-SITE	NO	
56	MW-27I	LP	OFF-SITE	NO	
57	MW-27S	D	OFF-SITE	YES	
58	MW-28D	LP	OFF-SITE	NO	

Key: * All wells were sampled using a low-flow pump
Tier: Well designations established w/draft contingency plan
Tier S: Sentinel Wells
LP: Low Priority Wells
OW: On-Site Wells
B: Background Wells
D: Downgradient Wells
Tier A4 are on-site wells the Township requested be sampled 11/02
Dedicated Pump: 27 wells have dedicated pumps; other wells can be successfully sampled (except where noted) using portable, low-flow pumps

Table 6. List of Monitoring Wells Whose Elevations are Representative of the Uppermost Groundwater Unit at IEL

Well ID	Screened Elevation	Comment	Well ID	Screened Elevation	Comment
1I	1081'-1086'	1S is perched	17S	1112'-1122'	Water@same as 17D
2D	1070'-1080'	2S is dry	18I	1052'-1062'	18S is perched
3I	1086'-1091'	3S is dry	19S	1076'-1086'	There is no 19I
7I	1088'-1098'	7S completed in waste	20S	1088'-1098'	Completion beneath muck
9I	1076'-1081'	9S, 4S, 5S, 6S, in muck	21S	1085'-1095'	~ same elevation as 11I
10S	1105'-1115'	Evaluate against 10i	22I	1055'-1065'	There is no 22S
11I	1081'-1086'	11S is perched	23S	1100'-1110'	
12I	1074'-1084'	There is no 12S	24I	1080'-1090'	Screened 1080-1090
13I	1042'-1052'	13S is dry	25S	1101'-1111'	
14I	1056'-1066'	14S is perched	26S	1055'-1065'	
15S	1108'-1118'	~ same as 15I	27S	1109'-1119'	
16I	1071'-1081'	There is no 16S		934'-944'	28D screened in bedrock

From: *SUMMARY REPORT on an Assessment of Individual Groundwater Monitoring Wells at the Industrial Excess Landfill (IEL) Site and the Regional Hydrogeologic Setting, December 12, 2000. (Amended August 2003).*

Table 5. List of Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds (TBCs) for the IEL Site

ARAR OR TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARAR's in the Context of the Remedy
3. Stormwater Discharge				
NPDES Stormwater Discharge Requirements	40 C.F.R. 122.26(a)	Applicable	Stormwater discharge requirements under the NPDES program.	NPDES permits are required for discharges, which the regulation defines to include landfills that have received industrail wastes. However, because of the CERCLA § 121 (e) permit exemption, only substantive requirements of the NPDES regulations are applicable.
4. Landfill Gas Management				
Stack height requirements	OAC 3745-16-02(B) and (C)	Applicable	Establishes allowable stack height for air emission sources based on good engineering practice	This provision is applicable to any stack at IEL (e.g., MVS)
Particulate non-degradation policy	OAC 3745-17-05	Applicable	Degradation of air quality is prohibitied in any area where air quality is better than required by 3745-17-02 (non degradation policy).	Pertains to stack emissions from methane venting system.
Organic emissions control from stationary sources.	OAC 3745-21-07(A),(B), (G), (I), and (J)	Applicable	Requires control of emissions from stationary sources. Requires best available technology	Pertains to emissions from MVS.
Carbon monoxide (CO) control from stationary sources.	OAC 3745-21-08(A) through (E)	Applicable	Requires any stationary source of CO to minimize emissions using best available control technologies and operating practices.	Pertains to emissions from venting system which is expected to emit carbon monoxide.
Standards for total suspended particuates.	OAC 3745-17-02(A), (B), and (C)	Applicable	Establishes specific standards for total suspends particulates.	Revelant to stack emissions from MVS and construction activities.
5. Remedy Construction Activities				
Worker Safety	29 C.F.R. 1910.120	Applicable	Establishes proper training and personal protection requirements for workers who have reasonable potential to be exposed to hazardous substances while performing job fuctions at the site.	Workers shall be proprly trained and shall wear appropriate personal protection equipment for activities conducted at the IEL Site.
State rules governing grading, excavating, etc. at sites containing hazardous or solid wastes	ORC 3734.02(H)	Relevant and Appropriate	Prohibition againist filling, grading, excavation, building, drilling, or mining on land where a hazardous or solid waste facility was operated, without prior authorization from OEPA.	OEPA in included in decision-making process.
State prohibitions on certain air emissions from a hazardous waste faciltiy.	ORC 3734.02(I)	Relevant and Appropriate	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that interferes with the comfortable enjoyment of life or property or its injurious to public	IEL is not a hazardous waste facility. However, to the extent that air emissions may occur, this may be relevant and appropriate..
Fugitive dust control.	ORC 3745-17-08	Applicable	Emissions of fugitive dust shall be controlled at sites where it may be generated due to grading, loading,	Pertains to clearing, grubbing, and related construction operations

Table 5. List of Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds (TBCs) for the IEL Site

ARAR OR TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARAR's in the Context of the Remedy
Standards for total suspended particulates.	OAC 3745-17-02(A), (B), and (C)	Applicable (to construction acttivities)	Estabishes specific standards for total suspended particulates.	Relevant for stack emissions from+E10 methane venting system and construction activities.
Nuisance control/prohibition	OAC 3745-15-07(A)	Applicable	Defines air pollution nuisance as the emission or escape into the air from any source(s) of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, and combinations of the above that endanger the health, safety, or welfare of the public or cause personal injury or property damage, such nuisances are prohibited.	Applies to activities that may cause nuisances, such as excavation, cap construction, demolition of buildings, etc.
5. Well Abandonment				
State requirements for well abandonment	OAC 3745-9-10	Applicable	State requirements for well abandonment	Obsolete wells will be abandoned in accordance with State standards
III. LOCATION-SPECIFIC				
Hazardous Waste Facilities and Old Landfills				
Monitoring for explosive gases at sanitary landfills.	OAC 3745-27-12(A), (B), (D), (E), (M), and (N)	Substantive Provisions are Applicable	Monitoring requirements for explosive gases at sanitary landfills	This requirement will be covered under long-term monitoring plan for this site
Requirements for non-methane organic compound (NMOC) emissions at old landfill sites.	OAC 3745-76	Relevant and Appropriate	Establishes standards for the control of NMOC emissions from old landfill sites. Covers definition, test methods, performance standards, and recorkeeping requirements.	IEL gas treatment system must meet these standards before operating in a passive mode.
State prohibitions on certain air emissions from a hazardous waste facility.	ORC 3734.02(I)	Relevant and Appropriate	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that interferes with the comfortable enjoyment of life or property or is injurous to public health.	IEL may not be a hazardous waste facility under ORC.
Prohibition of nuisances	ORC 3767.13(A)	Relevant and Appropriate	Prohibits noxious exhalations or smells.	Pertains to any site that may have noxious smells.
OAC regulations govering groundwater protection.	OAC 3745-54-90 et seq	To be Considered	Requires landfill permits to include standards that ensure protection of groundwater. Substantive requirements only.	Under CERCLA § 12 121 (e)(1), no permit is required at IEL. But in order to protect groundwater, substantive permit standards will be considered in designing the IEL monitoring program.

TABLE 8. Inventory of IEL Monitoring Wells
And Recommendations for their Disposition

Legend:

Historic well designations:

S = shallow completion depth
i = intermediate completion depth
D = deep completion depth

Clean – no contaminants detected for X# of years
RED – retained existing monitor wells
Blue – retained contingency monitor wells
NEW – replacement wells and new well locations

Well Identification	Proposed Fate	Rationale
MW-1i	Retain	Representative of uppermost continuous groundwater unit. Downgradient well location. VOC detect 3/97.
MW-1D	Retain	Retain as a contingency well. Not representative of the uppermost continuous groundwater unit. Clean +14 yrs.
MW-1S	Retain	Sentinel well. Perched aquifer completion, straddles water table. Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-2D	Abandon	Not representative of uppermost continuous groundwater unit, bedrock completion. Clean +10 yrs.
MW-2S	Abandon	Dry since 1988. Reflects prior perched aquifer.
MW-3i	Retain	Representative of uppermost continuous groundwater unit. Perimeter location. Clean +5 yrs.
MW-3D	Abandon	Not as representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-3S	Abandon	Dominantly dry. Reflects perched aquifer. Clean +10 yrs.
MW-4S	Abandon	Completed in Carlisle Muck. Perched upgradient aquifer.
MW-5S	Abandon	Completed in Carlisle Muck. Perched upgradient aquifer.
MW-6S	Abandon	Completed in Carlisle Muck. Perched upgradient aquifer.
MW-7i	Retain	Representative of uppermost continuous groundwater unit. Perimeter well. Clean +10 yrs.
MW-7D	Retain	Retain as a contingency well. Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-7S	Abandon	Completed partially within waste and the Carlisle Muck.

MW-9i	Retain	Contingency well. Representative of uppermost continuous groundwater unit. Upgradient. Clean +10 yrs.
MW-9D	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-9S	Abandon	Completed in Carlisle Muck. Perched upgradient aquifer.
MW-10i	Retain	Representative of uppermost continuous groundwater unit. Clean +10 yrs. Perimeter well.
MW-10D	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-10S	Abandon	Representative of uppermost continuous groundwater unit. Clean +10 yrs.
MW-11i	Retain	Representative of uppermost continuous groundwater unit. Downgradient location. Current analyses detect contaminants.
MW-11D	Retain	Retain as a contingency well. Representative of uppermost continuous groundwater unit. Clean +10 yrs.
MW-11S	Retain	Sentinel well. Perched aquifer completion. Not representative of the uppermost continuous groundwater unit. Single detection of Toluene at 1.3 ppb in 12/00.
MW-12i	Retain	Representative of uppermost continuous groundwater unit. Clean +10 yrs.
MW-12D	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-13i	Abandon	Broken.
MW-13S	Abandon	Perched aquifer completion. Not representative of the uppermost continuous groundwater unit. Very high detection limits.
MW-13NEW	Retain	New replacement well for MW13I (broken)
MW-14i	Abandon	Broken.
MW-14S	Abandon	Single cased well within landfill. Not representative of the uppermost continuous groundwater unit. Very high detection limits.
MW-14NEW	Retain	New replacement well for MW14I (broken)
MW-15i	Abandon	Single cased well within landfill.
MW-15S	Abandon	Single cased well within landfill Not as representative of the uppermost continuous groundwater unit. Very high detection limits.
MW-16i	Abandon	Representative of uppermost continuous groundwater unit. Upgradient well location. Clean +12 yrs. Single cased well within landfill. Replace with MW16 NEW at perimeter.

MW-17D	Abandon	Single cased well within landfill. Not representative of the uppermost continuous groundwater unit. Replace with MW17New further upgradient.
MW-17S	Abandon	Single cased well within landfill. Not representative of the uppermost continuous groundwater unit. Replace with MW17New at perimeter
MW-18i	Retain	Perimeter well. Representative of uppermost continuous groundwater unit. Clean +10 yrs.
MW-18S	Retain	Perimeter well. Clean +10 yrs.
MW-19S	Abandon	Not as representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-20i	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-20D	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-20S	Retain	Upgradient monitor well representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-21i	Retain	Retain as a contingency well. Downgradient monitor well representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-21S	Retain	Contaminated shallow sentinel well.
MW-22i	Retain	Representative of the uppermost continuous groundwater unit. Clean +10 yrs. Perimeter well.
MW23i	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-23D	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-23S	Retain	Completed partially within the Carlisle Muck.
MW-24i	Retain	Downgradient monitor well representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-24S	Abandon	Clean +10 yrs.
MW-25i	Abandon	Clean +10 yrs. Upgradient well.
MW-25S	Retain	Downgradient monitor well representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-26i	Abandon	Not representative of the uppermost continuous groundwater unit. Clean +10 yrs.

MW-26S	Retain	Downgradient monitor well more representative of the uppermost continuous groundwater unit. Clean +10 yrs.
MW-27i	Retain	Downgradient well. Clean +5 yrs. Trace of VOCs in Mar. 1997.
MW-27D	Abandon	Clean +10 yrs.
MW-27S	Abandon	Clean +10 yrs.
MW-28D	Abandon	Clean +10 yrs.

Table 8 Con't.
Replacement and New Well Recommendations

MW-16 NEW	Proposed Location	Replacement perimeter well.
MW-17 NEW	Proposed Location	Replacement well for the MW-17 series. Will be installed beyond the limit of waste.
MW-29	Proposed Location	New downgradient sentinel well located west of wells 13, 14, and 15.
MW-30	Proposed Location	New off site/background monitoring well. Located east of sod farm or within the new housing development, depending upon access issues.
MW-31	Proposed Location	New downgradient sentinel well.

Post-2003 Monitoring Well Network:

2 replacement perimeter wells (MW-16 NEW & MW-17 New)
1 proposed background well (MW-30)
2 proposed sentinel wells (MW-29 & MW-31)
19 retained monitoring wells
+6 contingency wells
30 total wells

Table 9. Tier Summary, Post-2003

#	Well ID	Tier	Location	Dedicated Pump?	Notes
1	MW-01I	Sentinel	ON-SITE	YES	
2	MW-01D	Contingency	ON-SITE	YES	Deep well on western boundary
3	MW-01S	Sentinel	ON-SITE	YES	Shallow well (straddles water table)
4	MW-03I	Perimeter	ON-SITE	YES	
5	MW-07I	Sentinel	ON-SITE	YES	
6	MW-07D	Contingency	ON-SITE	YES	Deep well on southern boundary
7	MW-09I	Contingency	ON-SITE	YES	Extra background well
8	MW-10I	Perimeter	OFF-SITE	YES	
9	MW-11I	Sentinel	ON-SITE	YES	
10	MW-11D	Contingency	ON-SITE	YES	Deep well on western boundary
11	MW-11S	Sentinel	ON-SITE	YES	Shallow well (straddles water table)
12	MW-12I	Background	OFF-SITE	YES	
13	MW-13i New	On-Site	ON-SITE	YES	replacement well, 2002
14	MW-14i New	On-Site	ON-SITE	YES	replacement well, 2002
15	MW-16 New	Perimeter/New	ON-SITE	YES	replacement well, outside waste
16	MW-17 New	Perimeter/New	ON-SITE	YES	replacement well, outside waste
17	MW-18S	Perimeter	ON-SITE	YES	
18	MW-18I	Perimeter	ON-SITE	YES	
19	MW-20S	Contingency	OFF-SITE	YES	Extra background well
20	MW-21S	Sentinel	ON-SITE	YES	
21	MW-21I	Contingency	ON-SITE	YES	Deep well on western boundary
22	MW-22I	Perimeter	ON-SITE	YES	
23	MW-23S	Perimeter	OFF-SITE	YES	
24	MW-24I	Downgradient	OFF-SITE	YES	
25	MW-25S	Downgradient	OFF-SITE	YES	
26	MW-26S	Downgradient	OFF-SITE	YES	
27	MW-27I	Downgradient	OFF-SITE	YES	
28	MW-29 New	Sentinel/New	ON-SITE	YES	new sentinel well
29	MW-30 New	Background/New	OFF-SITE	YES	new background well
30	MW-31 New	Sentinel/New	ON-SITE	YES	new sentinel well

Tier Summary

Tier Designation	Well Description	Monitoring Purpose / Approach
Sentinel Wells: 8 wells: 1s, 1i, 7i, 21s, 11s, 11i, 29, 31	Located along western boundary of landfill	Will detect migration downgradient from landfill if it occurs
On-Site Wells: 2 wells: 13i and 14i	Double-cased new wells installed through waste	Provide early indications of migration from landfill contents
Background: 2 wells: 12i, 30	Upgradient.	Identify regional changes; monitor naturally-occurring constituents
Perimeter Wells: 7 Wells: 3i, 18i, 18s, 22i, 16, 17, 23s	Along landfill perimeter but cross-gradient	Provide coverage of uppermost aquifer in all compass directions
Downgradient Wells: 5 24i, 25s, 26s, 27i, 10i	Further downgradient than sentinel wells	Allow measurement of extent should sentinel wells show detects
Contingency Wells: 6 9i, 1d, 20s, 11d, 21i, 7d	Western/southern boundary wells retained	Sampled only if results in 1i, 11i, 21s, 7i, and 30 warrant
New Wells: 5 16, 17, 29, 30, 31	Replacement: 16, 17 Background: 30 Sentinel 29, 31	Northside boundary coverage Better Sentinel well coverage Better background location

Table 10. Proposed 30-year IEL Sampling Event Matrix

as of 9/22/2003

Notes: Seven monitoring events conducted prior to August 2000. Remedy "in-place" since 1980
Regular monitoring using modern techniques conducted beginning in August 2000; I.e. year one through year three has already been completed under an agreement with the Township under the supervision of USEPA and OhioEPA.
Assume new monitoring wells installed before August 2004 event

Monitoring Year	Years Post ROD	Event #	Date	Monitoring Well Tiers to be Sampled	Analytical Parameters	Rationale
Year One		1	August-2000	All Tiers	VOCs, Metals, Nat'l, RAD	Supplement the historic database; charaterize seasonal variation; montor natural attenuation processes and chemical constituents on-site; monitor for potential off-site impacts via sentinel wells; put RAD issue to bed,
		2	November-2000	All Tiers; Tier A1** only for RAD	VOCs, Metals, Nat'l, RAD	
		3	February-2001	Tier S, B, OW; Tier A1 only for RAD	VOCs, Metals, Nat'l, RAD	
		4	May-2001	Tier S, B, OW; Tier A1 only for RAD	VOCs, Metals, Nat'l, RAD	
Year Two		5	August-2001	Tier S, B, OW;	VOCs, Metals, Nat'l	Monitor that no off-site migration of landfill constituents is occurring; monitor on-site conditions
		6	May-2002	Tier S, B, OW	VOCs, Metals, Nat'l	
		7	July-2002	All Tiers	VOCs, SVOCs, Metals, Nat'l	All Tiers/Parameters to complete characterization
Year Three		8	November-2002	Tier S, B	VOCs, Metals	Monitor that no off-site migration of landfill constituents is occurring. Snapshot of on-site conditions
		9	March-2003	Tier S, B, OW	VOCs	
		10	July-2003	All Tiers	VOCs, Nat'l	All Tiers to supplement database and confirm nat'l
				REMEDIAL ACTION APPROVED		
2003 Year Four	0	11	November-2003	All Tiers	VOCs	
		12	February-2004	All Tiers	VOCs	
		13	May-2004	All Tiers+G11	VOCs	
		14	August-2004	All Wells	VOCs, SVOCs, Metals, Nat'l	
Year Five	1	15	February-2005	Sentinel, On-Site	VOCs	Number of sampled wells reduced as long as results warrant.
		16	August-2005	Sentinel, On-Site	VOCs	
Year Six	2	17	November-2005	Sentinel, On-Site	VOCs	
		18	May-2006	All Tiers	VOCs, SVOCs, Metals, Nat'l	
Year Six			September-2006	**CERCLA 5-YEAR REVIEW**		Previous 5-year Review in 2001
Year Seven	3	19	August-2007	All Tiers	VOCs	Planned Annual Sampling of all wells for all parameters unless superseded by agreement
Year Eight	4	20	May-2008	All Tiers	VOCs	
Year Nine	5	21	February-2009	All Tiers	VOCs	
Year Ten	6	22	November-2010	All Tiers	VOCs	
Year Eleven	7	23	May-2011	All Tiers	VOCs, SVOCs, Metals, Nat'l	
Year Eleven			September-2011	**CERCLA 5-YEAR REVIEW**		Previous 5-year Review in 2006
Years 12-33	30	24-34	2012-2033	All Tiers	VOCs, SVOCs, Metals, Nat'l	Biannual sampling of all wells/paramters unless superseded by agreement.

24 Total Number of Events, post-ROD

34 Total Number of Events, post August 2000

Table 11. Summary of Existing MVS Operations and Maintenance Activities

Task No.	Task	Monitoring Frequency
1	**Inspection Extraction Wells**	
	Check handholes for breakage	Monthly
	Check handholes for settlement and reset as required	Monthly
	Check butterfly valves for breakage and workability	Monthly
	Chech sample parts for leakage, breakage, and workability	Monthly
2	**Inspect Header Pipe**	
	Check surface for settlement	Monthly
	Check above ground pipe for drainage or leakage	Monthly
3	**Inspect Moisture Traps**	
	Check handholes for breakage	Monthly
	Check handholes for settlement	Monthly
4	**Inspect Landfill Gas Sensor Monitoring Wells**	
	Check steel casing for breakage	Monthly
	Check steel casing for settlement and reset as required	Monthly
5	**Inspect Exhauster**	
	Coupling alignment	Weekly
	Lubricate bearings	Every 300 hrs of operation
	Clean lubrication resevoir	Annually
	Check exhauster motor	Annually
	Check voltage, frequency, and power	Annually
	Check for localized heating	Every 500 hrs
	Lubricate bearings	Every 500 hrs
	Drain exhuaster condensate	As necessary
6	**Inspect (visually) the Flame Bank of the Flame Arrestor**	
	Check and clean as needed	Weekly
7	**Ground Flare (recorder may be removed from service)**	
	Inspect chart paper of temperature recorder	Every 6 Months
	Calibrate temperature recorder	Every 6 Months
8	**Inspect Valves**	
	Turn all valves through all positions to prevent "freezing"	Every 6 Months
	Check above grade connections for tightness	Annually
	deterioration	Every 6 Months
	dirt	Every 6 Months
9	**Service Propane Generator (ie: Oil and Filter Change)**	Annually
10	**System Monitoring of Extraction System**	Monthly
11	**Mow Grass**	
	areas	4 Times Annually
12	**Snow Plowing**	
	4"minimum, monitor snow plow for well protection	5 Times Annually

Table 12. Capital Cost Estimate for the IEL Remedy

Task Description	Quantity	Unit	Unit Cost ($)	Total ($)	Comments/assumptions
Provide Funding for Alternate Water Supply	1	LS	$1,347,720	$1,347,720	Paid 1989 = $3,473,505 (2003 $$)
Detailed Design Submittals through Approval	1	LS	$75,000	$75,000	As needed, complete 9/30/03?
1. Mobilization / Demobilization	1	LS	$12,000	$12,000	for capital improvements year 1/2
Revise Work Plans, through approval	1	LS	$75,000	$75,000	As needed
2. Pre-Demo, characterize/dispose IDW, incl. geophysics	1	LS	$206,000	$206,000	Done 2000 / 2001
3. Demolish Buildings Along Cleveland Avenue					
Prepare plans through approval process	1	LS	$102,000	$102,000	Completed 5/01
Properly abandon 8 USTs	1	LS	$109,000	$109,000	Completed 6/01
Properly abandon 2 monitoring wells and 2 septic	1	LS	$21,000	$21,000	Completed 7/01
Demolish 3 buildings and dispose of waste	1	LS	$213,000	$213,000	Completed 7/01
Regrade and revegetate	1	LS	$5,000	$5,000	Completed 7/01
4. Remove debris from site and dispose	1	LS	incl. w/6 below		Done 7/01; remainder incl. w/6
5. Re-work monitoring well network					
Install new / replacement wells on-site, double case	2	ea.	$50,000	$100,000	Completed in 2002
Install new, single-cased wells	5	ea.	$10,000	$50,000	
Properly abandon on-site monitoring wells	10	ea.	$19,000	$190,000	10 MW through waste
Properly abandon off-site monitoring / observation wells	29	ea.	$13,000	$377,000	23 MW + 6 OW
Properly abandon MVS, when necessary	1	LS	$50,000	$50,000	
6. Enhanced Vegetative Cover and Wildlife Mgt. Improvements					
To be conducted by consortium in conjunction with CAG and WHC	1	LS	$450,000	$450,000	Includes hardwoods outside fence
8. Additional Studies	1	LS			
Restore fencing and signage	1	LS	$10,000	$10,000	~300' fence, 4 signs, tree removal
Methane study	1	LS	$47,000	$47,000	
Future Use Risk Assessment	1	LS	$75,000	$75,000	
CERCLA 5-year review (Calendar 2006 and 2011)	2	LS	$100,000	$200,000	to be done in 2006, 2011, blended
Subtotal				$3,714,720	$6,484,905
Less already Completed Items			$2,103,720	$1,611,000	in 2003 dollars
Engineering / Project Management @ 15% of remaining				$ 241,650	
Contingency @ 25% of remaining items				$ 402,750	Remaining Items Cost
Total				$ 4,359,120	$2,255,400

Table 14. Summary of Net Present Value (NPV) Analysis

Industrial Excess Landfill (IEL) Superfund Site Remedy Implementation

Year	Capital Cost	O&M Cost	Total Cost w/	NPV Discount	Present
Post-remedy	2003 $$	2003 $$	(+3.5%/yr COLA)	Factor (7%)	Worth
0	$6,234,905	$670,000	$6,904,905	1	$6,904,905
1		$131,246	$135,840	0.935	$126,953
2		$131,246	$140,594	0.873	$122,800
3	$100,000	$131,246	$256,387	0.816	$209,288
4	5-year review	$149,330	$171,360	0.763	$130,729
5		$149,330	$177,357	0.713	$126,453
6		$149,330	$183,565	0.666	$122,317
7		$149,330	$189,989	0.623	$118,316
8		$149,330	$328,320	0.582	$191,085
9		$50,690	$69,085	0.544	$37,578
10	5-year review	$50,690	$71,503	0.508	$36,349
11	$100,000	$50,690	$220,003	0.475	$104,522
12	$50,000	$50,690	$152,150	0.444	$67,556
13	MVS demo	$50,690	$79,277	0.415	$32,897
14		$50,690	$82,052	0.388	$31,821
15		$50,690	$84,923	0.362	$30,780
16		$50,690	$87,896	0.339	$29,773
17		$50,690	$90,972	0.317	$28,799
18		$50,690	$94,156	0.296	$27,857
19		$50,690	$97,452	0.277	$26,946
20		$50,690	$100,862	0.258	$26,065
21		$50,690	$104,393	0.242	$25,212
22		$50,690	$108,046	0.226	$24,387
23		$50,690	$111,828	0.211	$23,590
24		$50,690	$115,742	0.197	$22,818
25		$50,690	$119,793	0.184	$22,072
26		$50,690	$123,986	0.172	$21,350
27		$50,690	$128,325	0.161	$20,651
28		$50,690	$132,817	0.150	$19,976
29		$50,690	$137,465	0.141	$19,322
30		$50,690	$142,276	0.131	$18,690
Total	$6,484,905	$2,925,568	$10,943,317	Total $$, NPV	**$8,751,860**

Notes:

O&M: Operations and Maintenance

COLA: Cost of Living Adjustment (Price Inflation, 3.5% per year)

LS Lump Sum

Table 13. Cost Estimate For Operation, Maintenance, and Monitoring

Task Description	Quantity	Unit	Unit Cost ($)	Total ($)	Per Year Cost	Comments/assumptions
1. Groundwater Monitoring and O&M years 1-6:						August 2000 - July 2008
GW monitoring, Township, Years 1-3	10	Events	$67,000	$670,000	$223,333	Blended rate for completed sampling
Operation of MVS Plant, Years 4-6	3	Years	$85,000	$255,000		
Site rotational mowing, fence repair, site inspections; habitat restorations / upgrades;	3	Years	included			
Groundwater monitoring, Years 4-6	8	Events	$28,000	$224,000	N/A	
Total (for Years 4-6)				$479,000	$95,800	
					$11,496	Engineering/project Mgt. @12%
					$23,950	Contingency @ 25%
					$131,246	Per year total years 4-6
2. Groundwater Monitoring and O&M years 7-11:						
Operation of MVS years 7-11: site mowing, fence repair, site inspections, habitat restoration, etc. decommissioning of MVS assumed in year 11	5	LS	$85,000	$425,000	$116,450	Per-year cost includes engineering@12% contingeny @25%
Groundwater monitoring, Years 7-11	5	Events	$24,000	$120,000	N/A	
Total (for Years 7-11)				$545,000	$109,000	
Assumes annual sampling					$13,080	Engineering/project Mgt. @12%
all wells, all parameters					$27,250	Contingency @ 25%
					$149,330	Average over 5 years
						Demo in year 12 at ~$50,000
3. Groundwater Monitoring and O&M, Years 12-33						
Site mowing, fence repair, site inspections, habitat restoration, etc.	22	Years	$25,000	$550,000	$34,250	Per-year cost includes engineering @12% contingeny @25%
Groundwater monitoring, Years 12-33	11	Events	$24,000	$264,000	N/A	
Total (for Years 11-33)				$814,000	$37,000	
Assumed average of biannual sampling					$4,440	Engineering/project Mgt. @12%
Actual frequency to be determined					$9,250	Contingency @ 25%
					$50,690	Total per year

Subtotal			$ 2,508,000	
Engineering / Project Management @ 15%			$ 275,700	
Contingency @ 25%			$ 459,500	Remaining Items Cost
Total	Completed	$670,000	$ 3,243,200	$2,573,200

APPENDIX

APPENDIX

1. *Opportunities for Wildlife Habitat Enhancement at the Industrial Excess Landfill, Wildlife Habitat Council* (WHC), May 31, 2000.
2. *Applied Natural Sciences, Inc. Agronomic Investigation, Industrial Excess Landfill at Uniontown, OH,* August 2000.
3. Copy of Appendix F. of the *Summary Report on the March 2003 Groundwater Sampling Event at the Industrial Excess landfill (IEL) Site, Uniontown, Ohio, Sharp and Associates, Inc.*, June 2003. This attachment summarizes the results of detections of volatile organic hydrocarbons from historic sampling of the monitoring well network. Results date to 1988. Includes supplemental VOC detections.
4. Site Photos (annotated) from the July 31, 2003, and the August 15, 2003, site visits by SHARP
5. Contingency Plan
6. Draft Explosive Gas Investigation for the Eastern Facility Boundary
7. IEL Draft Remedy Construction Specification
8. Reclamation Master Plan (CAG Plan)

1

OPPORTUNITIES FOR WILDLIFE HABITAT ENHANCEMENT AT THE INDUSTRIAL EXCESS LANDFILL

REPORT SUBMITTED TO:

Industrial Excess Landfill Responding Parties:

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Uniontown, Ohio

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The Wildlife Habitat Council (WHC) acknowledges the dedication and commitment required for the Industrial Excess Landfill Responding Parties to initiate a wildlife habitat enhancement program. We thank Rick Laubacher, Donna Jennings, and Paul Wolford for their hospitality during the WHC visit.

Note: This report is intended as a guidance tool for implementing wildlife habitat enhancement programs on corporate sites worldwide. WHC cannot assume responsibility for all local, state, and federal regulatory programs and authorizations. Prior to implementing any activity in a regulated habitat (i.e., wetland, floodplain, forest), we recommend that you reference regulatory requirements in your region. WHC can assist you with the identification of appropriate regulatory contacts.

Nondisclosure Statement: This document contains confidential and proprietary information. WHC will not distribute this report to others without express written consent from Industrial Excess Landfill Responding Parties. We also recommend that discretion be used when distributing this document to others.

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I. EXECUTIVE SUMMARY

The Industrial Excess Landfill Responding Parties are collaborating with the Wildlife Habitat Council (WHC) to pursue a voluntary wildlife habitat enhancement program at the Industrial Excess Landfill (IEL) in Uniontown, OH. Goodyear Tire & Rubber Company and Bridgestone/Firestone, two of the IEL Responding Parties, are corporate members of WHC working to demonstrate that corporations are good land stewards and can manage closed sites, buffers and unused portions of their property for wildlife. Sites involving employees and/or community groups in the program exemplify the principles of WHC's Wildlife at Work program that contains, a comprehensive process for creating long-lasting benefits for wildlife and the people implementing the program. Although IEL has no employees on site, the process of involving IEL Responding Parties' employees and community groups in the development and implementation is still very valid.

This report, *Opportunities for Wildlife Habitat Enhancement at the Industrial Excess Landfill*, details a menu of potential habitat enhancement projects for the IEL Responding Parties to implement. These recommendations include not only habitat enhancement projects but also projects for involving community groups and government agencies in the program. The recommendations in this report are meant to provide the IEL Responding Parties with an optimal amount of work to maintain the program for three to five years. Initial projects focus on high visibility, ease of implementation, and likelihood of success. Once IEL Responding Parties become comfortable with the basic concepts of habitat and wildlife management, more complex projects can be recommended. Habitat enhancement recommendations outlined in this report include the following.

- Creating a nest monitoring program for bluebirds, tree swallows, and American kestrels throughout the property.
- Providing nectar sources by creating a wildflower meadow and hummingbird garden on the landfill and the surrounding area.
- Implementing a field border management program that includes a rotational mowing program, enhancing the hedgerow, and planting forested islands that will provide more diversified habitat types on the landfill.
- Promoting a balanced predator-prey relationship by building brush piles and placing raptor perch posts around the landfills.
- Providing a fox den to encourage survival of foxes on the landfill.
- Installing bat boxes to control mosquito populations.
- Control invasive species that take over and keep native vegetation from growing.

In addition to the habitat and community outreach projects, specific information about attaining recognition through WHC's Corporate Wildlife Habitat Certification/International Accreditation program is provided. Corporate sites that implement successful habitat enhancement programs on their property are eligible to receive recognition for their efforts once projects have been implemented and documented for a minimum of one year.

WHC looks forward to assisting the IEL responding parties in their effort to provide habitat for wildlife at the IEL. The opportunity to create programs with long-lasting benefits is real, and we encourage the IEL Responding Parties to use this report to make these programs successful.

II. OVERVIEW

In order to recommend wildlife enhancement projects that are appropriate to each site, the Wildlife Habitat Council (WHC) requires a site visit by one of their wildlife biologists. During this visit, the biologist assesses the site and the wildlife present, speaks with personnel to determine the goals that the site would like to accomplish and makes suggestions for habitat enhancement projects. The following is an overview of the proceedings of the visit, a description of the site itself and the flora and fauna noted during the visit.

A. Site Visit

WHC wildlife biologist, Marcia Maslonek visited the Industrial Excess Landfill (IEL) on May 19, 2000. The purpose of the visit was to assess potential habitat enhancement opportunities at the IEL site located in Uniontown, OH.

The visit began with a meeting attended by Rick Laubacher, project manager from Goodyear, Donna Jennings, manager of Corporate Issues from Goodyear, Paul Wolford, public relations from Wolford Communications, Sue Ruley, president of Lake Township. Trustees, and Carolyn Casey, administrative assistant of Lake Township Trustees. During the meeting, Marcia discussed WHC and the Wildlife at Work program, as well as the benefits of managing IEL for wildlife verses utilizing a cap.

IEL is a Superfund site that has been a significant community issue for decades, and the EPA is now proposing to cap the site. The IEL Responding Parties would like to consider the alternative of managing the landfill as a greenspace instead. During the meeting, Mr. Laubacher and Ms. Ruley discussed the safety of IEL and community concerns. Ms. Ruley agreed that managing IEL for wildlife would be a win-win situation

for all, and would prevent an eyesore that would continue to remind the community of the past. Since the site is already succeeding to forest, Ms. Ruley also agreed that capping would destroy an important area for wildlife, especially with the new development the township is currently experiencing. Township concerns about any future development on site may also be alleviated with the greenspace option.

B. Site Description

Located in Uniontown OH, south of Akron, IEL is a Superfund site immediately surrounded by residential homes and a farm. The site consists of 40 fenced acres, of which 30 comprises the landfill. The site was covered in 1980 with sandy, poor soils. The fence line has grown into a hedgerow with large trees such as silver maples and black cherry and a border of shrubs and other vegetation, which is very valuable to many wildlife species. The interior is covered with cool-season grasses and large big-toothed aspen (poplar) dominate the center. Metzger's Ditch lies on the eastern side along the fence. Although narrow and shallow, this wetland is important for wildlife, as evidenced by the green frogs and painted turtle seen in the "lagoon."

C. Representation of Wildlife on Site

A number of wildlife species were observed during WHC's visit to the landfill or noted by IEL Responding Parties and the community as occurring at the site. The landfill and surrounding properties support a number of habitat requirements of species common to this area. Table 1 offers a small representation of the wildlife that was observed on site.

Table 1. Wildlife Noted During the WHC Visit

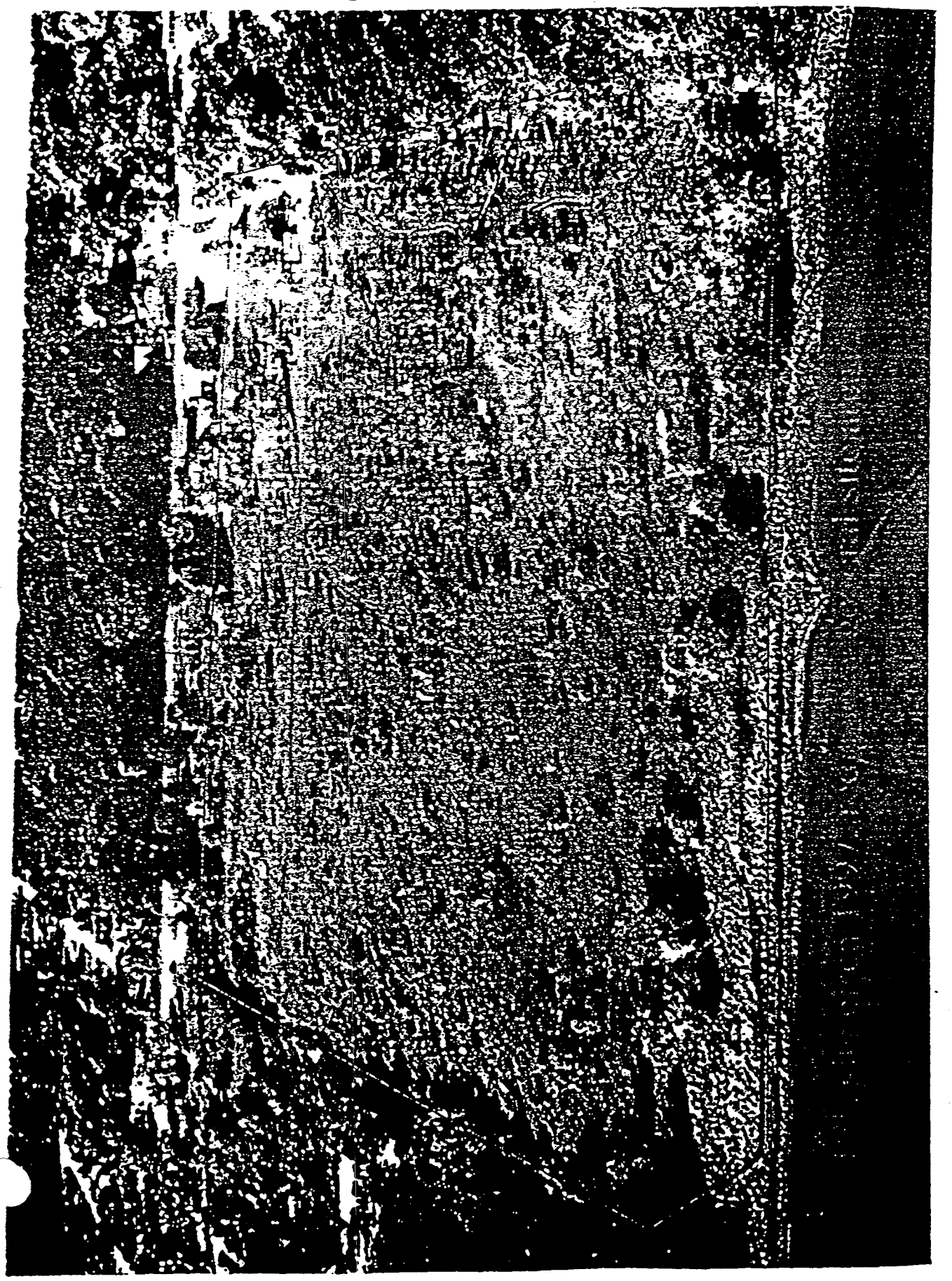
Type	Common Name	Scientific Name
Plants	box elder	*Acer negundo*
	silver maple	*Acer saccharinum*
	milkweed	*Asclepias syriaca*
	field mustard	*Brassica rapa*
	teasel	*Dipsacus sylvestris*
	horsetail	*Equisetum fistulosum*
	green ash	*Fraxinus pennsylvanica*
	English ivy	*Hedera helix*
	rush	*Juncaceae Family*
	Eastern red cedar	*Juniperus virginiana*
	apple	*Malus sylvestris*
	Autumn olive	*Oleaceae Family*
	switch grass	*Panicum virgatum*
	Phragmites	*Phragmites communis*
	phlox	*Polemoniaceae Family*
	big-toothed aspen (poplar)	*Populus grandidentata*
	black cherry	*Prunus serotina*
	scrub oak	*Quercus ilicifolia*
	staghorn sumac	*Rhus typhina*
	common locust	*Robinia pseudoacacia*
	raspberry	*Rubus occidentalis*
	black willow	*Salix nigra*
	little bluestem	*Schizachyrium scoparium*
	poison ivy	*Toxicodendron pubescens*
	red clover	*Trifolium pratense*
	rock elm	*Ulmus thomasii*
Birds	red tailed hawk	*Buteo jamaicensis*
	cardinal	*Cardinalis cardinalis*
	turkey vulture	*Cathartes aura*
	chimney swift	*Chaetura pelagica*
	American crow	*Corvus brachyrhynchos*
	gray catbird	*Dumetella carolinensis*
	northern oriole	*Icterus galbula*
	American robin	*Turdus migratorius*
Reptile	painted turtle	*Chrysemys picta*
Mammal	white-tailed deer	*Odocoileus virginianus*
	muskrat	*Ondatra zibethica*
	red fox	*Vulpes fulva*
Amphibian	green frog	*Rana clamitans*

Wildlife Noted During the WHC Visit Continued

Insects	bumblebee	*Apidae Family*
	Spring azure butterfly	*Celastrina argiolus*
	clouded sulphur butterfly	*Colias philodice*
	mosquito	*Culicidae Family*
	field cricket	*Gryllidae Family*
	European cabbage butterfly	*Pieres rapae*

Because common names of plants and animals can vary from region to region, a list of all species mentioned in this report, alphabetically by scientific name, is included in Appendix B.

Figure 1. Industrial Excess Landfill



III. DEVELOP A COMPREHENSIVE HABITAT ENHANCEMENT PROGRAM

For IEL to develop a successful wildlife enhancement program a volunteer wildlife team should be formed, an inventory conducted, and a Wildlife Management Plan developed. Since IEL does not have any employees at the site, WHC highly encourages that the IEL Responding Parties involve the community in the majority of the projects. WHC will also be available to assist when needed. When an IEL wildlife team is established, WHC recommends that the site purchase a Team Kit which contains volunteer recruitment tools, outreach ideas, guidance on writing a wildlife management plan and information about WHC's programs such as the Corporate Wildlife Habitat Certification/International Accreditation Program. A Team Kit will give ideas on how to further enhance the IEL Wildlife Enhancement program.

A. Form a Volunteer Wildlife Team

Since IEL does not have an employee base at the site, Mr. Laubacher may be one of only a few employees that will have direct involvement in the project. Therefore the team could consist of Mr. Laubacher, other interested employees, Ms. Ruley or other township trustees, and a variety of community groups and residents. A team in the form of a steering committee is recommended for IEL to expand interest in the habitat management program and ensure that a variety of interests are presented in the management plan.

WHC staff recommends that the team be structured with one team leader, who will be in charge of the overall project and smaller working groups that will deal with specific projects. Mr. Laubacher should be the team leader because he was informed of the Wildlife at Work process and is the most capable of developing the goals of the program. The team should be broken up into smaller subcommittees composed of 1-3 people who

will undertake the development of specific projects. Each subcommittee could be designated to address specific projects. WHC staff also recommends that the wildlife program consider developing a logo and a mission statement, which will give the program an identity and generate a feeling of ownership.

B. Conduct an Inventory

Once the wildlife teams are established, one of the first tasks could be to conduct an inventory of the plants and animals present at each site. The initial inventory has two important purposes. The first is to help the wildlife team become familiar with local plant and animal species. Familiarity with the wildlife at each site can stimulate enthusiasm within the interested parties and generate knowledge about individual species and their interactions. The other major purpose of the wildlife inventory is to provide baseline data for later comparison. The programs can use the baseline data to determine the success of projects and to develop new projects that will further enhance habitat. Wildlife will utilize any adequate habitats that the teams may provide, therefore as projects develop the wildlife team will hopefully witness their inventory lists grow and become more exciting.

A wildlife inventory should be a thorough and ongoing process. The goal of the inventory is to identify as many plants and animals as possible. In order to be most beneficial, inventories should be done once each season, which insures flowering plants and migratory animal species are not missed. The inventories should also be conducted at different times of the day including a night inventory to record nocturnal species such as owls and singing frogs.

WHC recommends that community volunteers and any employees that may be involved undertake the majority of the projects themselves. Outside experts assisting should understand the importance of providing educational experiences to wildlife team volunteers that are new to wildlife identification concepts. WHC is available to conduct or assist with inventories as well.

C. Write the Wildlife Management Plan

One of the most important tasks for each program is to prepare a wildlife management plan. This plan outlines the goals of the wildlife habitat program, describes projects that will achieve these goals, makes provisions for monitoring projects and presents an implementation and review schedule. Although the overarching goal of the wildlife habitat program is to enhance wildlife habitat at each site, the IEL Responding Parties may have other, more specific goals for the programs such as achieving WHC certification or enhancing community relations. WHC recommends that each of these goals, as well as all projects associated with each goal, be included in the wildlife management plans.

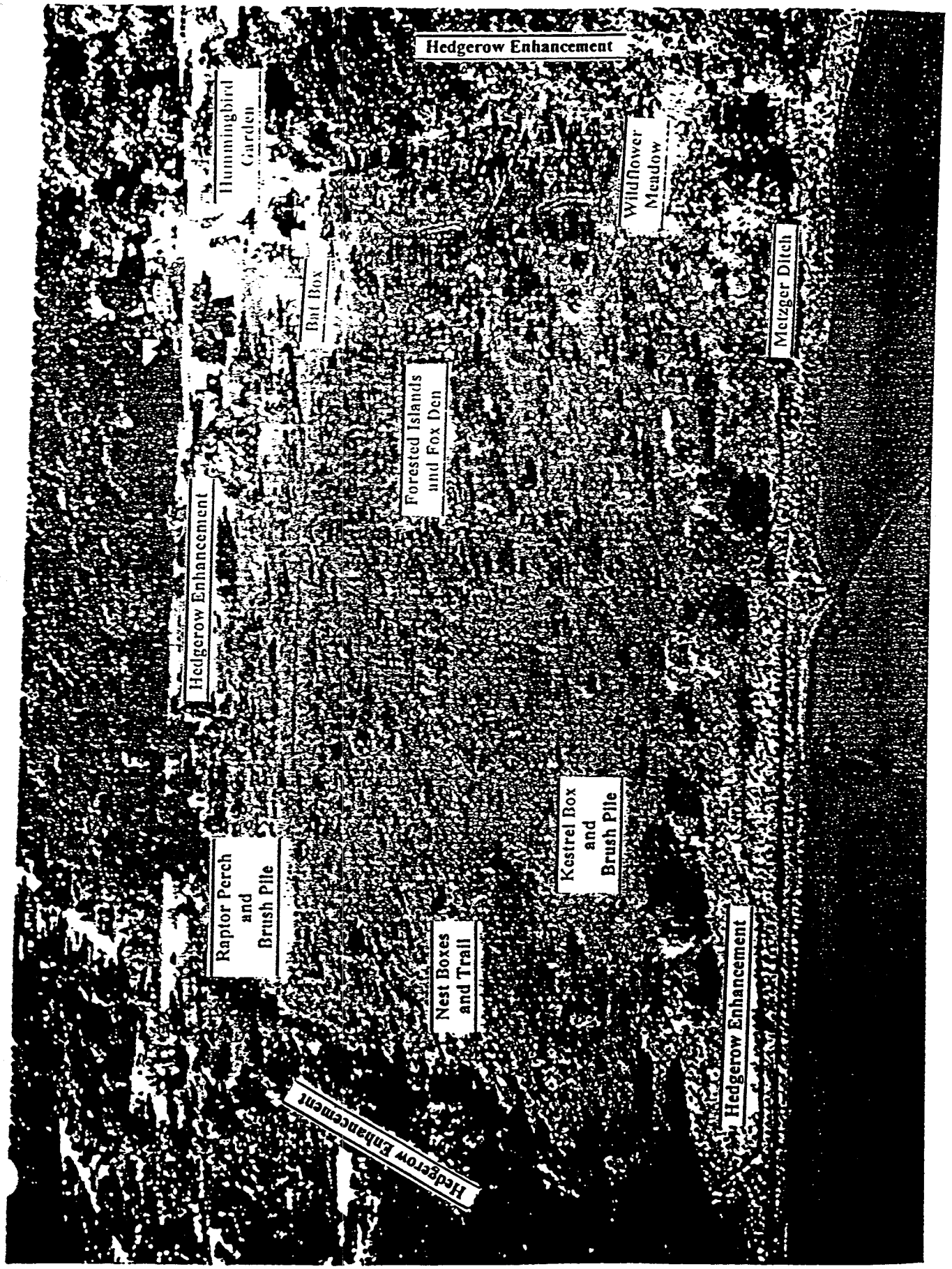
D. Implement the First Team Project

Implementing the first team project is especially important for building a solid volunteer program. Simple projects with high visibility are ideal first projects for the wildlife teams. Simplicity yields quick and measurable results while visibility generates enthusiasm and community recognition. The first year of the program at IEL may be geared towards projects that provide learning experiences for volunteers, generate additional enthusiasm and volunteers, and demonstrate to the community that the IEL Responding parties are committed to enhancing wildlife habitat at their landfills. Although enhancing habitat is a primary goal, WHC recommends the more complex, intensive habitat management projects be implemented after the teams gain experience and greater support from management and the community. Page 42 of this Opportunities Report contains a suggested implementation schedule for projects.

IV. RECOMMENDED HABITAT ENHANCEMENT PROJECTS

WHC has provided a number of habitat enhancement recommendations in this report. These projects were chosen based upon ease of implementation, high visibility and relative likelihood of success. Projects recommended for the landfill include artificial nesting structures, a fox den, wildflower meadow, bat box, field border management, hummingbird garden, management for raptors, control of invasive species and wildlife monitoring. Some projects recommended might even reduce ground maintenance time. The program at IEL could have considerable positive impact on local wildlife habitats. Figure 2 is a map of recommended enhancement project locations in IEL. The concepts presented in this report can be used to develop a site map once the program begins and specific opportunities are recognized.

Figure 2. Enhancement Projects at the Industrial Excess Landfill.



A. Install Nesting Structures for Cavity Nesting Birds

The landfill will provide the needed habitat components for a number of cavity nesting bird species that are likely to use the site. To build upon the preferred open space habitat component for eastern bluebird, tree swallow and American kestrel, WHC recommends the creation of a nest-monitoring program for the IEL site. Nest monitoring programs are fun, highly successful and provide active management at an otherwise dormant site.

1. Begin a Nest Monitoring Program

Like other projects, monitoring and maintenance of nesting structures is critical for program success. Nesting boxes for songbirds should be checked weekly during the nesting season. Data should be recorded on the species, number of eggs, chicks and, in the future, the number of fledglings. This data can be sent to WHC at the conclusion of the nesting season for submission in the Nest Monitoring Program. Additional information on registering for this program, as well as sample monitoring data sheets, can be found in Appendix F.

Monitoring weekly during the nesting season will help volunteers identify threats to the success of the project such as wasps, ants, and other parasites that may invade the box. Team members should also identify the user of the nest box to ensure that the species using the box are not European starlings or English house sparrows. These two species are not native to North America, and compete with native bluebirds and other cavity nesters for nesting habitat. These aggressive competitors have been known to invade a nest occupied by native birds and even kill the adult to obtain access to and use of the nesting cavity. Starlings and house sparrows and their eggs should be removed from the nesting box, and (if the team members feel comfortable) destroyed in the effort to counteract the effects of these birds on bluebird populations. Removing the nests of these species before eggs are laid or young hatch may be referable for some members of the team, and addresses the problem more quickly. Monitors should positively identify nest occupants as European starlings or house sparrows before any bird is disturbed, as these two species are the only two cavity nesters not protected by federal law.

In addition to weekly monitoring, the wildlife team should remove nests once young have fledged to prevent parasite problems, and clean boxes at the conclusion of the nesting season in preparation for the following season. Damaged boxes should be repaired or replaced. Nesting boxes that were unsuccessful for more than two consecutive years should be relocated to more suitable locations. Nesting boxes should not be removed for the winter, as some species of birds and small mammals will use the box as protective cover during winter months.

2. Eastern Bluebird

Eastern bluebirds have suffered greatly due to habitat degradation, the widespread removal of dead standing trees, and the systematic removal of hedgerows once common in farmlands across the eastern United States. Efforts to restore bluebird nesting habitat via the placement of artificial nesting boxes throughout the nation have been successful, and WHC recommends that wildlife team volunteers contribute to this effort by placing nest boxes at the IEL site. This project is also of great educational value, because boxes are simple to construct and provide team members the opportunity for viewing wildlife up close.

Bluebirds inhabit open fields, pastures, and rights-of-way with scattered trees and shrubs that serve as perching sites. Nests are built in tree cavities, or in artificial cavities provided by humans. Their diet consists of insects, which are spotted by perching bluebirds and captured in mid-flight. In winter when insects are scarce, bluebird diets shift to include berries and seeds. They are gregarious birds, and are often seen in flocks of ten or more, sometimes mixed with juncos and cedar waxwings. To provide nesting sites at the IEL site, WHC recommends placing nesting boxes along a trail in the grassy, open areas along the path. To improve success of the bluebird nesting structures, weekly monitoring is required.

Nesting boxes for eastern bluebirds can be built using various designs, however, some designs tend to be more successful than others. WHC recommends the design provided

in the Eastern Bluebird Habitat Management Leaflet in Appendix F because of its proven success. The box should be built from weather-resistant cedar.

Nesting boxes should be erected along hedgerows or in open fields near a tree that can serve as a hunting perch and a location for fledging chicks to fly to on their first flight. Boxes should be placed on a pole with a predator guard affixed below the nesting box. Boxes placed on trees instead of poles tend to be less successful because of the accessibility by predators from both below and above. A predator guard is an umbrella shaped piece of metal that is attached to the pole and disallows predators such as raccoons and black snakes from accessing the box easily. Designs for predator guards are found in the *Eastern Bluebird Habitat Management Series* in Appendix F.

WHC recommends that the IEL wildlife team involve local community organizations, schools, and scouts in the construction, upkeep, and monitoring of the nesting structures. The Ohio Bluebird Society should be contacted for information and involvement in advancing this program. WHC also recommends that the trail be registered with the North American Bluebird Society's Transcontinental Bluebird Trail. The wildlife team could also attract volunteers by posting invitations and updates on the IEL community newsletter. Contact information for different organizations is found in Appendix C.

3. Tree Swallow

Tree swallows are another species that commonly use nest boxes placed in open areas. They are attracted to open areas and water sources and will commonly be seen feeding on insects close to the water's surface. The lack of suitable nesting sites is a limiting factor in the success of the tree swallow's reproduction. Tree Swallows will use the same box design as the bluebirds. WHC recommends placing tree swallow nesting structures near the Metzger's Ditch where the birds will help in insect control. Paired boxes can be successful in attracting both target species since bluebirds and tree swallows are only territorial within their respective species. Similar care should be taken when monitoring these boxes as snakes, raccoons, European starlings and English sparrows are also common predators or competitors of the tree swallow. Additional information about

managing for tree swallows is included in the *Tree Swallow Habitat Management Series* located in Appendix F.

4. American Kestrel

The American kestrel feeds on mice, lizards and large insects such as grasshoppers and crickets. The kestrel typically builds its nests in cavities created by flickers or pileated woodpeckers. However, such cavities are in short supply, and kestrels can be attracted to nest boxes.

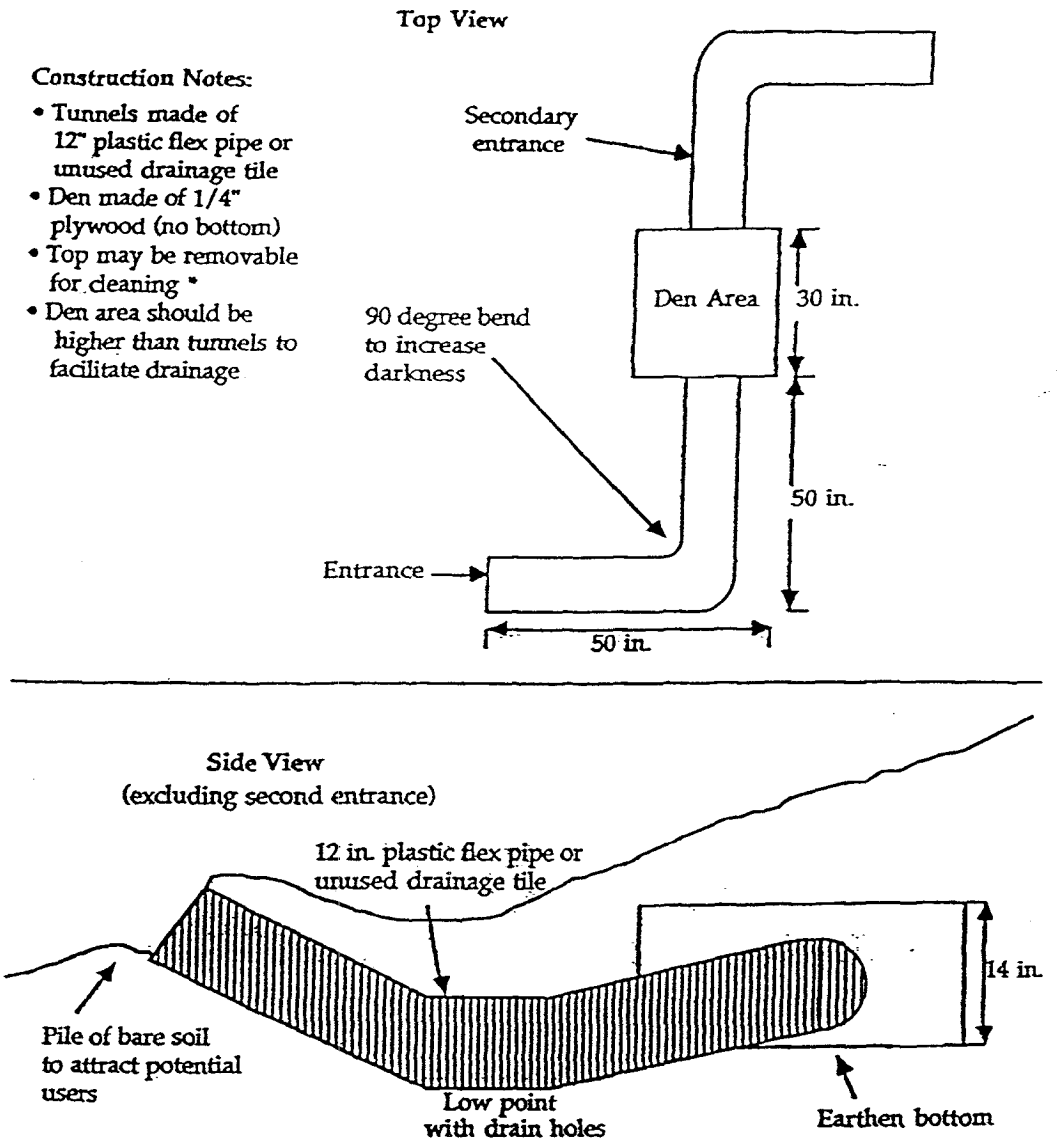
Monitoring of nest boxes is to be done from afar since American kestrels are sensitive to human disturbance during their nesting cycle. Nest boxes should not be opened or disturbed to observe nests and young. If kestrels are observed bringing nesting material to the box, it can be assumed that they are building a nest. Once the young have hatched, kestrels can be observed flying to the box with food throughout the day. WHC recommends that nesting boxes for kestrels be placed in open areas, near brush or forest edge for food, and near a lookout perch (refer to Section F). Care should be taken to place boxes in open areas, but not too near songbird boxes as kestrels will occasionally feed on small birds as well as insects and small mammals. Additional information on kestrel management is available in the *American Kestrel Habitat Management Series* in Appendix F.

B. Artificial Fox Den

Red foxes are primarily carnivorous, feeding mostly upon small birds and mammals such as mice and rabbits, but will also eat berries and nuts when the opportunity arises. They primarily utilize underground dens during the breeding season (March to June) and to escape inclement weather. Dens are not typically located in areas which are heavily frequented by humans. Preferred den sites are near water sources and have at least two entrances.

The den should be installed near the center of the property or along the hedgerow area where it might be visible to visitors but still far enough to provide the foxes with plenty of privacy. Since a Fox's home range is at least 250 ha., the site will probably only support one breeding pair. However, foxes usually occupy more than one den site. To provide adequate denning habitat, two fox dens should be created on site.

Figure 3. Artificial Fox Den



* For safety, if a removable top is installed, the den should only be opened when the den is not occupied.

A fox den can be created by constructing a 14-inch by 30-inch box out of plywood to serve as the actual den and using 12-inch plastic flexible pipe for the entrance (see Figure 3). The entire structure should be buried, but the den area should be higher than the tunnels to provide drainage. Small holes can be drilled in the floors of the den and the entrance tunnels to improve drainage as well. Vegetation can be planted around the

tunnel entrances to help stabilize the soil around the openings. Detailed instructions for constructing a fox den can be found in the Red Fox Habitat Management Series in Appendix E. The fox den should be monitored for use by observing signs of activity such as fox tracks and scrapes or remains of prey near the den entrances. The den itself should not be opened if there is a chance that there is a fox inside.

C. Wildflower Meadow

WHC recommends planting a wildflower meadow to increase the vegetative diversity and aesthetic quality to the landfill. A variety of wildlife species such as songbirds, butterflies, small mammals and other pollinators use meadow habitat. To accomplish the goal of increasing diversity, WHC recommends one-acre test plots of wildflowers to determine the species that are most likely to flourish in the soils found at the sites. The wildflower meadow should be planted in the grassy field just right of the entrance gates. This area is naturally framed by the landscape and is one of the first things people see as they come in. The wildflower meadow will make a good first impression to visitors at the site.

1. Preparing the Planting Area

The preparation and planting of the wildflower meadow is a good opportunity to initiate enthusiasm amongst the volunteer wildlife team. Careful site preparation is essential to wildflower meadow success. WHC recommends drill-seeding wildflower species into the existing vegetation. This method should be adequate for introducing additional species to the vegetative community found on the landfill. To prepare the seeding areas, WHC recommends mowing the chosen areas to a height of three inches to limit initial competition from grasses.

WHC recommends planting the meadow seed using a no-till native seed drill such as a Truax brand seed drill in May following the mowing. If preparation of the meadow does not finish before spring breaks, seeding of the meadow can occur in the fall (early

October). This may give the seed more time to settle in the soil and promote germination once the soil warms the following spring. Truax drills sow seed directly into existing vegetation without requiring disturbance of the soil. Ultimately, this reduces soil erosion and siltation into nearby water sources. Seed rates for meadow grass/forb mixtures typically range from 12 to 20 lbs./acre. It is also important to keep fluffy and heavier wildflower and grass seed separated in the proper compartments within the seeder to ensure proper dispersion of seed into the soil.

Signs could be placed in the area to label it as a wildflower management area. Without the signs, people passing by could perceive that maintenance of the area has waned especially during times when flowers are not in bloom.

2. Choosing Appropriate Seed Mixes

A list of potential wildflowers and grasses for the team to plant can be found on Table 2. Native wildflowers tend to grow more successfully in local area soils, are more beneficial to local native wildlife and tend to need less maintenance and monitoring over time. The mix should be composed of a variety of plant species. A high percentage of perennials, however, will reduce the need for continual seeding of the area year after year. Some native annuals can be added to provide color during the first and second years after planting.

Table 2. Native Plants for Wildflower Meadow

Type	Common Name	Scientific Name
Grasses	little bluestem	*Andropogon scoparius*
	broom sedge	*Andropogon virginicus*
	side-oats grama	*Bouteloua curtipendula*
	purple love grass	*Eragrostis spectabilis*
	Indian rice grass	*Oryzopsis hymenoides*
	switch grass	*Panicum virgatum*
Wildflowers	columbine	*Aquilegia canadensis*
	Verbena stricta	*Asclepias syriaca*
	butterfly weed	*Asclepias tuberosa*
	New England aster	*Aster novae-angliae*
	wild indigo	*Baptisima tinctoria*
	purple coneflower	*Echinacea purpurea*
	fireweed	*Epilobium angustifolium*
	saw-toothed sunflower	*Helianthus grosseserratus*
	thyme leaved pinweed	*Lechea minor*
	round-headed bush clover	*Lespedeza capitata*
	cardinal flower	*Lobelia cardinalis*
	wild lupine	*Lupinus perennis*
	wild bergamot	*Monarda fistulosa*
	horsemint	*Monarda punctata*
	common evening primrose	*Oenothera biennis*
	tall cinquefoil	*Potentilla arguta*
	Canada goldenrod	*Solidago canadensis*
	hoary vervain	*Verbena stricta*

Local nurseries, such as those listed in Appendix C, may have seed mixes available, but the team should closely examine the list of components of the mix in order to confirm that they are native. Invariably, some seed mixes contain annual wildflowers that will provide color during the first year of seeding. Although many of the annuals commonly used in wildflower seed mixes are not native to the state of Ohio, the wildlife team could retain one or two native annual species in the mix to provide this initial burst of color. At the time of purchase, verify with the local nursery on planting technique, as these considerations vary with the actual seed mix chosen. Experienced nursery personnel should also be able to provide seeding and seedbed preparation suggestions to supplement those recommendations outlined above.

3. Maintenance and Monitoring of the Wildflower Meadow

The team should keep in mind that although the seeds will germinate, a large amount of brightly colored flowers should not be expected during the first year of seeding (unless the annual species referenced above are included in the seed mix). Perennial wildflowers expend most of their energy during initial years of growth in root production, and relatively little energy in flower production. In future years, the flowering perennials will thrive, provided weeds surrounding the area are kept in check and climate conditions are relatively normal. During the first year of establishment it will be critical to provide favorable growing conditions. To accomplish this, WHC recommends mowing the planting area to a height of six inches from spring to fall. This will limit competition and will allow perennial wildflowers to become established while focusing energy on the development of strong root systems. After the first year, a yearly mowing or burning program could be developed.

The wildflower meadow should be mowed the second year in late winter/early spring before ground-nesting species begin nests. After the second year, half of the meadow should be mowed every year, alternating the half mowed each year. This will eliminate the impact on beneficial insects in the meadow. Further information on the preparation, planting, and maintenance of the meadow can be found in the *Meadow Management Habitat Management Series* in Appendix F

The team should record in their wildlife activity journal the relative success of each wildflower species in addition to any particular species of wildlife that is found to be using the wildflower meadow. Photo documentation is an excellent addition to a site's application for WHC certification.

D. Bat Box

Contrary to popular belief, bats are not blind and do not get tangled in people's hair. Centuries of myths and superstition have caused bats to be one of the most endangered

animals in the world and the least appreciated. Bats are extremely important to our ecosystem. In tropical areas of the world bats are one of the primary pollinators and are the chief pollinators in banana plantations. In the United States, bats help control insect populations. A single little brown myotis, one of the nation's most widespread bat species, can consume up to 600 mosquitoes per hour. In areas of large insect populations, bats reduce nuisance species dramatically.

1. Bat Boxes

Bats are the only mammals that can truly fly, and are most active at dawn and dusk. Bats are cavity nesters, often using building attics and rafters, hollow trees, and caves. They are very particular about their nesting spaces, but if proper conditions are provided, bats will nest in manmade bat boxes.

Research by Bat Conservation International shows that bats prefer boxes near open fields at least ¼ mile from water, where insect populations are high. WHC recommends that bat boxes be placed around the open area above the lagoon. The team could also place bat boxes on posts, and in trees 15-30 feet above the ground, as long as the box receives at least eight hours of full sun. The exterior can also be painted black to increase the interior temperature Bats also prefer boxes mounted in an area free of obstacles such as brush and tree branches for 20 feet.

Bats are most likely to move into a box in an area with other boxes nearby. Once the boxes are established, bats will generally return to the same one annually. The wildlife team members can monitor bats by looking up into the boxes during the day with a flashlight to count the number of occupants. Although they are not aggressive, bats should never be handled.

If no bats occupy the boxes within the first year two years, try moving the boxes to new locations. Box height and amount of sunlight in the area can be critical. For more information about bats, and for a diagram on constructing a bat box, refer to the North American Bat Conservation Habitat Management Series in Appendix F.

2. Utilize Bat Detection Software and Equipment

Insectivorous bats use high frequency sounds (echolocation calls) to navigate and hunt their prey during the night. The echolocation sounds provide an opportunity to monitor and identify insectivorous bats. WHC recommends that the wildlife team borrow or purchase and utilize bat detection equipment such as Anabat to help learn bat species, their locations, and behavior.

Bat call identification requires specialized computer software and a set of reference calls for bat species in the state of Ohio. Bat calls are recorded and displayed on a computer screen as a pattern of dots on a graph that plots frequency vs. time graph. Different species of bats give calls with different frequencies, shapes, and timing. By distinguishing the differences in the calls, the wildlife team could determine the species of bat. Without the computer software the wildlife team may not be able to identify the species of bat, but they could still listen and monitor bats with a bat detector.

The Anabat system is comprised of a bat detector, interface module and software, as well as many accessories. The system is readily and inexpensively available to the general public. Anabat software can be downloaded from the University of New Mexico's web page at http://talpa.umn.edu/batcall/software. For general questions on the Anabat system contact Titley Electronics, titley@nor.com.au.

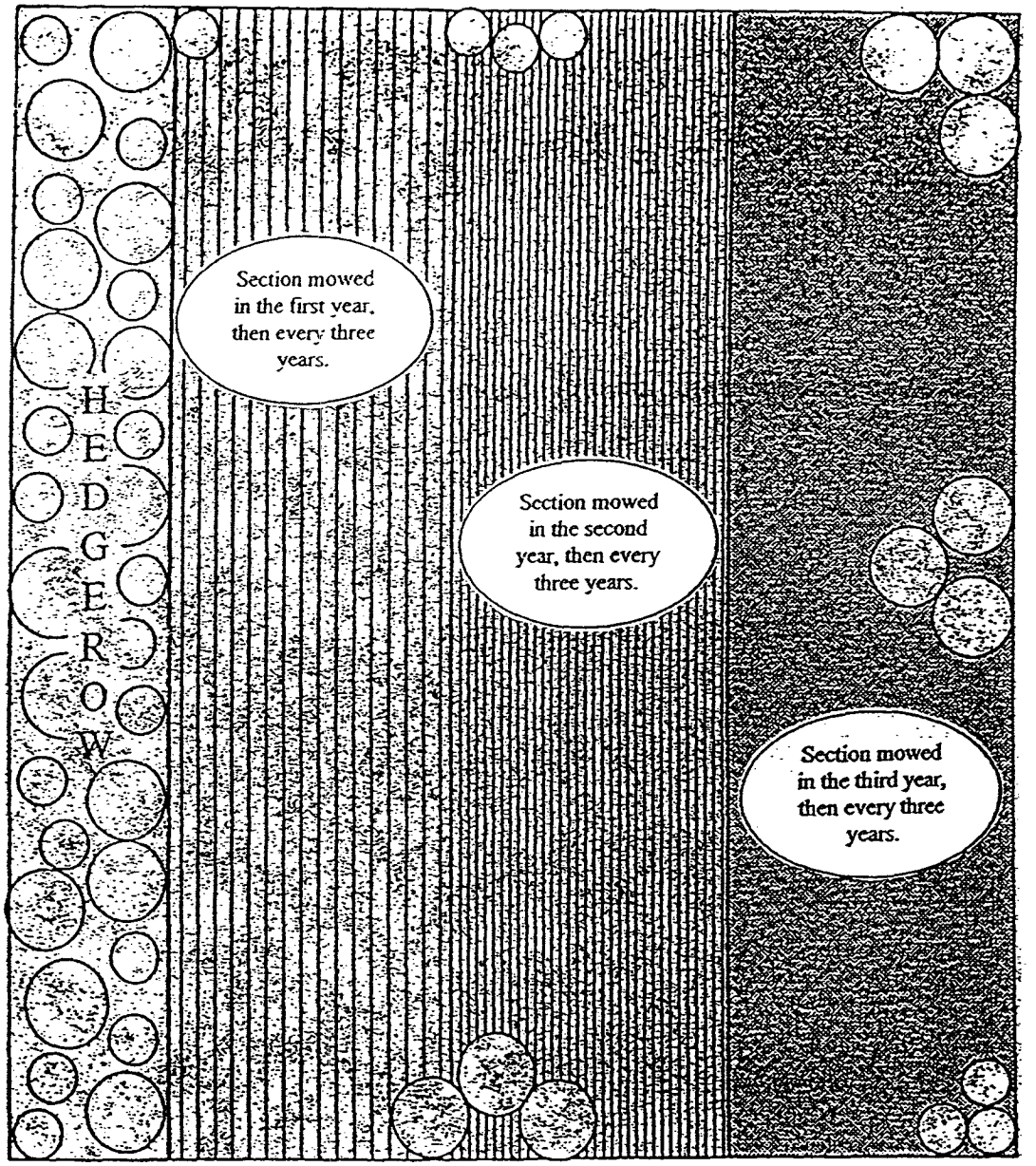
E. Field Border Management

WHC recommends that IEL be managed in a way that benefits wildlife by improving habitat. Hedgerow maintenance, vegetation islands, and rotational mowing are managing techniques that could be implemented to increase cover and food sources for wildlife.

1. Develop a Rotational Mowing Program

A rotational mowing program could be established on the wildflower meadow and the open grassy area that encircles the landfill. By implementing a rotational mowing program, money can be saved by reducing maintenance costs while providing wildlife with more suitable habitat. In addition, many of the grasses used to vegetate the landfill will be encouraged to produce seed, a food source for a variety of wildlife. Regular mowing can prevent species from achieving their optimum food and cover values. To develop a rotational mowing program, divide the area into sections that are mowed in alternate years. Figure 4 shows the layout of rotational mowing strips. Each strip is assigned a number representing the year in which that particular strip is to be mowed in. For example, strips with number one are mowed in the year 2000, number 2 strips in the year 2001, and number 3 strips in 2002. A plan should be developed that allows for no more than three years without mowing to keep woody vegetation from becoming established. Rotational mowing diversifies habitat by providing short grass areas for foraging and taller grass areas for nesting and escape cover. Mowing should not occur May-September as this is the nesting season for ground-nesting birds.

Figure 4. Rotational Mowing



2. Enhance Hedgerow

Hedgerows provide important components, such as food and cover, for many species of wildlife and are most important to wildlife when accessible as travel corridors. They are especially important to birds that prefer edge habitat, such as the catbirds noted during the site visit, because they prefer trees and shrubs near their feeding grounds. To enhance these hedgerows for wildlife even further, trees and shrubs can be planted to widen the

rows, increase the biodiversity of the site, and provide additional food sources for wildlife. A strip of switchgrass bordering the hedgerow would be an especially valuable addition, providing winter cover and seed as well as summer nesting grounds for a variety of birds, Table 3 contains a list of other species that may be used to enhance the hedgerow over time.

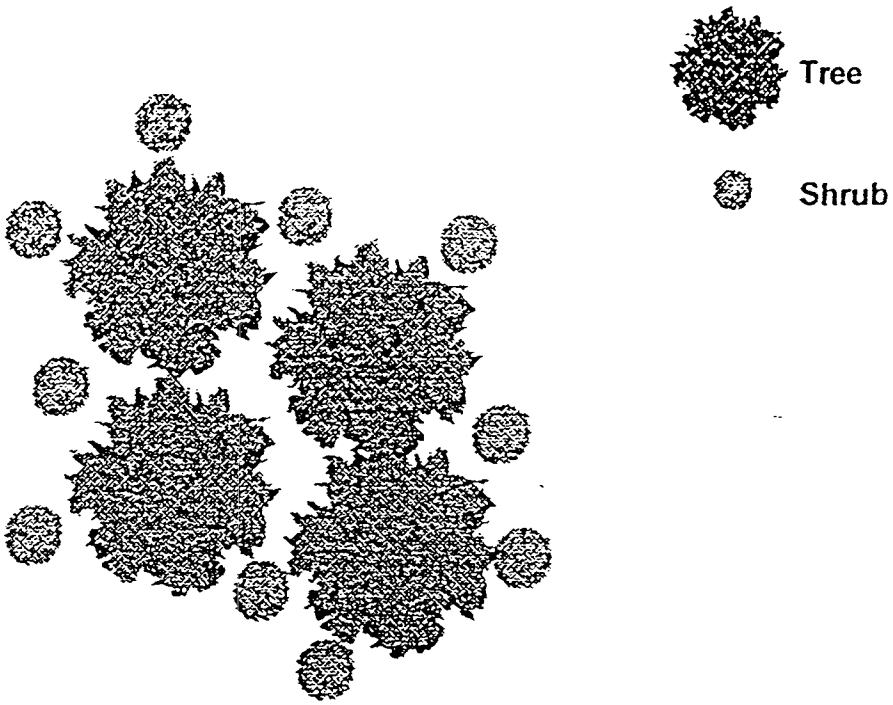
Table 3. Native Vegetation for Hedgerows and Forested Islands

Type	Common Name	Scientific Name
Grass	switch grass	*Panicum virgatum*
	needlegrass	*Stipa spartea*
	June grass	*Koeleria cristata*
Shrubs	Jerseytea	*Ceanothus americanus*
	common buttonbush	*Cephalanthus occidentalis*
	silky dogwood	*Cornus amomum*
	gray dogwood	*Cornus racemosa*
	American filbert	*Corylus americana*
	shrubby Saint John's wort	*Hypericum prolificum*
	common winterberry	*Ilex verticillata*
	common spicebush	*Lindera benzoin*
	American black currant	*Ribes americanum*
	Allegany blackberry	*Rubus allegheniensis*
	blackcap raspberry	*Rubus occidentalis*
Trees	box elder	*Acer negundo*
	black maple	*Acer nigrum*
	red maple	*Acer rubrum*
	common pawpaw	*Asimina triloba*
	bitternut hickory	*Carya cordiformis*
	shagbark hickory	*Carya ovata*
	common hackberry	*Celtis occidentalis*
	frosted hawthorn	*Crataegus pruinosa*
	dotted hawthorn	*Crataegus punctata*
	green ash	*Fraxinus pennsylvanica*
	common witchhazel	*hamamelis virginiana*
	red mulberry	*Morus rubra*
	American plum	*Prunus americana*
	black cherry	*Prunus serotina*
	northern red oak	*Quercus borealus*
	smooth sumac	*Rhus glabra*
	staghorn sumac	*Rhus typhina*

3. Forested Islands

The center of the landfill is in the early stages of succession to a forest, as evidenced by the tall poplars dominating the area, sumac, and a few scrub oak saplings. The center can be left to succeed to a forested area while creating covered areas for shelter. Planting in this manner more closely imitates nature by providing species diversity, as well as vertical diversity, for maximum benefit to wildlife. Figure 5 illustrates what a forested island may look like. In addition to the naturally occurring species, the team may wish to supplement with planting, thereby "helping nature along." By using native species that produce fruit or hard mast (like oaks and hickories), the IEL Responding Parties can provide food and cover for wildlife while helping to protect the natural biodiversity of Ohio. Seedlings and saplings should be planted in early spring, giving them time to develop a root system and enough nutrients to carry them through the winter. WHC recommends planting the small trees and shrubs listed in Table 3 because they were chosen for their attractiveness to butterflies, birds, and other wildlife species. The nursery supplying IEL with the trees and shrubs could provide additional tips and information, particularly regarding species that will thrive on the soil conditions of IEL.

Figure 5. Forested Island



Trees should be planted 12 feet apart

Shrubs should be planted 3 feet apart

F. Hummingbird Garden

The entrance in front of the gates lends itself well to the creation of native wildflower gardens that attract and provide habitat for hummingbirds. Hummingbird gardens are ideal initial projects for a Wildlife at Work program, and WHC recommends that the wildlife team undertake this project as one of their first. The garden will serve as an invitation to the community to participate and learn about the efforts at IEL.

WHC recommends that wildflower species from table 2 be used in the hummingbird garden. Once planted, the garden will need periodic monitoring. The wildlife team should take note of which species are surviving better than others, and the species of plants visited most frequently by hummingbirds. Also, weeds that appear to be invading

the gardens should be removed once they get tall enough to confirm their identity as undesirable. A raised bed can be created for the garden to reduce the spread of grasses and other intrusive species, as well as increase visibility of the garden. Also, the garden may need supplemental watering in times of excessive drought.

The entrance gate may also be incorporated into the garden by planting native vines that will eventually climb up the fence. Vines are of great benefit to hummingbirds and other birds as they provide nesting cover and additional food sources. By having vines near the hummingbird gardens, the wildlife team is providing escape cover from predators. Table 4 lists native species of vines that may be used.

Table 4. Native Vine Species

Common Name	Scientific Name
common trumpetcreeper	*Campis radicans*
American bittersweet	*Celastrus scandens*
virginsbower	*Clematis virginiana*
common moonseed	*menispermum canadense*
Virginia creeper	*Parthenocissus quinquefolia*
common greenbrier	*Smilax rotundifolia*

WHC recommends that the wildlife team make note of their monitoring efforts in their activities journal for future reference, and for documentation necessary for WHC Certification.

G. Manage Open Areas for a Balanced Predator Prey Population

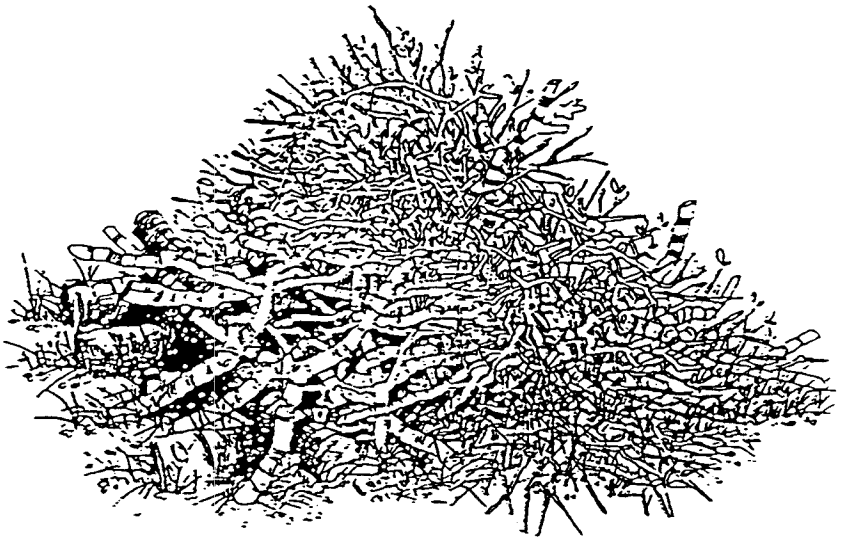
Managing for a balanced predator-prey population is important to keep a healthy ecosystem. A balanced population of predators and prey will keep vegetation from being over consumed and diseases from spreading. Predators will eat injured and weak prey keeping populations strong and healthy. To maintain this balance WHC recommends building brush piles to provide cover for prey and raptor perches to provide hunting platforms for avian predators. The wildlife team could gather information on predator prey relationships that they may observe.

1. Brush Piles

Brush piles provide essential nesting, escape and perching cover for small mammals and birds. When properly constructed and installed in appropriate locations, brush piles serve to balance interaction and population dynamics between predator and prey species. Birds nest and perch in the top branches; small mammals, especially rodents, burrow and nest in the lower parts; and insects and worms live and feed in the rich soils formed as the brush pile ages. Brush piles are dynamic habitat components, offering living and feeding options for wildlife species that are continually faced with habitat fragmentation and degradation.

Construct brush piles from cut or downed trees and twigs found around the sites. A properly constructed brush pile has two parts: a base and a top. Build the base with the largest and most weather-resistant logs available. Lay these directly on the ground or on cinder blocks to reduce weather rot. Take care to keep the lowest base logs close enough to the ground, approximately four inches off the ground, to allow passage for small mammals like rodents while discouraging foxes or coyotes. After stacking several of these layers in a log house design, construct the top of the brush pile by covering the base logs with twigs and brushy branches. WHC recommends that brush piles be built along grassy paths. Figure 5 shows a diagram of a typical brush pile. Refer to the *Brush Pile Habitat Management Series* in Appendix F for further instruction on how and where to install brush piles.

Figure 6. Brush Pile Construction



The Base
A solid base with thick branches or trunks should be created. This will extend the life of the brush pile and it will also provide cover and nesting areas for additional species.

The Crown
Smaller branches should be piled on the top making the brush pile half as tall as it is wide. This will create a brush pile that can be used by larger mammals.

Adapted from "Enhancement of Wildlife Habitats on Private Lands." Daniel J. Decker and John W. Kelly. 1968.

Constructing rock piles is another easy, beneficial way of providing security and habitat components for wildlife. They offer many of the same benefits as brush piles, and can also support different species, including reptiles, if the interior of the pile is constructed to provide a fairly stable interior climate.

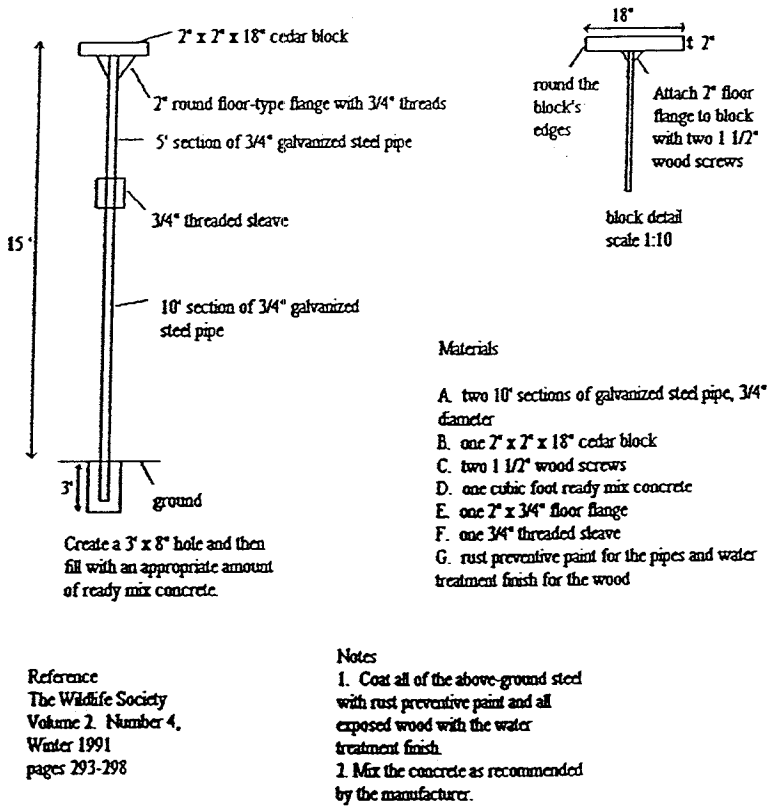
For best results, use rocks with diameters greater than 30 cm. Place the coarsest, biggest rocks along the foundation of the pile in order to create a maze of spaces within the pile. Avoid creating a perfectly symmetrical pile; the more irregular a rock pile's edges, the more wildlife diversity it will attract. For this reason, WHC recommends constructing several small, adjacent piles in place of one large one. This arrangement creates adjoining microhabitats, thus supporting more species variety.

Rock piles and brush piles are versatile in size, so the team can place them anywhere they notice a lack of natural nesting and habitat components. WHC recommends placing rock piles in open areas near the lagoon.

2. Place Raptor Perch Posts

Creating raptor perches will be one way to improve IEL for raptors such as American kestrels, red-tailed hawks, and broad-winged hawks. Raptor perches serve as management tools used to compensate for the lack of natural habitat components, such as snags and open-branched trees commonly found in or along open fields. They provide raptors with a good view of open fields, thus providing vantage points for hunting prey items, especially small mammals. Refer to Figure 6 for a diagram of a raptor perch.

Figure 7. Diagram of Raptor Perch Construction



Raptor perches serve to create a balance among the avian predators and prey typically found in more natural areas. Raptor perches are also valuable as a program component because they provide ideal locations for spotting raptors for identification. This often draws the attention of volunteers or others interested in any new management strategies on site. Raptor perches should be placed in open areas to facilitate hunting. Refer to the Raptor Perches Habitat Management Series in Appendix F for more information.

H. Control Invasive Species

Several strands of *Phragmites*, autumn olive, and sumacs were observed during the site visit. Like most invasive species, these three species are aggressive and form dense thickets that crowd out desirable native plants. Unlike the other two, the sumac is native and provides food for wildlife, but is aggressive. Control measures for this species should be undertaken to control large, dense stands that may crowd out more desirable species.

Once established, these plants are difficult to control. WHC recommends using a variety of methods. Smaller plants (with stems one inch or less in diameter) can be dug out and physically removed. The larger plants will require chemical control. For larger plants, the wildlife team can use a non-persistent glyphosphate herbicide. The herbicide should be applied carefully in accordance with the instructions on the product label. A non-persistent glyphosphate herbicide is nonselective; thus great care must be taken to reduce the possibility of damaging desirable vegetation. The herbicide can be applied directly to the foliage or to a cut stump. WHC recommends using both methods. The wildlife team should apply the herbicide to the foliage in late summer. Also, spraying in late fall after most natives have dropped their leaves will help avoid killing desirable plant species. The second method requires cutting the stems at the base and then applying herbicide to the cut stem to inhibit further growth.

V. RAISING COMMUNITY ENVIRONMENTAL AWARENESS

An important aspect of a wildlife program is the benefit it provides, through environmental education, to the community and the employees and their families. Therefore, a volunteer-driven wildlife program that approaches outside groups in the local community for assistance has great potential to educate participants about wildlife and their habitats. A program could begin with IEL Responding Parties' staff, expand to

civic groups, scouts and eventually local schools. If IEL is opened for education a nature trail, descriptive signs of different programs, and an education center could be utilized. Since the Township is still uncertain about allowing people, especially children, on site, special trips could be scheduled with the responding parties ahead of time. After these regular visits occurred as a pilot program, the site could possibly be opened to the community as a whole, or to certain groups or schools. The following sections detail recommendations to develop these relationships with the community and provide environmental education.

A. Nature Trail

A nature trail could be incorporated into the existing grassy path that goes around the landfill. Loops can be added to include the fox den and the lagoon. If these loops are going to be added careful attention should be paid to maintaining a level of privacy needed for a successful fox den and to minimize the disturbance on amphibians and reptiles that use the lagoon. The trail should parallel the bluebird boxes for educational purposes and to make monitoring easier.

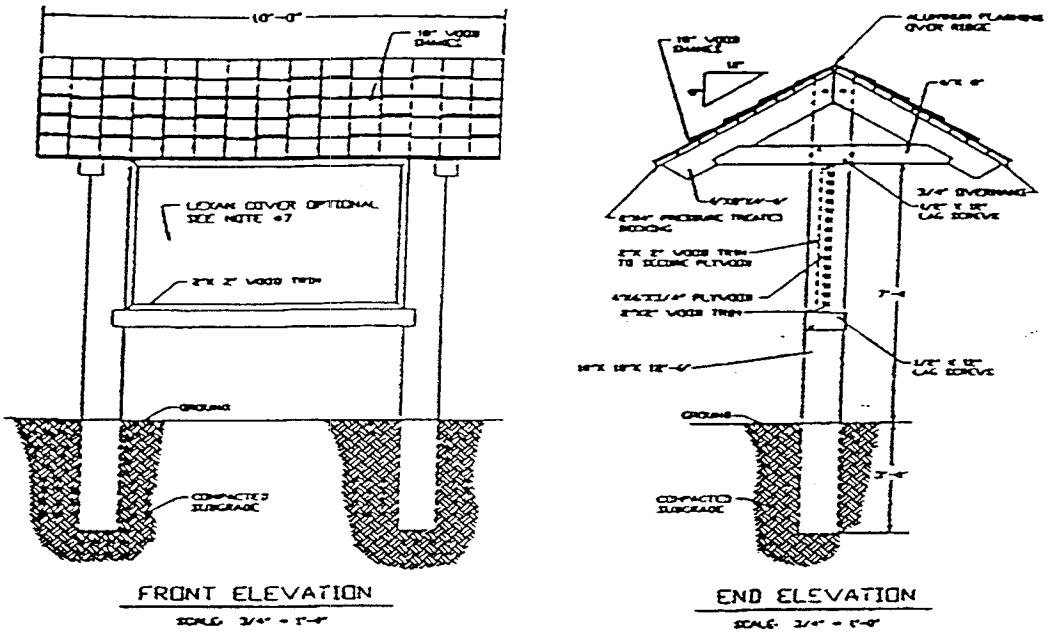
Goodyear has expressed interest in using recycled rubber as the trail surface. This is an excellent opportunity to demonstrate to the community that the IEL Responding Parties are devoted to good land stewardship and are practicing recycling and reusing of products. An interpretive sign should point out the importance of reusing and recycling and discuss the use of recycled rubber.

1. Add Interpretive Stations

Interpretive stations at certain points along the trail can be valuable educational tools. Developing these stations would also make an excellent partnership between the school or scout groups, provided that the students would be involved in their placement.

WHC recommends that the trailhead contain a kiosk or bulletin board. A kiosk (Figure 7) can serve a variety of purposes. First, it offers an opportunity to educate and communicate environmental programs and efforts to employees. A kiosk can also be used to provide information that may be essential to the enjoyment of the trail. Information on protecting the natural features of the trail is also crucial. More specifically, a kiosk could provide a trail map, trail rules, guidelines for minimizing impact on trail resources, and a species list pamphlet. Including a species checklist at the kiosk would provide visitors with a challenge to see if they could observe all of the species found on the site. People using the checklist could be asked to deposit the list in a drop-box at the end of the trail so that the data can be used to update the team's wildlife species inventory. Since people will not stand at the kiosk for long periods of time, short, concise messages using graphics are best.

Figure 8. Kiosk Design



(NOT TO SCALE)

Notes:

1. All wood should be pressure treated.
2. All hardware and nails need to be galvanized.
3. Cedar wood shakes should be approximately 18" x 1/2 with a 5 ½" exposure.

Source: Appalachian Trail Conference. 1995. *Planning a Trailhead Bulletin Board.*

Education stations along the trail should be designed to inform visitors about the plants, wildlife, and natural features that can be seen from the vantage point of each interpretive station. Trail markers, signs, and corresponding trail guides could point out habitat projects natural features, historical sites, plants, or signs of wildlife using the area (i.e. deer and fox trails). Figure 8 contains examples of interpretive sign designs.

During the evolution of the wildlife programs, there are several important program values to keep in mind. First, voluntary involvement is crucial and can lead to increased recognition, better community relations and improved environmental performance. Moreover, by implementing proactive habitat enhancement projects at the landfill, IEL Responding Parties will help protect biodiversity. While the projects recommended in this report focus on allowing volunteers to learn and understand wildlife management techniques, the overall goal of the wildlife program should be to increase biodiversity. With this in mind, WHC has recommended several enhancement projects for various areas at the sites including the following.

- Providing nesting structures for bluebirds, tree swallows and American kestrels.
- Planting wildflower meadows.
- Field border management.
- Providing raptor hunter perches and brush piles in open field areas.
- Providing fox dens.
- Providing bat boxes.
- Planting a hummingbird garden.
- Controlling invasive species.

Throughout the formation and growth of the wildlife programs, WHC can provide technical assistance regarding project implementation and maintenance, and recommendations for future projects. WHC staff is also available to participate in meetings, species inventories, planting events and strategic planning of the program. WHC looks forward to assisting the IEL Responding Parties in the development and implementation of long-term habitat management programs and encourages the IEL Responding Parties to continue its leadership in this pursuit.

APPENDIX A

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APPENDIX B

WILDLIFE CITED IN OPPORTUNITIES REPORT

Appendix B. Wildlife Cited in Opportunities Report

Type	Common Name	Scientific Name
Plants	box elder	*Acer negundo*
	silver maple	*Acer saccharinum*
	milkweed	*Asclepias syriaca*
	field mustard	*Brassica rapa*
	teasel	*Dipsacus sylvestris*
	horsetail	*Equisetum fistulosum*
	green ash	*Fraxinus pennsylvanica*
	English ivy	*Hedera helix*
	rush	*Juncaceae Family*
	Eastern red cedar	*Juniperus virginiana*
	apple	*Malus sylvestris*
	Autumn olive	*Oleaceae Family*
	switch grass	*Panicum virgatum*
	Phragmites	*Phragmites communis*
	phlox	*Polemoniaceae Family*
	big-toothed aspen (poplar)	*Populus grandidentata*
	black cherry	*Prunus serotina*
	scrub oak	*Quercus ilicifolia*
	staghorn sumac	*Rhus typhina*
	common locust	*Robinia pseudoacacia*
	raspberry	*Rubus occidentalis*
	black willow	*Salix nigra*
	little bluestem	*Schizachyrium scoparium*
	poison ivy	*Toxicodendron pubescens*
	red clover	*Trifolium pratense*
	rock elm	*Ulmus thomasii*
Birds	red tailed hawk	*Buteo jamaicensis*
	cardinal	*Cardinalis cardinalis*
	turkey vulture	*Cathartes aura*
	chimney swift	*Chaetura pelagica*
	American crow	*Corvus brachyrhynchos*
	gray catbird	*Dumetella carolinensis*
	American kestrel	*Falco sparverius*
	northern oriole	*Icterus galbula*
	tree swallow	*Iridoprocne bicolor*
	eastern bluebird	*Sialia sialis*
	American robin	*Turdus migratorius*
Reptile	painted turtle	*Chrysemys picta*
Mammals	white-tailed deer	*Odocoileus virginianus*
	muskrat	*Ondatra zibethica*
	red fox	*Vulpes fulva*

Amphibian	green frog	*Rana clamitans*
Insects	bumblebee	*Apidae Family*
	Spring azure butterfly	*Celastrina argiolus*
	clouded sulphur butterfly	*Colias philodice*
	mosquito	*Culicidae Family*
	field cricket	*Gryllidae Family*
	European cabbage butterfly	*Pieres rapae*
Grasses	little bluestem	*Andropogon scoparius*
	broom sedge	*Andropogon virginicus*
	side-oats grama	*Bouteloua curtipendula*
	purple love grass	*Eragrostis spectabilis*
	June grass	*Koeleria cristata*
	Indian ricegrass	*Oryzopsis hymenoides*
	switch grass	*Panicum virgatum*
	needlegrass	*Stipa spartea*
Wildflowers	columbine	*Aquilegia canadensis*
	Verbena stricta	*Asclepias syriaca*
	butterfly weed	*Asclepias tuberosa*
	New England aster	*Aster novae-angliae*
	wild indigo	*Baptisima tinctoria*
	purple coneflower	*Echinacea purpurea*
	fireweed	*Epilobium angustifolium*
	saw-toothed sunflower	*Helianthus grosseserratus*
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	American filbert	*Corylus americana*
	shrubby Saint John's wort	*Hypericum prolificum*
	common winterberry	*Ilex verticillata*
	common spicebush	*Lindera benzoin*

Shrubs	American black currant	*Ribes americanum*
	Allegany blackberry	*Rubus allegheniensis*
	blackcap raspberry	*Rubus occidentalis*
Trees	boxelder	*Acer negundo*
	black maple	*Acer nigrum*
	red maple	*Acer rubrum*
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	bitternut hickory	*Carya cordiformis*
	shagbark hickory	*Carya ovata*
	common hackberry	*Celtis occidentalis*
	frosted hawthorn	*Crataegus pruinosa*
	dotted hawthorn	*Crataegus punctata*
	green ash	*Fraxinus pennsylvanica*
	common witchhazel	*Hamamelis virginiana*
	red mulberry	*Morus rubra*
	American plum	*Prunus americana*
	black cherry	*Prunus serotina*
	northern red oak	*Quercus borealus*
	smooth sumac	*Rhus glabra*
	staghorn sumac	*Rhus typhina*
Vines	common trumpetcreeper	*Campis radicans*
	American bittersweet	*Celastrus scandens*
	virginsbower	*Clematis virginiana*
	common moonseed	*Menispermum canadense*
	Virginia creeperq	*Parthenocissus quinquefolia*
	common greenbrier	*Smilax rotundifolia*

APPENDIX C

INFORMATION SOURCES

Appendix C. Information Sources

Conservation Organizations

Bat Conservation International
P.O. Box 162603
Austin, TX 78716
512-327-9721
www.batcom.org

Boy Scouts of America
Mike Jones
Location Address:
1601 South Main Street
Akron, OH 44301
Mailing Address:
P.O. Box 68
Akron, OH 44309
330-315-5053

The Dawes Arboretum: Promotes the planting of forests and ornamental trees.
7770 Jacksontown Rd., SE
Newark, OH 43056
740-323-2355
1-800-44-DAWES
www.dawesarb.org

Environmental Education Council of Ohio
P.O. Box 2911
Akron, OH 44309
614-695-5100

The Holden Arboretum: Promote the knowledge and appreciation of plants for personal enjoyment, inspiration, and recreation.
9500 Sperry Rd.
Kirtland, OH 44094
440-256-1110
440-256-1655 fax
holden@holdenrb.org

League of Ohio Sportsmen: Devoted to the wise use, conservation, aesthetic appreciation, and restoration of wildlife and other natural resources.
3953 Indianola Ave.
Columbus, OH 43214
614-268-9924

NRCS Wildlife Habitat Incentives Program (WHIP)
Patrick K. Wolf, State Conservationist
Rm. 522
200 N. High St.
Columbus, OH 43215
614-469-6962

National Audubon Society
692 N. High St.
Suite 208
Columbus, OH 43215
614-224-3303
614-224-3305 fax

North American Amphibian Monitoring
Dr. Harry Schutte
Department of Biological Science
Room 067, Irvine
Ohio Univeristy
Athens, OH 45701
740-593-9486
schutte@ohiou.edu

North American Association for Environmental Education
P.O. Box 400
Troy, OH 45373
513-676-2514

The North American Bluebird Society
P.O. Box 74
Darlington, WI 53530
www.nabluebirdsociety.org

The Ohio Academy of Science: Stimulates interest in the sciences, to promote research, to improve instruction in the sciences, and to recognize high achievement in attaining these objectives.
1500 W. 3rd Ave.
Suite 223
Columbus, OH 43212
614-488-2228
oas@iwaynet.net

Ohio Alliance for the Environment: Provides leadership in resolving environmental conflicts and to promote and support environmental education in Ohio.
445 King Ave.
Columbus, OH 43201
614-421-7819
614-421-7819 fax
www.shell.idt.net/~oaenvi19/oae.htm

Ohio Bluebird Society
20680 Twp. Rd 120
Senecaville, OH 43780
www.obsbluebirds.com
iathomatu@wesnet.com

Ohio Department of Agriculture
8995 E. Main St
Reynoldsburg, OH 43068
614-466-2732

Ohio Department of Natural Resources
Fountain Square
Columbus, OH 43224
614-265-6565

Ohio Division of Wildlife
Kendra Wecker, Administrative Assistant
1840 Belcher Drive
Columbus, OH 43224
614-265-7043
614-262-1143 fax
kendra.wecker@dnr.ohio.gov

Ohio Environmental Council, INC.: Promotes improved environmental, advocacy, research, education and collaborative efforts.
Suite 201
1207 Grandview Ave.
Columbus, OH 43212
614-487-7506

Ohio Environmental Protection Agency
1800 Watermark Dr.
P.O. Box 163669
Columbus, OH 43216

Partners for Wildlife
Kent Kroonemeyer/Bill Hegge
6950-H Americana Parkway
Reynoldsburg, OH 43068
614-469-6923

Seed Sources:

C.M. Brown Nurseries, INC.
4906 Middle Ridge Rd
Perry, OH 44081
440-259-5403
440-259-4965 fax
info@cmbrown.com

Dayton Nursery
3459 Cleveland Massillon
Norton, OH 44203
330-825-3320

Girard Nurseries
P.O. Box 428
6839 N. Ridge East
Geneva, OH 44041
440-466-2881
440-466-3999 fax

Hoot Owl Nursery
Location Address:
4308 Rhoric Road
New Marshfield, OH 45766
Mailing Address:
P.O. Box 91
New Marshfield, OH 45766

Marietta State Nursery
Roger Hendershot
Box 428
Reno, OH 45773
740-373-6574

Sunny Border Ohio Nurseries Inc
3637 State Route 167
Jefferson, OH 44047
800-577-1760
440-858-9666 fax

Zanesville State Nursery
Chuck Bathrick
5880 Memory Rd
Zanesville, OH 43701
740-453-9472

APPENDIX D

WHC MEMBERS' "GOOD IDEAS"

(For reference only. Please refer to the black bound copy of this report for full Appendices)

APPENDIX E

CERTIFICATION INFORMATION

(For reference only. Please refer to the black bound copy of this report for full Appendices)

APPENDIX F

HABITAT MANAGEMENT SERIES

(For reference only. Please refer to the black bound copy of this report for full Appendices

I. ADDENDUM TO OPPORTUNITIES REPORT FOR INDUSTRIAL EXCESS LANDFILL

The Industrial Excess Landfill PRPs are collaborating with the Wildlife Habitat Council (WHC) to pursue a voluntary wildlife habitat enhancement program at the Industrial Excess Landfill (IEL) in Uniontown, OH. The purpose of this addendum is to briefly demonstrate the complimentary relationship between the habitat and community projects, as described in the Opportunities Report, and the proposed biodiverse phytoremediation cap. Detailed recommendations on projects and their implementation are provided in the report.

After the site visit conducted by Marcia Maslonek, the PRPs expressed interest in the implementation of a modified phytoremediation cap that would preserve and enhance as much habitat as feasible. A joint visit between WHC and Applied Natural Sciences was then conducted to discuss this possibility. Both parties agreed that supplementing the existing cottonwoods with hybrid poplars in specific areas only where needed, as determined by Applied Natural Sciences, would be preferred to the traditional phyto cap. This approach would preserve the water-consuming properties of the mature cottonwoods and other species already present on the landfill, in addition to promoting overall biodiversity. Habitat enhancement projects, as mentioned below and in the Report, would then be implemented in areas adjacent to and outside of the poplars. Retention and supplementation of the existing vegetation on the landfill, where feasible, is also a potential habitat project. For instance, the existing silky dogwood shrubs are providing berries for a variety of wildlife species, in addition to cover.

II. Impact of Recommendations on Proposed Biodiverse Phytoremediation Cap:

A. Nest Box Program

Creating a nest monitoring program for bluebirds, tree swallows, and American kestrels throughout the property can be done on any area of the landfill cap as well as the buffer. These species, however, prefer open grassy areas which may be eliminated with the poplar cap. Open field habitat can be retained in areas such as cell 22-25, 15, 20, and other areas where poplars are not be required (see attached map). Nest boxes and management for these species can also occur in cells 1,6,11,and 16 for similar reasons. Rotational mowing to maintain this state will be needed, and is described in detail in the report. In wooded sections of the landfill nest boxes can be erected for other species of songbirds and raptors, such as the eastern screech owl. A nest box program is an excellent project for the involvement of community, schools, and local conservation groups.

B. Wildflower Meadow and Hummingbird Garden

Nectar sources can be provided for pollinators such as hummingbirds, butterflies, and bees by constructing a wildflower meadow and hummingbird garden. Both of these projects were suggested for areas not affected by the proposed phyto cap. The meadow can be implemented in any location that the PRPs wish, but the open field upon entering the gates (cell 1) is an excellent location. The hummingbird garden was suggested for outside the gates on either side of the entrance road. Both locations would be visible to the public and provide a pleasing view, as well as benefit to wildlife.

C. Field Border Management Program

Field border management includes a rotational mowing program, enhancing the hedgerow, and planting forested islands that will provide more diversified habitat types on the landfill. This complements the biodiverse phyto cap by

supplementing the poplars with other species of trees and shrubs to increase diversity, food sources, and shelter for a variety of wildlife, from songbirds to game species. Maintaining the existing hedgerow along the fenceline will also leave hardwood species intact as well as food sources found in the bushes and shrubs. The hedgerow as it stands is a valuable edge habitat. Rotational mowing will maintain open field areas which are important to other species, such as the bluebirds and kestrels. This practice will also encourage ground-nesting birds as well as an abundance of prey for various predators. This can be done in the wildflower meadow(s), open fields, and around tree/shrub islands.

D. Raptor Management

Raptors (bird-of-prey) can be managed for on site by promoting a balanced predator-prey relationship. Besides management of open fields and the hedgerow, building brush piles and placing raptor perch posts around the landfills will encourage their use of IEL. The raptor perch should be placed in an open area, such as any of the cells mentioned for the open field habitat. This provides a good vantage point for spotting prey. Brush piles can be constructed near the tree islands, in open fields, or near the hedgerow. They can be placed within the poplars as well.

E. Fox Management

Red foxes have been seen on site, and many of the projects mentioned in the report will enhance the food and cover for this species (i.e. brush piles, rotational mowing, etc.) However, providing an artificial fox den to encourage foxes on the landfill is another project that can implemented relatively easily. The den should be constructed in any open area near cover, but where little disturbance will occur. The den is a highly-visible and simple project which can stir enthusiasm with the community and students on site.

F. Bat Boxes

Bat boxes can be installed near Metzger's Ditch to control mosquito populations. Although it may take several years before bats will locate and occupy the box, once established, a single bat can eat over 600 insects in an hour. The open area near the lagoon is an excellent location. A bat box is also a strong educational tool to educate the public on this misunderstood mammal.

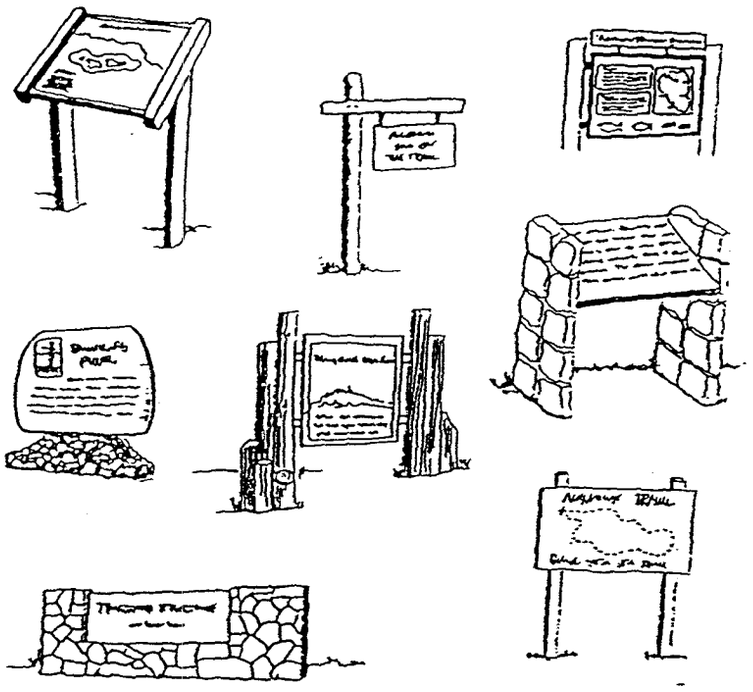
G. Control invasive species

There are several invasive species present at IEL that, if not controlled, could compete with and overtake native and/or more desirable vegetation. The common reed (*Phragmites*), autumn olive, and sumac are examples. Control methods are explained in detail in the report. At this stage, they can be easily controlled, but if left to spread much further, they will be difficult to keep in check. Control of invasive plant species will not only benefit wildlife, but also the phytocap itself.

Conclusion

WHC looks forward to assisting the IEL PRPs in their effort to provide habitat for wildlife at the IEL. The biodiverse phyto cap has the potential to serve as a unique demonstration site for the Superfund program. Greenspace, a disappearing asset in many communities, would be conserved, and a community resource created from a once controversial and unusable site. WHC plans to be involved in the implementation of the habitat projects, and looks forward to the opportunity to bring together community, local organizations, and industry for the benefit of wildlife and education.

Figure 9. Interpretive Signs



Source: Ham, Sam H. 1992. *Environmental Interpretation: A Practical Guide for People with Big Ideas and Small Budgets.* North American Press. Golden, Colorado. 400pp.

Certain areas such as the lagoon and wildflower meadow along the trail will naturally lend itself to interpretive signs. Specifically, a variety of information could be made available to visitors about the value of wetlands and native plant species to wildlife. A predator-prey station would also be ideal due to the brush piles, raptor perches, and fox den. Animal track molds are simple to include on interpretive signs, as well. If tracks are found on the site, such as those of the fox, pour melted paraffin poured into the track and allowed to cool will provide a 3-dimensional track for an educational station. If no tracks are found on site they could be cut out of wood, covered with a preservative, and glued to an interpretive sign that includes information on the animal. Furthermore, signs providing information on native plant species are recommended. This can include written information, a drawing or 3-dimensional wood outline of a leaf, and a seed glued to the sign. WHC recommends that interpretive signs stress the importance of biodiversity and how these projects contribute to improving biodiversity. Interpretive

stations will provide the community with additional opportunity to inform them on how to be good land stewards within their community.

2. Trail Maintenance

The nature trail will need attention and maintenance to keep it accessible and useful. Signs and information stations may need to be maintained so that the information provided will continue to be available and updated for everyone using the trail. Other maintenance activities include resurfacing the trail, repairing steps or walkways, removing fallen trees, or picking up brush and trash to keep the trail in good shape.

B. Education Center

WHC recommends, as a future, potential project, that an education center be built by the front gate. The education center will serve as a community meeting place where education seminars and routine meetings about IEL could be held. The education center should be interactive and provide specific information about the programs and projects that are or will be implemented at the site. The education center will be especially important if access to the site is going to be restricted. The center will show the community that IEL Responding Parties are serious and devoted to becoming good community members.

VI. FUTURE PROJECTS

As the program builds and interest grows, additional projects should be pursued to maintain momentum and continue expanding the program. With the growth of the program will come additional opportunities to contribute to pressing environmental and wildlife conservation goals. WHC encourages IEL to give these initiatives consideration. as they arise. In addition to unforeseen opportunities for employees to contribute

positively to wildlife conservation, WHC recommends exploring additional areas of the site for future projects.

A. Develop Formal Educational Programs

There are a number of local schools that could utilize the IEL as an outdoor classroom. WHC recommends that the IEL Responding Parties start a Corporate Lands for Learning Program (CLL).

The Corporate Lands for Learning (CLL) program is a partnership between WHC, an individual facility, and an organization, individual school or school system, which establishes an environmental education program at the facility. The program promotes an awareness of the role of corporations in protecting the environment, teaching the public about nature in an outdoor (and/or indoor) classroom. CLL provides a vehicle for on-going study of local wildlife habitat and an awareness of how everyday actions can affect the quality of this habitat.

Considerations for establishing a CLL program include: determining the appropriate partners, determining what is needed to make the site an effective outdoor classroom, training teachers to use the site and developing an educational advisory committee to guide the CLL program into the future. By participating in this program, the IEL Responding Parties will gain recognition as a corporate leader in environmental education and encourage employees to think critically and solve problems.

B. Lagoon Enhancements

The lagoon provides a valuable wetland area. As a future project, IEL could consider providing additional basking structures for painted turtles, planting native wetland vegetation along banks, and possibly expanding another area along the ditch to create a second lagoon for maximum wildlife benefit. Special attention should be paid to this area during inventories, including nocturnal ones for amphibians. Results could be

shared with the North American Amphibian Monitoring Program (see Appendix for contact information).

VII. WHC CORPORATE HABITAT CERTIFICATION/INTERNATIONAL ACCREDITATION PROGRAM

WHC certification provides recognition of the efforts put forth by sites that demonstrate a long-term commitment to managing habitat for wildlife. As a reward for a company's efforts, descriptions of certified programs are published in an annual registry and press releases approved by the site are distributed to local and national news contacts. Sites with WHC-certified programs also receive an award plaque and are honored at WHC's annual symposium.

IEL could be eligible to apply for certification in 2001 if at least one project is implemented prior to July 2000. Habitat enhancement projects need to be implemented, documented, monitored and maintained for at least one year. The wildlife team members will need to submit the necessary documentation for their program to be considered for certification. Employee and community participation in the program is also reviewed and greatly strengthens the application. Overall, IEL must demonstrate a commitment to good environmental stewardship. WHC can assist in compiling material that could be submitted for certification. A team of wildlife biologists will review the documentation to determine if the program meets the criteria of certification.

As outlined on the certification application form included in Appendix E of this report, the following items should be included in the application.

- An inventory of the animal and plant species found on each site.
- Wildlife management plans.
- Activities logs, showing when meetings were held, when projects were implemented, and what management techniques were used.

- Documentation of maintenance and monitoring activities to demonstrate that the programs are ongoing. (Documentation should include before and after photographs, number and species of any plants used, success of nest boxes, dates of projects and records of those involved.)

In order to continue to recognize sites for their wildlife programs and to ensure that their commitment to creating wildlife habitat is long-term, WHC requires certified sites to apply for recertification two years after their initial certification and every two or three years thereafter. The recertification process also allows WHC to review the site's efforts, provide recommendations for continued habitat enhancement and recognize new projects. Further information about the certification process and associated awards such as Rookie of the Year can be found in Appendix E of this report.

VIII. SUGGESTED IMPLEMENTATION SCHEDULE

WHC does not suggest that projects in this report be implemented all at once. WHC has simply provided a menu of options from which IEL can choose the projects of most interest. The goal is to create an exceptional program that can be incorporated into everyday activities. The following implementation schedule is suggested as a basis for the IEL program, and to help volunteers assign a relative priority to the listed projects. IEL can use it as a template for their program and add or subtract ideas as they choose.

Phase I

Program Development

Create volunteer wildlife teams

Begin drafting the wildlife management plans

Initiate the wildlife inventories

Begin project-monitoring efforts

Project Implementation

Install nesting structures

Plant hummingbird garden

Build fox dens

Phase II

Program Development

Continue the wildlife inventory

Meet community leaders that could benefit from project

Continue project-monitoring efforts

Start developing the nature trail

Project Implementation

Plant wildflower meadow

Install bat boxes

Begin controlling invasive species

Phase III

Program Development

Continue the wildlife inventory

Continue project-monitoring efforts

Apply for certification

Develop CLL program

Project Implementation

Manage for balanced predator-prey populations

Implement field border management

IX. SUMMARY

IEL Responding Parties presents the Uniontown community with a variety of opportunities for enhancing wildlife habitat and improving environmental awareness at the IEL. WHC has developed the recommendations in this report to best supplement existing habitat types and to correspond to goals of the IEL Responding Parties' habitat enhancement, community involvement and public recognition of its environmental commitment.

2

APPLIED NATURAL SCIENCES, INC.

Agronomic Investigation

Industrial Excess Landfill

at

Uniontown, OH

submitted by

Applied Natural Sciences, Inc.

4129 Tonya Trail

Hamilton, Ohio 45011

Ph: 513-895-6061 Fax: 513-895-6062 email: ans@fuse.net

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b) Secondary & MicroNutrients - S, Ca, Mg, Zn, Cu, Fe, Mn 3

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Tables Figures & Photographs ..... **Appendix I**

Agronomic Investigation

- Industrial Excess Landfill at Uniontown, OH -

I. INTRODUCTION

In August, 2000 Applied Natural Sciences, Inc. (ANS) conducted a site investigation designed to evaluate site conditions relative to the implementation of a vegetative cover (phyto cap) for the Industrial Excess Landfill (IEL) at Uniontown, OH. This investigation focused on the condition of the vegetation and soil cover across the site. To accomplish these tasks, the site was surveyed and staked to a 200 feet by 200 feet grid. A total of 25 grid squares were created and each grid was given a numerical designation in addition to the alpha-numeric coordinates designations (see Figure 1). Soil samples were collected from each grid. A ground photographic survey of the site was also completed to provide documentation of the vegetative survey that was performed by the Wildlife Habitat Council.

A. Soil Sampling

Each of the 25 grid squares was physically transected across the middle of the grid in a direction that was roughly perpendicular to its slope. Shallow (0-6 inch) soil samples were collected at four equidistant locations along the transect. These within-grid soil samples were composited and subsampled. The bagged subsamples were labeled and placed in an iced cooler for overnight shipment to Servi-Tech Laboratory, an agricultural testing laboratory in Dodge City, Kansas.

B. Tissue Sampling

Two tissue samples were collected from the eastern boundary of Grid 7. Leaves were collected from 1 to 2 inch and 2 to 4 inch diameter trees and submitted to Servi-Tech Laboratories for nutrient analysis.

C. Photographic Survey

Photographic evidence of the site's vegetative diversity was obtained at grid coordinates along the eastern and western portions of the site. Typically 360° scans were obtained near coordinates B through E along rows 02+00 and 06+00 (see Figure 2 & Photographs in Appendix I). Additional scans were taken from near coordinates B, 04+00 and E, 08+00. These scans were able to provide a representative photographic capture of most of the site.

D. Site Conditions

1. Soil and Topographic Conditions

The site encompasses roughly 30 acres. About half of the landfill cover is situated on a slightly sloping plateau on the western portion of the site. Near the middle of the landfill area, the slope becomes steep to the east and continues this progression to the eastern boundary of the site (Figure 3). On the plateau, the relief has a slightly undulating quality that is probably a reflection of the settling of the landfill material below. Poplar trees appear to be successfully populating these areas. Sparely vegetated areas are scattered across the site and are located primarily on the steeper slopes.

The soil cover is estimated to be two feet thick. However, the cover was approximately 6 inches thick in at least one of the sparsely vegetated areas. The soil texture is gravely and ranges from a loamy sand to a sandy loam (see Table 1). The moisture holding capacity on 2 feet of this cover soil would be at most an acre-inch of water or enough for about 3 days of high transpiration by the vegetation.

2. Soil Chemical Conditions

a) Primary Nutrients - N, P & K

Nitrogen, phosphorus and potassium are considered the primary plant nutrients. These nutrient levels, while variable, are generally low to very low with the best soils being at the base of the eastern slope. Nitrogen levels were very low, potassium levels were low and except for the soils at the base of the slope, Phorsporus levels were low to very low.

b) Secondary & MicroNutrients - S, Ca, Mg, Zn, Cu, Fe, Mn

Sulfur, calcium and magnesium are considered secondary nutrients as lesser amounts are needed in the plant for healthy growth while, correspondingly, the remainder are termed micronutrients due to very low concentrations required. Calcium and magnesium levels are generally good while the micronutrients such as iron (Fe) and copper (Cu) were low. The remaining parameters are generally in concentrations adequate for healthy plant growth with the exception of higher than normal concentrations of metals such as zinc (Zn) and manganese (Mn) which hasn't adversely affected the site's vegetation growth and development.

c) Other Parameters - pH, SS, OM, Na, CEC

Soluble salt (SS) and sodium (Na) levels are generally low and do not pose a vegetative hazard. Organic matter (OM) levels are generally good and reflect the contributions by the rhizosphere in the 0 to 6 inch sampling interval. Cation exchange capacity (CEC - the cation attenuation capacity of the soil material) values are consistent with the type of material encountered and the organic matter content of the samples.

3. Vegetation

The site's ecosystems are identified and presented in Figure 4. Poplar trees are the predominant woody species on the site with locust trees being the second most dominant species. Willow trees are well established in the wetland and are becoming established in sections of the grassland and on the perimeter of the central woodlot. Elm, chinese elm, and apple trees are scattered across the site. The forest edges, western grassland and woodlots are on boundary property off of the landfill.

II. CONCLUSIONS OF AGRONOMIC INVESTIGATION

The objective of this agronomic investigation was to evaluate current conditions and develop recommendations regarding the feasibility of creating a vegetative cover on the landfill commonly refered to as a Phyto Cap. It is clear that the existing woody vegetation is well rooted into the landfill waste. The state of growth of the trees that was observed at the site could not be supported by the soil cover qualified in this report. The

soil nutrient status is too low and the moisture holding capacity is too limited to support the productive growth that was observed. The tissue sample data (see Table 1) further support this conclusion. The data indicated adequate nutrient status in spite of the very low soil nutrient supply.

Groundwater data supports the notion that natural attenuation is aggressively controlling contaminant evolution from the landfill. Tree root systems enhance natural attenuation by providing nutrients, oxygen, substrates and a mechanism for transporting and supporting diverse microbial populations well into the landfill waste. Therefore, based on the site's environmental conditions and the current productive state of the existing vegetative cover it is apparent that the only activities that would be reasonable would be the repair and enhancement of existing conditions.

III. Recommendations

In consideration with the Wildlife Habitat Council and the local authorities, the tree population on the plateau area (see Figure 5) of the site should be supplemented with poplar and locust trees to achieve a tree population density spacing between 12 to 15 feet. The steeper slope of the landfill cover should essentially remain a grassland with enhancements for wildlife. The western boundary that is off of the landfill would be used for establishing hardwood trees for nut production and shrubs for berries to enhance wildlife food supplies (Figure 6).

APPENDIX I

- Tables, Figures & Photographs -

Table 1. Agronomic Data from Soil & Tissue Sampling

Soil Fertility Parameters

Lab #	Location	Sample ID	Depth	pH	S.S.	O.M.	NO3-N	P	K	Zn	Fe	Mn	Cu	S	Ca	Mg	Na	CEC	%H	%K	%Ca	%Mg	%Na
			inches		mmhos/cm	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
Soil Fertility Parameters																							
Lab #	Location	Sample ID	Depth	pH	S.S.	O.M.	NO3-N	P	K	Zn	Fe	Mn	Cu	S	Ca	Mg	Na	CEC	%H	%K	%Ca	%Mg	%Na
			inches		mmhos/cm	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
53310	IEL	1	0-6	7.5	0.11	1.6	2.6	18	54	2.9	45.9	16.0	1.2	7	1044	76	9	6	0	2	87	11	1
53311	IEL	2	0-6	7.8	0.15	2.3	2.3	9	63	1.8	26.3	13.8	1.7	6	1416	95	6	8	0	2	88	10	0
53312	IEL	3	0-6	7.8	0.14	2.0	2.1	6	54	1.2	54.0	14.6	0.7	7	1486	95	6	8	0	2	89	9	0
53313	IEL	4	0-6	7.8	0.17	2.5	2.1	6	76	1.7	20.9	21.5	1.0	7	1352	87	5	8	0	3	88	9	0
53314	IEL	5	0-6	7.6	0.16	3.2	2.7	10	74	1.7	19.5	20.3	1.3	9	1599	121	6	9	0	2	87	11	0
53315	IEL	6	0-6	7.8	0.13	1.9	2.4	3	49	3.0	23.9	12.2	2.0	9	1403	80	8	8	0	2	89	9	0
53316	IEL	7	0-6	7.7	0.15	1.6	2.1	4	54	1.1	15.5	15.0	0.9	10	1619	113	6	9	0	2	88	10	0
53317	IEL	8	0-6	7.6	0.15	1.6	3.2	4	64	2.5	29.7	17.0	1.8	10	1686	95	7	9	0	2	90	8	0
53318	IEL	9	0-6	7.8	0.12	1.3	2.2	9	64	2.0	15.6	17.3	0.7	8	1638	112	6	9	0	2	88	10	0
53319	IEL	10	0-6	7.6	0.18	3.4	2.9	13	77	2.3	19.8	19.5	1.2	8	1556	135	7	9	0	2	85	12	0
53320	IEL	11	0-6	7.7	0.17	2.6	2.6	6	63	4.3	31.7	19.0	2.8	10	1677	125	7	10	0	2	87	11	0
53321	IEL	12	0-6	7.7	0.15	2.4	2.1	3	76	2.4	22.6	16.4	1.4	7	1535	129	8	9	0	2	85	12	0
53322	IEL	13	0-6	7.5	0.20	3.2	2.7	5	64	2.2	22.6	18.1	1.1	7	1414	129	7	8	0	2	85	13	0
53323	IEL	14	0-6	7.4	0.19	3.0	3.5	6	59	2.1	27.5	22.3	1.8	7	1241	106	5	7	0	2	85	12	0
53324	IEL	15	0-6	7.6	0.21	3.4	4.8	26	96	2.1	20.9	20.7	0.9	7	1623	135	5	10	0	3	85	12	0
53325	IEL	16	0-6	7.8	0.15	2.2	2.1	4	50	1.7	22.0	16.0	3.5	7	1419	94	6	8	0	2	88	10	0
53326	IEL	17	0-6	7.9	0.13	1.6	2.6	9	52	1.2	15.2	12.4	1.0	9	1783	98	6	10	0	1	90	8	0
53327	IEL	18	0-6	7.8	0.15	2.1	2.7	4	55	1.4	15.9	14.9	0.8	14	1506	97	6	9	0	2	89	10	0
53328	IEL	19	0-6	7.8	0.14	2.7	3.2	28	52	1.9	16.4	16.2	0.7	8	1334	82	6	8	0	2	89	9	0
53329	IEL	20	0-6	7.7	0.17	2.2	3.7	10	74	1.4	20.4	12.9	1.1	9	1380	121	6	8	0	2	85	12	0
53330	IEL	21	0-6	7.9	0.15	1.8	2.8	5	56	1.5	17.6	16.1	1.2	8	1660	99	7	9	0	2	89	9	0
53331	IEL	22	0-6	7.6	0.15	3.5	5.9	7	70	2.9	17.5	22.5	0.9	8	1424	92	5	8	0	2	88	9	0
53332	IEL	23	0-6	7.9	0.13	3.0	4.8	13	46	1.5	18.0	20.5	1.3	8	1577	69	5	9	0	1	92	7	0
53333	IEL	24	0-6	7.6	0.18	3.5	3.8	10	78	1.9	25.4	22.1	1.1	8	1671	115	6	10	0	2	88	10	0
53334	IEL	25	0-6	7.6	0.18	4.0	3.2	15	73	2.6	20.3	27.2	0.8	9	1519	98	4	9	0	2	88	9	0
53335	IEL	Bad Shallow (24x)	0-3	7.6	0.19	2.3	5.3	11	40	1.6	48.4	13.8	3.0	11	1030	34	5	6	0	2	93	5	0
55220	IEL	Bad Deep (14x)	3-4	7.4	0.24	1.9	2.9	19	55	4.3	126.4	10.2	2.8	12	928	69	8	5	0	3	86	11	1
				Medium Soil Test Value Range				15-22	101-150	0.6-1.0	2.1-4.5	1.1-2.0	0.5-0.7			51-100							

Soil Texture

Sample	ID:	1	Soil	Texture:	Sandy	Loam	Sand	%77.5	Silt	%13.8	Clay	%8.8
Sample	ID:	4	Soil	Texture:	Loamy	Sand	Sand	%80.0	Silt	%11.3	Clay	%8.8
Sample	ID:	7	Soil	Texture:	Loamy	Sand	Sand	%86.3	Silt	%6.3	Clay	%7.5
Sample	ID:	10	Soil	Texture:	Sandy	Loam	Sand	%71.3	Silt	%17.5	Clay	%11.3
Sample	ID:	13	Soil	Texture:	Sandy	Loam	Sand	%76.3	Silt	%13.8	Clay	%10.0
Sample	ID:	16	Soil	Texture:	Loamy	Sand	Sand	%78.8	Silt	%12.5	Clay	%8.8
Sample	ID:	19	Soil	Texture:	Loamy	Sand	Sand	%81.3	Silt	%11.3	Clay	%7.5
Sample	ID:	22	Soil	Texture:	Loamy	Sand	Sand	%82.5	Silt	%7.5	Clay	%10.0
Sample	ID:	25	Soil	Texture:	Loamy	Sand	Sand	%86.3	Silt	%6.3	Clay	%7.5
Sample	ID:	24X	Soil	Texture:	Loamy	Sand	Sand	%81.3	Silt	%12.5	Clay	%6.3

Tissue Samples

Lab No.	Location	Tree Diameter	Sampled	Analyzed	Tissue	N	P	K	Ca	Mg	S	Na	Zn	Fe	Mn	Cu	B
						%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
2871	IEL	1"-2"	8/29	9/1/00	LEAVES	1.34	0.12	1.57	2.46	0.35	0.54	181	158	72	7	65	0.02
2872	IEL	2"-4"	8/29	9/1/00	LEAVES	1.42	0.14	1.14	2.7	0.34	0.39	195	238	73	8	88	0.01

Figure 1 - Survey Coordinates & Grid Numbers

Figure 2 - Photograph Locations (Field Map)

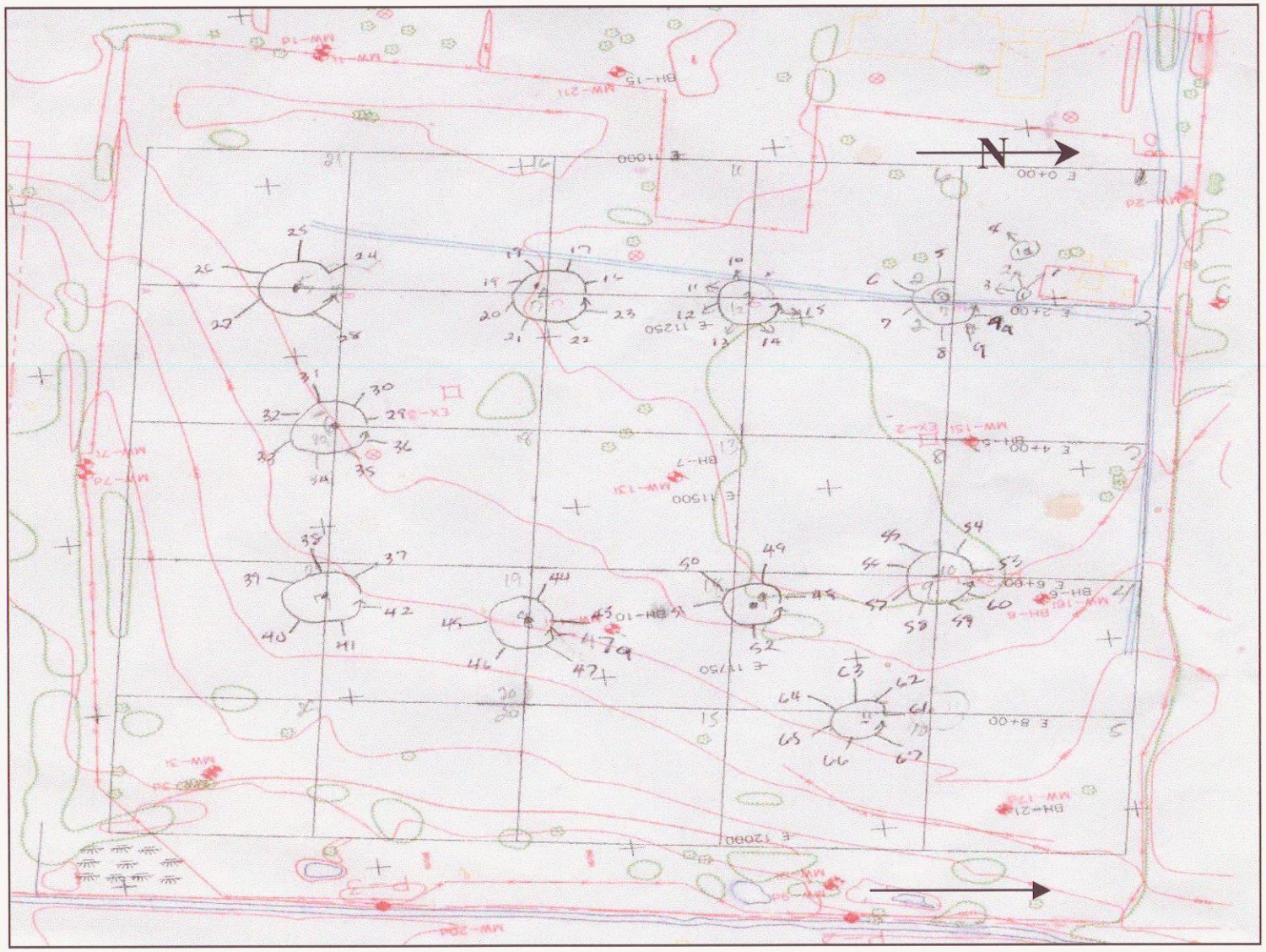


Figure 3 - Site Topography

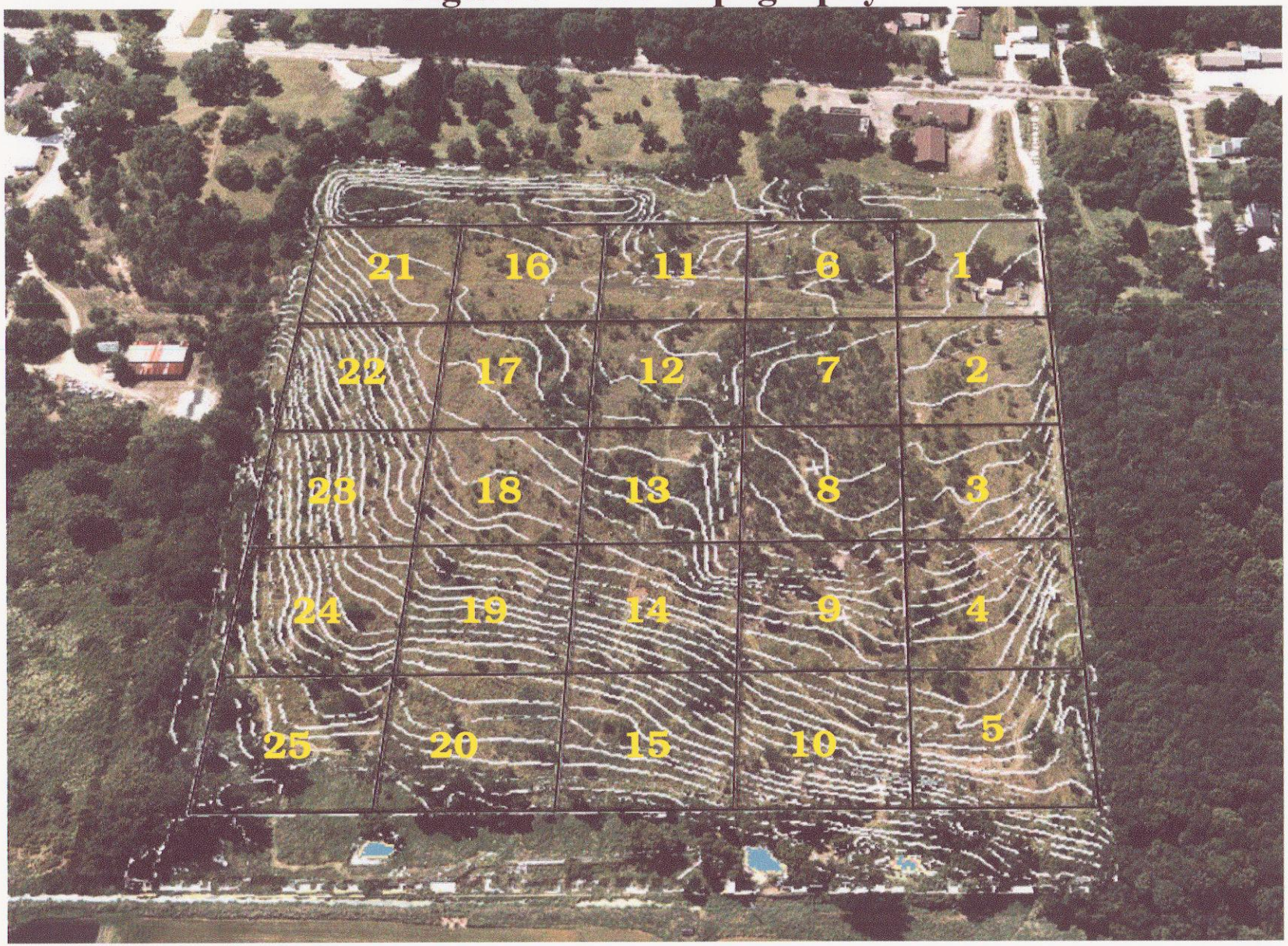


Figure 4 - Current Ecosystem

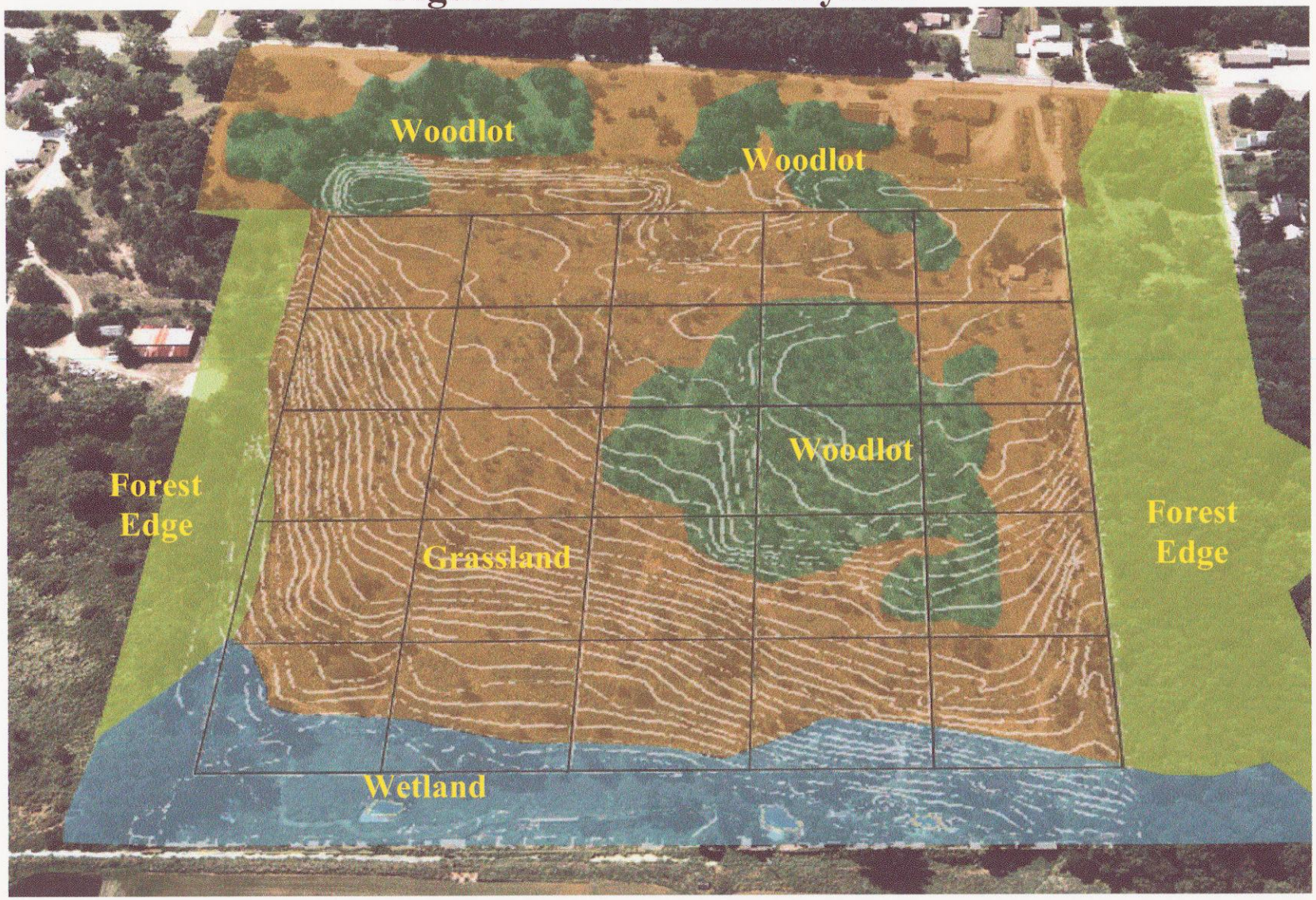
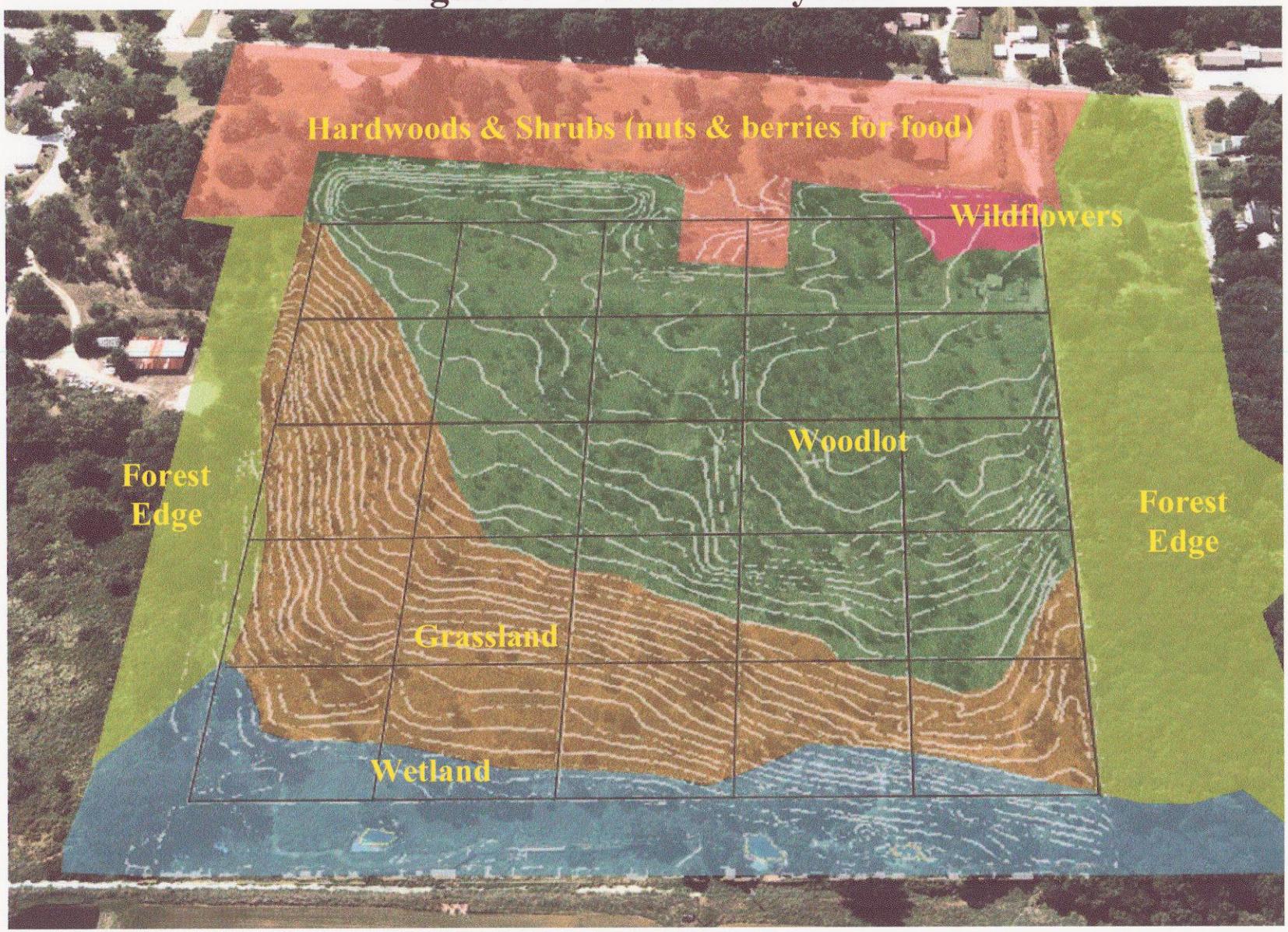


Figure 5 - Tree Planting Area

Figure 6 - Future Ecosystem



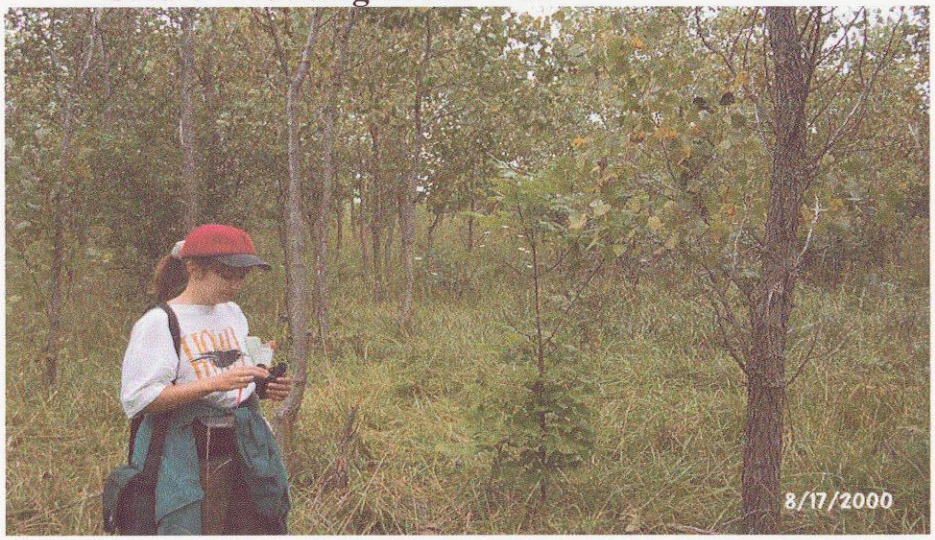
Photographs

Grid 1 - Looking West

Grid 11 - Looking south to grids 16 & 21

Grid 18 - Looking Northeast

Grid 8 - Looking South West



3

Industrial Excess Landfill

Water Quality Records for:

MW-01D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88															
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 29
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 06
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERP 62
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 44
3/20/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198010
8/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H120110002
12/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L120219001
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110003
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G300112006

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-01I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 61
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 05
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 63
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 15
3/17/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1133
3/17/97			.68	.94	.82						.8	.74			9703-1134
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198011
8/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H120110001
12/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L120110003
3/23/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128015
6/4/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F050202004
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102004
4/10/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126007
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110001
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104008
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102008
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G300112004

Prepared by: **SHARP and Associates, Inc.**
982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-01S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88		6													
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 55
8/31/92	2	< 10	< 10	1	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 04
12/7/92	< 10	< 10	< 10	1	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 14
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 51
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0892
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198012
8/16/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H170199004
12/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.3	< 10	< 10	A0L120110002
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110002
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G300112005

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Industrial Excess Landfill

Water Quality Records for:

MW-02D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 20	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 26
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 48
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		2			< 10	4	< 10	2	ERP 95
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 01
3/24/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1277
3/24/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1276
4/3/97			< 10												9703-1277
4/3/97			< 10												9703-1276
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198007
8/10/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116005
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106013
3/21/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C220107004
5/30/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F010108004
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106009
4/10/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126001
7/23/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G240168004
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104007
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102002

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Industrial Excess Landfill

Water Quality Records for:

MW-02D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102003
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G230245005

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Industrial Excess Landfill

Water Quality Records for:

MW-02S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88	25														

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Industrial Excess Landfill

Water Quality Records for:

MW-03D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 24
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 18
9/1/92	< 10	< 10	< 10	2	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 09
11/30/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 49
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 14
3/26/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1513A
4/3/97			< 10												9703-1513A
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129003
8/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H080171002
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104007
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108004
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102006
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102005

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Industrial Excess Landfill

Water Quality Records for:

MW-03I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 39
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 08
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 72
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 16
3/24/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1280
3/24/97				1.2	1.04						1.22	1			9703-1281
4/3/97			.64												9703-1281
4/3/97			< 10												9703-1280
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129002
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129004
8/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H080171003
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104006
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108005
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102007

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982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-03S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88				1.2								1.1			
5/11/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 58
9/1/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	24	< 10	< 10	ERP 07
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 18
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 81
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0893
9/24/98	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198009

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Industrial Excess Landfill

Water Quality Records for:

MW-04S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 35
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	EQZ 27
11/30/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 46
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 75
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1518
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129001
8/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H080171001
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104008
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112004
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112005
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G300112002

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Industrial Excess Landfill

Water Quality Records for:

MW-05S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 42
8/31/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 51
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 68
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 05
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0891
9/21/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I220163006
8/16/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H170199002
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104009
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105004
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102004

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Industrial Excess Landfill

Water Quality Records for:

MW-06S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 15
8/31/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	EQZ 44
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 93
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 77
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1272
9/18/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180216002
8/16/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H170199003
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060111002
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112003
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2.9	< 10	< 10	A3G300112001

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Industrial Excess Landfill
Water Quality Records for:

MW-07D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 36
8/31/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 43
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 73
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 31
3/26/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1514
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129006
8/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H080171004
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104005
8/6/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H070112002
8/1/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H020105004

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Industrial Excess Landfill

Water Quality Records for:

MW-07I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 06
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 05
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 20
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 79
12/2/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 82
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 17
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1523
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129007
8/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H080171005
12/6/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L070104002
3/20/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C210102005
6/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237002
6/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237001
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106006
4/11/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126013
8/6/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H070112001
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104001
3/19/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102016

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Industrial Excess Landfill
Water Quality Records for:

MW-07I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
8/1/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H020105003

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-07S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88			10	9	26			88				5		240	
5/13/92	< 10	< 10	6	3	8	< 10		48			< 10	2	< 10	74	ERJ 95
8/26/92	< 10	< 10	3	3	7	< 10		43			< 10	5	< 10	110	EQZ 19
12/8/92	< 10	< 10	5	3	10	< 10		27			< 10	< 10	< 10	63	ESM 28
3/9/93	< 10	< 10		< 10	9	< 10		29			< 10	< 10	< 10	59	ETE 87
3/9/93	< 10	< 10	6	< 10	9	< 10		29			< 10	< 10	< 10	58	ETE 86
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0894
9/22/98	< 10	< 10	5	4	14	< 10		2			< 10	1	< 10	40	A8I230129005
8/8/00	< 10	< 10	3.7	1.7	6.2	< 10	< 10	< 10	4.8	< 10	< 10	< 10	< 10	15	A0H090123001
12/6/00	< 10	< 10	2.1	3	4.7	< 10	< 10	6.4	2.7	< 10	< 10	< 10	< 10	28	A0L070104003
3/20/01	< 10	< 10	5.5	1.2	5.2	< 10	< 10	2.6	6	< 10	< 10	< 10	< 10	13	A1C210102006
6/5/01	< 10	< 10	6.1	1.6	6.1	< 10	< 10	2.6	8.7	< 10	< 10	< 10	< 10	15	A1F060237003
9/6/01	< 10	< 10	9.1	9.3	37	< 10	< 10	< 10	6.4	< 10	< 10	1.9	< 10	45	A1I070106007
4/11/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126014
8/6/02	< 10	< 10	6	8.2	29	< 10	< 10	< 10	3.4	< 10	< 10	1.9	< 10	28	A2H070112003
3/19/03	< 10	< 10	1.4	< 10	1.9	< 10	< 10	< 10	2.4	< 10	< 10	< 10	< 10	3.6	A3C210102017
3/19/03	< 10	< 10	1.7	< 10	1.7	< 10	< 10	< 10	2.7	< 10	< 10	< 10	< 10	3.7	A3C210102018
8/1/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H020105005

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982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-08D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 12
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 65
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	2	< 10	< 10	ESM 11
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 38

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Industrial Excess Landfill

Water Quality Records for:

MW-08I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/1/88															
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 08
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 66
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 67
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 47
12/2/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 48
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 02

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Industrial Excess Landfill

Water Quality Records for:

MW-08S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERJ 09
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 02
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 77
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 03

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-09D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 40
9/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EPR 11
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 54
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 37
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0888
9/21/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I220163004
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3.1	< 10	< 10	< 10	< 10	A0H050101003
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080104005
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105003
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102003

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-09I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 27
8/31/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 10
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 08
12/1/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 09
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 35
3/3/93	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 36
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0886
9/21/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I220163003
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H050101004
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080104003
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105002
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102002

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-09S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 22
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 40
12/7/92	< 10	< 10	< 10	2	< 10	< 10		< 10			1	2	< 10	< 10	ESM 07
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 34
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0887
9/21/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I220163002
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H050101005
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080104002
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105001
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102001

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-10D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 01
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 03
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 56
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 30
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1278
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126004
8/15/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H160120001
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106007
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119006
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119007
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103004

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-10I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERJ 04
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 64
11/30/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 51
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 06
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1267
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060122005
3/22/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128003
3/22/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128002
6/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237007
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102005
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119005
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103003

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614-841-4650

Industrial Excess Landfill
Water Quality Records for:

MW-10S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 03
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 63
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	2	< 10	2	ERP 59
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 04
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0880
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126008
8/15/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H160120002
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060122003
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060122004
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119004
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103002
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103001

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-11D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 17
8/27/92	< 10	< 10	< 10	1	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 08
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	2	< 10	< 10	ERP 85
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 40
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1515
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198001
8/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116006
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106012
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110005
7/30/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261001

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-11I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/8/92	< 10	< 10	< 10	3	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 50
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	2	< 10	EQZ 32
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ESM 10
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	6	< 10	ETE 21
3/2/93	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 20
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1525
9/24/98	< 10	< 10	< 10	< 10	< 10	3		< 10			< 10	< 10	3	< 10	A8I250181001
8/11/00	< 10	< 10	< 10	< 10	< 10	3.3	< 10	< 10	< 10	< 10	< 10	< 10	2.6	< 10	A0H120110004
12/8/00	< 10	< 10	< 10	< 10	< 10	3.5	< 10	< 10	< 10	< 10	< 10	< 10	2.9	< 10	A0L090106011
3/21/01	< 10	< 10	< 10	< 10	< 10	4.4	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A1C220107001
3/21/01	< 10	< 10	< 10	< 10	< 10	4.6	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A1C220107002
6/5/01	< 10	< 10	< 10	< 10	< 10	5.1	< 10	< 10	< 10	< 10	< 10	< 10	4	< 10	A1F060237004
9/6/01	< 10	< 10	< 10	< 10	< 10	4.5	< 10	< 10	< 10	< 10	< 10	< 10	3.3	< 10	A1I070106008
4/11/02	1.5	< 10	< 10	< 10	< 10	6.9	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A2D120126015
8/1/02	< 10	< 10	< 10	< 10	< 10	4.8	< 10	< 10	< 10	< 10	< 10	< 10	3.7	< 10	A2H020110006
11/14/02	1.1	< 10	< 10	< 10	< 10	5.1	< 10	< 10	< 10	< 10	< 10	< 10	3.5	< 10	A2K140323008
11/14/02	< 10	< 10	< 10	< 10	< 10	4.6	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A2K140323007
3/19/03	1.4	< 10	< 10	< 10	< 10	5.4	< 10	< 10	< 10	< 10	< 10	< 10	3.7	< 10	A3C210102015

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-11I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/30/03	< 10	< 10	< 10	< 10	< 10	6.2	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A3G310261004
7/30/03	< 10	< 10	< 10	< 10	< 10	5.6	< 10	< 10	< 10	< 10	< 10	< 10	3.6	< 10	A3G310261003

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-11S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 14
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 68
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 86
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 23
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0883
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198002
8/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H120110006
8/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H120110005
12/11/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.3	< 10	< 10	A0L120219002
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110007
7/30/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261002

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-12D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 18
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 42
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 76
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 50
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0875
3/21/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0875
9/15/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I170219001
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136001
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107002
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107003
3/20/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C210102002
6/4/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F050202002
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102003
4/10/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126005
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105003
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104003
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102006
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114006

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Industrial Excess Landfill
Water Quality Records for:

MW-12I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	2	< 10	< 10	ERJ 19
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 31
12/2/92	< 10	< 10	< 10	2	< 10	< 10		< 10			< 10	5	< 10	3	ERP 83
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 49
3/12/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0873
3/21/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0873
9/15/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I170219002
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136002
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107001
3/20/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C210102001
6/1/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F020106003
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102002
4/16/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D160157001
4/16/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D160157002
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105002
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104002
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102005
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114005

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-13I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 10	< 10	< 10	22	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 67
5/12/92	< 10	< 10	< 10	21	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 69
8/31/92	< 10	< 10	< 10	5	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 01
8/31/92	< 10	< 10	< 10	4	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 02
12/3/92	< 10	< 10	< 10	2	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 90
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 22
3/27/97	< 10	< 10	< 10	86	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1536
9/29/98	< 10	< 10	< 10	.9	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8J010103008
3/23/01	< 1000	< 1000	< 1000	12000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A1C240128013
5/30/01	< 1700	< 1700	< 1700	25000	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	A1F010108002
9/11/01	< 83	< 83	< 83	1200	< 83	< 83	< 83	9.2	< 83	< 83	< 83	< 83	< 83	14	A1I110259006
4/15/02	< 770	< 770	< 770	11000	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	A2D160102001
6/4/02	< 50	< 50	< 50	610	< 50	< 50	< 50	6	< 50	< 50	< 50	< 50	< 50	7.7	A2F040234001
8/6/02	< 10	< 10	< 10	67	< 10	< 10	< 10	1.4	< 10	< 10	< 10	< 10	< 10	2.6	A2H070112005
11/14/02	< 10	< 10	< 10	6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140323006

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-13I NEW

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
6/4/02	< 10	< 10	< 10	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	4.9	< 10	< 10	A2F040234002
7/23/02	< 10	< 10	< 10	3.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G240168001
7/23/02	< 10	< 10	< 10	2.8	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G240168002
8/6/02	< 10	< 10	< 10	2.8	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H070112004
11/14/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140323005
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102010
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294004

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Industrial Excess Landfill
Water Quality Records for:

MW-13IXP

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
9/11/01	< 33	< 33	< 33	560	< 33	< 33	< 33	4.5	< 33	< 33	< 33	< 33	< 33	7	A1I110259007

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Industrial Excess Landfill
Water Quality Records for:

MW-13S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/14/92	< 10	< 10	< 10	180	< 10	8		< 10			< 10	< 10	< 10	< 10	EQK 55
5/14/92	< 10	< 10	< 10	180	< 10	7		< 10			< 10	< 10	< 10	< 10	EQK 59
8/31/92	< 20	< 20	< 10	310	< 20	< 20		< 20			< 20	< 20	< 20	< 20	ERP 03
12/8/92	< 40	< 40	< 10	460	< 40	< 40		< 40			< 40	< 40	< 40	< 40	ESM 19
3/8/93	< 10	< 10	< 10	570	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 73

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Industrial Excess Landfill

Water Quality Records for:

MW-14I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	11	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 65
8/31/92	< 10	< 10	< 10	6	< 10	< 10		< 10			< 10	3	< 10	3	EQZ 50
12/8/92	< 10	< 10	< 10	4	< 10	< 10		< 10			< 10	1	< 10	< 10	ESM 24
3/4/93	< 10	< 10	< 10	7	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 53
3/4/93	< 10	< 10		7	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 54
3/20/97	< 10	< 10	< 10	160	< 10	< 10		< 10			< 10	< 10	< 10	< 10	
9/29/98	< 10	< 10	< 10	11	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8J010103007
9/29/98	< 10	< 10	< 10	16	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8J010103006
8/16/00	< 83	< 83	< 83	1100	< 83	< 83	< 83	< 83	< 83	< 83	< 83	< 83	< 83	< 83	A0H170199006
3/23/01	< 710	< 710	< 710	8100	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	A1C240128012
5/30/01	< 200	< 200	< 200	2700	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	A1F010108001
9/10/01	< 50	< 50	< 50	750	< 50	11	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	A1I110259002
4/12/02	< 330	< 330	< 330	4800	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	A2D120237003
6/4/02	< 250	< 250	< 250	4200	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	A2F040234003
8/7/02	< 160	< 160	< 160	2800	< 160	< 160	< 160	< 160	< 160	< 160	< 160	< 160	< 160	< 160	A2H080102001
11/14/02	< 500	< 500	< 500	7400	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	A2K140323004

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Industrial Excess Landfill
Water Quality Records for:

MW-14I NEW

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
6/3/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2F040224002
6/3/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2F040224003
7/23/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G240168003
8/7/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H080102003
8/7/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H080102004
8/7/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H080102002
11/14/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140323003
3/20/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102021
8/4/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H050110003
8/4/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H050110002

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-14S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/13/92	< 83	< 83	< 10	1100	< 83	< 83		70			< 83	93	< 83	10	ERJ 87
9/1/92	< 10	< 10	< 10	1400	< 10	< 10		87			< 10	5	< 10	9	EQZ 49
12/9/92	< 100	< 100	< 10	1000	< 100	< 100		59			< 100	< 100	< 100	< 100	ESM 30
3/8/93	< 40	< 40	< 10	510	< 40	< 40		35			< 40	< 40	< 40	< 40	ETE 78
3/20/97	< 10	< 10	< 10	1900	1.2	< 10		< 10			1.2	1	< 10	< 10	
9/29/98	< 500	< 500		8300	< 500	< 500		< 500			< 500	< 500	< 500	< 500	A8J010103005
8/16/00	< 710	< 710	< 710	12000	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	A0H170199007
8/16/00	< 710	< 710	< 710	12000	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	< 710	A0H170199005
12/12/00	< 1000	< 1000	< 1000	12000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A0L130105006
3/20/01	< 420	< 420	< 420	6100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	A1C210102007
5/31/01	< 1000	< 1000	< 1000	16000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A1F010108005
9/10/01	< 1000	< 1000	< 1000	10000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A1I110259004
4/12/02	< 1200	< 1200	< 1200	15000	< 1200	< 1200	< 1200	< 1200	< 1200	< 1200	< 1200	< 1200	< 1200	< 1200	A2D120237004
6/3/02	< 770	< 770	< 770	13000	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	< 770	A2F040224001
8/6/02	< 1000	< 1000	< 1000	16000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A2H070112006
3/20/03	< 1000	< 1000	< 1000	15000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A3C210102022
8/4/03	< 1000	< 1000	< 1000	15000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	A3H050110004

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-15I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 10	< 10	< 10	2	< 10	< 10		< 10			< 10	3	< 10	< 10	ERJ 68
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 38
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 69
3/2/93	5	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 19
3/27/97	31	10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1537
3/27/97	12	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1538
3/23/01	< 10	< 10	< 10	2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128014
5/30/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F010108003
9/10/01	< 10	< 10	< 10	< 10	< 10	< 10	1.1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I110259003
4/15/02	3.1	< 10	< 10	< 10	< 10	< 10	3.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D160102002

Prepared by: **SHARP and Associates, Inc.**
982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-15S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/14/92	74	36	< 10	170	< 40	< 40		630			16	580	< 40	96	EQK 56
8/27/92	160	55	< 10	310	< 83	< 83		1200			< 83	620	< 83	98	EQZ 39
12/8/92	110	43	< 10	210	< 50	< 50		840			< 50	490	< 50	120	ESM 25
3/8/93	45	19	< 10	91	< 10	< 10		540			< 10	170	19	55	ETE 79
3/27/97	29	13	< 10	17	< 10	< 10		130			< 10	< 10	< 10	20	9703-1521
9/29/98	28	14	< 10	8	< 10	3		46			< 10	.6	3	8	A8J010103004
8/15/00	67	16	< 10	10	< 10	7	38	38	< 10	< 10	5.3	1.1	8.3	2	A0H160120007
8/15/00	54	14	< 10	8.2	< 10	5.1	34	29	< 10	< 10	4.5	1	7.2	1.7	A0H160120006
12/11/00	35	13	< 10	4	< 10	4.3	19	6.9	< 10	< 10	2.9	< 10	3.9	< 10	A0L120219004
12/11/00	32	13	< 10	3.5	< 10	3.8	19	6	< 10	< 10	2.4	< 10	4.1	< 10	A0L120219003
3/21/01	34	13	< 10	5	< 10	5.3	25	7.8	< 10	< 10	3.1	< 10	5.3	< 10	A1C220107005
5/31/01	28	12	< 10	2.7	< 10	4	22	5.5	< 10	< 10	2.1	< 10	4.8	< 10	A1F010108006
9/6/01	37	12	< 10	2.2	< 10	6.1	14	4	< 10	< 10	1.8	< 10	3.2	< 10	A1I070106001
4/11/02	27	13	< 10	3.8	< 10	4.5	39	2.2	< 10	< 10	3.9	< 10	9.9	< 10	A2D120126012
8/5/02	20	10	< 10	2.2	< 10	5.7	7.6	1.6	< 10	< 10	< 10	< 10	1.7	< 10	A2H060110004
8/5/02	25	11	< 10	3	< 10	7.6	7.5	1.9	< 10	< 10	1.3	< 10	1.6	< 10	A2H060110003
3/19/03	21	13	< 10	1.7	< 10	1.8	33	< 10	< 10	< 10	2.8	< 10	8.9	< 10	A3C210102019
8/1/03	12	10	< 10	1.4	< 10	< 10	13	< 10	< 10	< 10	1.7	< 10	2.8	< 10	A3H020105002

Prepared by: **SHARP and Associates, Inc.**
982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-16I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 59
9/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 20
9/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 12
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 96
12/3/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 97
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 18
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1274
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126009
8/15/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H160120003
12/12/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L130105001
3/21/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C220107006
5/31/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F010108007
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106002
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106003
4/11/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126010
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105006
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105005
3/19/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102011

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Industrial Excess Landfill

Water Quality Records for:

MW-16I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113007

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-17D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/13/92	< 10	< 10	< 50	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 88
5/13/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0515523
8/27/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C0828535
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 29
12/9/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C1214525
12/9/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ESM 33
3/3/93	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	D0305505
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 42
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1275
9/29/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8J010103002
8/15/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H160120004
12/12/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L130105002
3/20/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C210102003
5/31/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F010108008
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106004
4/11/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126011
8/5/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H060110001
3/19/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102013

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Industrial Excess Landfill

Water Quality Records for:

MW-17D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294005
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294006

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Industrial Excess Landfill
Water Quality Records for:

MW-17S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
8/27/92	< 5	< 5	< 10	6	< 5	6	< 5	6			< 5	9	< 10	16	C0828507
8/27/92	< 10	< 10	< 10	6	< 10	< 10		5			< 10	11	< 10	13	EQZ 10
8/27/92			59												C0828509
12/9/92	< 5	< 5	< 10	7	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C1214529
12/9/92	< 10	< 10	< 50	7	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 32
3/3/93	< 5	< 5	< 10	7	< 5	3	< 5	< 5			< 5	< 5	< 10	< 5	D0305501
3/3/93	< 10	< 10	< 10	8	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 43
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1520
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1519
9/29/98	< 10	< 10	< 10	6	< 10	2		< 10			< 10	< 10	< 10	< 10	A8J010103003
8/15/00	< 10	< 10	< 10	6.9	< 10	< 10	< 10	< 10	3.5	< 10	< 10	< 10	< 10	< 10	A0H160120005
12/12/00	< 10	< 10	< 10	6	< 10	< 10	< 10	< 10	3	< 10	< 10	< 10	< 10	< 10	A0L130105005
12/12/00	< 10	< 10	< 10	6.1	< 10	< 10	< 10	< 10	3.1	< 10	< 10	< 10	< 10	< 10	A0L130105003
3/20/01	< 10	< 10	< 10	6.7	< 10	< 10	< 10	< 10	4.1	< 10	< 10	< 10	< 10	< 10	A1C210102004
5/31/01	< 10	< 10	< 10	6.7	< 10	1.1	< 10	< 10	5.1	< 10	< 10	< 10	< 10	< 10	A1F010108009
9/6/01	< 10	< 10	< 10	6.5	< 10	< 10	< 10	< 10	3.8	< 10	< 10	< 10	< 10	< 10	A1I070106005
4/12/02	< 10	< 10	< 10	7.1	< 10	< 10	< 10	< 10	5.5	< 10	< 10	< 10	< 10	< 10	A2D120237006
8/5/02	< 10	< 10	< 10	7.7	< 10	1.2	< 10	< 10	3.9	< 10	< 10	< 10	< 10	< 10	A2H060110002

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-17S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
3/19/03	< 10	< 10	< 10	7.3	< 10	< 10	< 10	< 10	4	< 10	< 10	< 10	< 10	< 10	A3C210102014
8/1/03	< 10	< 10	< 10	8.7	< 10	1.7	< 10	< 10	4.2	< 10	< 10	< 10	< 10	< 10	A3H020105001

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Industrial Excess Landfill

Water Quality Records for:

MW-18I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 13
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 15
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 61
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 07
3/1/93	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 08
3/20/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126001
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126002
8/14/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H150117001
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060122001
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105006
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G230245002

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Industrial Excess Landfill

Water Quality Records for:

MW-18S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/4/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERJ 02
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 04
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 02
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 25
3/17/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1202
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126007
8/14/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H150113004
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060122002
3/22/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128004
6/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237005
9/7/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I080105004
9/7/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I080105005
4/10/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126006
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105005
11/14/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140323002
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102009
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.5	< 10	< 10	A3G230245003

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Industrial Excess Landfill

Water Quality Records for:

MW-19S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/5/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 16
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 06
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 05
12/2/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 88
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 87
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 27
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1263
9/21/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I220163001
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H040109003
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107008
8/2/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020255001
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114001

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-20D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0513514
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 60
3/9/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 91
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1257
9/17/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180132006
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136003
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107007
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105001
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294003

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-20I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 38
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 41
3/9/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 90
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1259
3/23/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1260
4/2/97			< 10												9703-1260
9/17/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180132005
9/17/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180132002
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136005
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136004
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107006
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112001
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294002

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Industrial Excess Landfill

Water Quality Records for:

MW-20S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 37
3/9/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 89
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1258
9/17/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180132001
8/2/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H030136006
12/4/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107005
6/4/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F050202001
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102001
4/11/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126009
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112002
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104004
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102004
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294001

Prepared by: **SHARP and Associates, Inc.**
982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-21I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 53
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 26
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		1			< 10	< 10	< 10	< 10	ESM 15
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 41
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1516
9/28/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I290126005
8/14/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H150113001
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106010
8/5/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H060110006
8/1/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H020105006

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-21S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	45	5	< 10	7	< 10	< 10		< 10			< 10	< 10	7	< 10	ERJ 78
8/26/92	53	7	< 10	11	< 10	13		< 10			< 10	< 10	9	< 10	EQZ 25
12/8/92	56	8		17	< 10	7		< 10			< 10	< 10	10	< 10	ESM 25
12/8/92			< 10												ESM 26
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 59
3/14/97	50	< 10	< 10	< 10	< 10	23		< 10			< 10	< 10	< 10	< 10	9703-0884
9/28/98	37	7	< 10	4	< 10	31		< 10			< 10	< 10	9	< 10	A8I290126006
8/14/00	15	6.3	< 10	2.4	< 10	57	14	< 10	< 10	< 10	< 10	< 10	5.1	< 10	A0H150113002
8/14/00	15	6.2	< 10	2.4	< 10	56	14	< 10	< 10	< 10	< 10	< 10	5.2	< 10	A0H150113003
12/8/00	13	6.7	< 10	2.7	< 10	56	14	< 10	< 10	< 10	< 10	< 10	5.4	< 10	A0L090106009
12/8/00	13	7	< 10	2.5	< 10	57	14	< 10	< 10	< 10	< 10	< 10	5.7	< 10	A0L090106008
3/21/01	9.2	5.7	< 10	2.3	< 10	59	12	< 10	< 10	< 10	< 10	< 10	5.7	< 10	A1C220107003
6/1/01	7.8	6	< 10	2.2	< 10	59	13	< 10	< 10	< 10	< 10	< 10	6	< 10	A1F020106004
9/5/01	6.5	6.7	< 10	2.5	< 10	73	13	< 10	< 10	< 10	< 10	< 10	5.9	< 10	A1I060102006
4/12/02	4.1	6	< 10	4.2	< 10	73	10	< 10	< 10	< 10	< 10	< 10	4.8	< 10	A2D120237001
4/12/02	4.3	6.3	< 10	2.3	< 10	72	10	< 10	< 10	< 10	< 10	< 10	4.7	< 10	A2D120237002
8/5/02	4.4	6.8	< 10	2.1	< 10	66	9.9	< 10	< 10	< 10	< 10	< 10	5.5	< 10	A2H060110005
11/14/02	3.3	6.1	< 10	2.3	< 10	70	9.7	< 10	< 10	< 10	< 10	< 10	5	< 10	A2K140323009

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982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-21S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
3/19/03	2.9	6	< 10	1.9	< 10	62	8.6	< 10	< 10	< 10	< 10	< 10	3.7	< 10	A3C210102020
8/4/03	2.7	6.8	< 10	2.1	< 10	80	10	< 10	< 10	< 10	< 10	< 10	4.6	< 10	A3H050110001

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982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-22I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERJ 25
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ERJ 23
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 34
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 98
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 28
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1264
9/15/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I170219008
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H040109002
12/1/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L020107001
3/22/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1C240128009
6/1/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F020106001
6/1/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F020106002
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102008
4/10/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120126002
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108003
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104006
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104005
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102007

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Industrial Excess Landfill

Water Quality Records for:

MW-22I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.1	< 10	< 10	A3G230245004

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614-841-4650

Industrial Excess Landfill
Water Quality Records for:

MW-23D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0514526
5/12/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 70
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 13
12/3/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 91
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 10
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0878
9/17/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180132004
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H040109005
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060111003
8/2/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020255002
7/30/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261005

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-23I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 45
8/25/92	< 10	< 10	< 50	2	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 12
12/8/92	< 10	< 10	< 20	3	2	< 10		< 10			< 10	2	< 10	< 10	ESM 21
12/8/92	< 10	< 10	< 50	1	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 20
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 70
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0879
9/18/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I180216003
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H050101001
12/5/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L060111005
8/2/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020255004
7/30/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261006

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982 Crupper Avenue
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Industrial Excess Landfill

Water Quality Records for:

MW-23S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 34
8/24/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C0826500
8/24/92	1	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 62
12/3/92	1	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 89
3/2/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 26
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0877
3/13/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0876
3/21/97	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0877
3/21/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0876
3/31/97			< 10												9703-0877
9/17/98	2	< 10	< 10	< 10	< 10	2		< 10			< 10	< 10	< 10	< 10	A8I180132003
8/3/00	< 10	< 10	< 10	< 10	< 10	< 10	2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H050101002
12/4/00	2	< 10	< 10	< 10	< 10	2.6	3	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L050107009
6/5/01	2.3	< 10	< 10	< 10	< 10	2.7	4.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237008
9/7/01	2.6	< 10	< 10	< 10	< 10	2.6	5	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I080105002
8/2/02	2.4	< 10	< 10	< 10	< 10	3.1	4.4	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020255003
7/30/03	2.8	< 10	< 10	< 10	< 10	3.1	6.1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261007

Prepared by: **SHARP and Associates, Inc.**
982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-24I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 56
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 30
12/7/92	< 10	< 10	< 40	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 99
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 32
3/3/93	< 10	< 10		< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 33
3/23/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1265
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134003
8/9/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H100112002
12/1/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L020107003
9/7/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I080105003
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102005
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113001

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-24S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/8/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 49
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 14
12/1/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 66
3/1/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 09
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1269
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134004
8/9/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H100112001
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080111002
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102006
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113002

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-25I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 44
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 23
12/8/92	< 10	< 10	< 20	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 27
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 47
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1534
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1535
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134009
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134010
8/10/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116001
8/10/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116002
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106006
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108001
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114002

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-25S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/6/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 28
8/24/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C0826502
8/24/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQK 69
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 13
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 48
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1270
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134008
8/10/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116003
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106003
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106005
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108002
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114003

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Industrial Excess Landfill

Water Quality Records for:

MW-26I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/11/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 57
8/25/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 09
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ESM 16
3/3/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 45
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1528
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134007
8/9/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H100112003
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080111001
6/4/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F050202003
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102007
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119002
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103006

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-26S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/13/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 89
5/13/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 85
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 21
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 22
12/8/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 22
12/8/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 23
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 76
3/14/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-0889
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134006
8/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H100112004
12/1/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L020107005
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119003
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103007

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Industrial Excess Landfill
Water Quality Records for:

MW-27D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 77
5/12/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0514528
8/27/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C0828533
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 33
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 03
12/2/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C1204555
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 58
3/4/93	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	D0308519
3/20/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	.4	< 10	< 10	A8I230129010
8/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H090123002
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080111004
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102001
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113004

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982 Crupper Avenue
Columbus, Ohio 43229
614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-27I

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 75
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 36
8/27/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	EQZ 37
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERP 84
3/8/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 71
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1529
3/27/97			.61	.87	.99						1.34	.87			9703-1530
9/23/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I240134002
8/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H090123004
12/7/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L080111003
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102002
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113003
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113006

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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-27S

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/12/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0514520
5/12/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 76
8/25/92	< 10	< 10		< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	EQZ 11
8/27/92			< 10												EQZ 11
8/27/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C0827500
12/2/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	1	< 10	< 10	ESM 01
12/2/92	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	C1204570
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 57
3/4/93	< 5	< 5	< 10	< 5	< 5	< 10	< 5	< 5			< 5	< 5	< 10	< 5	D0308523
3/24/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1271
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129009
9/22/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I230129008
8/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H090123005
12/1/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L020107002
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102003
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102004
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113005

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

MW-28D

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/13/92	< 5	< 5	< 10	< 5	< 5	< 10		< 5			< 5	< 5	< 10	< 5	C0515521
5/13/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ERJ 86
8/26/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	EQZ 24
12/7/92	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ESM 17
3/4/93	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	ETE 52
3/27/97	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	9703-1526
9/24/98	< 10	< 10	< 10	< 10	< 10	< 10		< 10			< 10	< 10	< 10	< 10	A8I250198004
8/10/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0H110116004
12/8/00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A0L090106002
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119001
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G230245001

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982 Crupper Avenue
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614-841-4650

Industrial Excess Landfill

Water Quality Records for:

Trip Blank

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
5/31/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F010108011
6/1/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F020106005
6/4/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F050202005
6/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F060237009
6/8/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F080323004
9/5/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I060102009
9/6/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I070106010
9/7/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I080105006
9/11/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1I110259008
4/12/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D120237007
4/15/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D160102003
4/16/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2D160157003
6/3/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2F040224004
6/4/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2F040234005
7/23/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G240168005
7/24/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G250112006
7/25/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G260105007
7/26/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G270102008

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Industrial Excess Landfill

Water Quality Records for:

Trip Blank

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/29/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G300119008
7/30/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2G310108007
7/31/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H010105007
8/1/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020110008
8/2/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H020255005
8/5/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H060110008
8/6/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H070112007
8/7/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2H080102006
11/13/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140104009
11/14/02	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A2K140323010
3/18/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3C210102001
7/22/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G230245006
7/23/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G240103008
7/24/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G250113008
7/25/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G260114007
7/28/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G290102008
7/29/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G300112007
7/30/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3G310261009

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Industrial Excess Landfill

Water Quality Records for:

Trip Blank

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
7/31/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H010294007
8/1/03	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H020105008
8/4/03	< 10	< 10	< 10	2.4	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A3H050110006

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Industrial Excess Landfill

Water Quality Records for:

UT-01

Analysis Results

Sample Date	1,1-DCA µg/l	1,2-DCA µg/l	1,4-DCB µg/l	Benzene µg/l	Chloro-benzene µg/l	Chloro-ethane µg/l	cis-1,2-DCE µg/l	Ethyl-benzene µg/l	Isopropyl-benzene µg/l	Methyl acetate µg/l	TCE µg/l	Toluene µg/l	Vinyl Chloride µg/l	Xylenes, Total µg/l	Lab Report Number
6/8/01	< 10	8.4	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	A1F080323002

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Industrial Excess Landfill
Detected Constituents Not Included In Water Quality Records Database Printout

WELL KEY	CHEM KEY	DATE	VALUE	FLAG 1	UNITS
MW-03S	1,1,1-Trichloroethane	9/1/92	7		ug/l
MW-15S	1,1,1-Trichloroethane	5/14/92	5		ug/l
MW-07S	1,2-Dichloroethene (total)	9/22/98	0.3	J	ug/l
MW-15I	1,2-Dichloroethene (total)	3/2/93	12		ug/l
MW-15I	1,2-Dichloroethene (total)	3/27/97	77		ug/l
MW-15I	1,2-Dichloroethene (total)	3/27/97	35		ug/l
MW-15S	1,2-Dichloroethene (total)	5/14/92	240		ug/l
MW-15S	1,2-Dichloroethene (total)	8/27/92	50		ug/l
MW-15S	1,2-Dichloroethene (total)	12/8/92	26		ug/l
MW-15S	1,2-Dichloroethene (total)	3/8/93	23		ug/l
MW-15S	1,2-Dichloroethene (total)	3/27/97	16		ug/l
MW-15S	1,2-Dichloroethene (total)	9/29/98	31		ug/l
MW-21S	1,2-Dichloroethene (total)	5/12/92	12		ug/l
MW-21S	1,2-Dichloroethene (total)	8/26/92	19		ug/l
MW-21S	1,2-Dichloroethene (total)	12/8/92	20		ug/l
MW-21S	1,2-Dichloroethene (total)	3/14/97	15		ug/l
MW-21S	1,2-Dichloroethene (total)	9/28/98	15		ug/l
MW-23S	1,2-Dichloroethene (total)	9/17/98	3	J	ug/l
MW-07S	2-Butanone	8/6/02	4.9	J	ug/L
MW-17S	2-Hexanone	12/9/92	2		ug/l
MW-13S	4-Methyl-2-pentanone	8/31/92	7		ug/l
MW-15S	4-Methyl-2-pentanone	3/8/93	6		ug/l
MW-02D	Bromodichloromethane	5/6/92	1		ug/l
MW-25I	Bromodichloromethane	8/26/92	2		ug/l
MW-26S	Bromodichloromethane	8/26/92	2		ug/l
MW-27D	Bromodichloromethane	8/27/92	1		ug/l
MW-28D	Bromodichloromethane	5/13/92	7		ug/l
MW-28D	Bromodichloromethane	5/13/92	8		ug/l
MW-28D	Bromodichloromethane	8/26/92	3		ug/l
MW-02D	Bromoform	5/6/92	2		ug/l
MW-02D	Bromoform	9/1/92	2		ug/l
MW-11I	Bromoform	5/8/92	2		ug/l
MW-25I	Bromoform	8/26/92	3		ug/l
MW-26S	Bromoform	8/26/92	4		ug/l
MW-27D	Bromoform	8/27/92	1		ug/l
MW-28D	Bromoform	5/13/92	16		ug/l
MW-28D	Bromoform	5/13/92	12		ug/l
MW-28D	Bromoform	8/26/92	5		ug/l
ASW-01	Carbon disulfide	6/8/01	5.4	J	ug/L
MW-01D	Carbon disulfide	9/1/92	4		ug/l
MW-01D	Carbon disulfide	12/1/92	2		ug/l
MW-01S	Carbon disulfide	8/31/92	6		ug/l
MW-02D	Carbon disulfide	9/1/92	2		ug/l
MW-03I	Carbon disulfide	9/1/92	2		ug/l
MW-03S	Carbon disulfide	9/1/92	5		ug/l
MW-05S	Carbon disulfide	5/7/92	1		ug/l
MW-05S	Carbon disulfide	12/1/92	4		ug/l
MW-06S	Carbon disulfide	8/31/92	17		ug/l
MW-06S	Carbon disulfide	12/3/92	1		ug/l
MW-07D	Carbon disulfide	12/2/92	2		ug/l
MW-07S	Carbon disulfide	5/13/92	2		ug/l
MW-07S	Carbon disulfide	8/26/92	3		ug/l
MW-08D	Carbon disulfide	8/24/92	1		ug/l

Industrial Excess Landfill
Detected Constituents Not Included In Water Quality Records Database Printout

WELL KEY	CHEM KEY	DATE	VALUE	FLAG 1	UNITS
MW-09D	Carbon disulfide	9/1/92	1		ug/l
MW-09I	Carbon disulfide	8/31/92	3		ug/l
MW-10D	Carbon disulfide	8/25/92	2		ug/l
MW-10D	Carbon disulfide	12/1/92	4		ug/l
MW-10I	Carbon disulfide	8/24/92	1		ug/l
MW-10S	Carbon disulfide	12/2/92	2		ug/l
MW-11D	Carbon disulfide	8/27/92	1		ug/l
MW-11D	Carbon disulfide	12/2/92	3		ug/l
MW-11I	Carbon disulfide	8/27/92	1		ug/l
MW-12D	Carbon disulfide	8/27/92	5		ug/l
MW-14I	Carbon disulfide	8/31/92	1		ug/l
MW-15I	Carbon disulfide	8/27/92	5		ug/l
MW-15I	Carbon disulfide	12/1/92	5		ug/l
MW-17S	Carbon disulfide	12/9/92	3		ug/l
MW-19S	Carbon disulfide	8/26/92	1		ug/l
MW-21S	Carbon disulfide	12/8/92	7		ug/l
MW-22I	Carbon disulfide	8/27/92	1		ug/l
MW-23I	Carbon disulfide	8/25/92	2		ug/l
MW-25S	Carbon disulfide	8/24/92	3		ug/l
MW-27D	Carbon disulfide	8/27/92	2		ug/l
MW-27D	Carbon disulfide	8/27/92	6		ug/l
MW-27I	Carbon disulfide	8/27/92	22		ug/l
MW-14I	Chloroform	8/31/92	1		ug/l
MW-24I	Chloroform	12/7/92	2		ug/l
MW-25I	Chloroform	8/26/92	2		ug/l
MW-26S	Chloroform	8/26/92	2		ug/l
MW-27D	Chloroform	8/27/92	2		ug/l
MW-27D	Chloroform	8/27/92	2		ug/l
MW-27I	Chloroform	8/27/92	1		ug/l
MW-28D	Chloroform	5/13/92	2		ug/l
MW-28D	Chloroform	5/13/92	3		ug/l
MW-28D	Chloroform	8/26/92	1		ug/l
MW-28D	Chloromethane	12/7/92	20		ug/l
MW-17D	Tetrachloroethene	9/29/98	1	J	ug/l
MW-18S	Tetrachloroethene	5/4/92	1		ug/l
MW-18S	Tetrachloroethene	8/25/92	1		ug/l
MW-18S	Tetrachloroethene	12/2/92	1		ug/l
MW-18S	Tetrachloroethene	9/28/98	2	J	ug/l
MW-18S	Tetrachloroethene	12/5/00	1.1	J	ug/L
MW-18S	Tetrachloroethene	3/18/03	1	J	ug/L
MW-01S	trans-1,2-Dichloroethene	7/1/88	3.8		ug/l

Flags
J = Estimated concentration detected between the method detection limit and the laboratory reporting limit.
B = Method Blank contamination. The associated method blank contains the target analyte at a reportable level.

4

Picture 1: Condition of man gate on north side fence

Picture 2: Condition of man gate on north side fence

Picture 3: Newer man gate

Picture 4: 5'x5' bare spot in grid 2

Picture 5: 5'x5' bare spot in grid 2

Picture 6: Vegetation on the northern portion of the site

Picture 7: Vegetation on the north portion of the site

Picture 8: Pine tree

Picture 9: Apple tree

Picture 10: Bird in tree

Picture 11: Catawba tree

Picture 12: Downed tree in northeastern section of site

Picture 13: Downed tree in eastern section of site

Picture 14: Bare spot between grid sections #10 and #15

Picture 15: Phragmites in the swamp area

Picture 16: Sumac

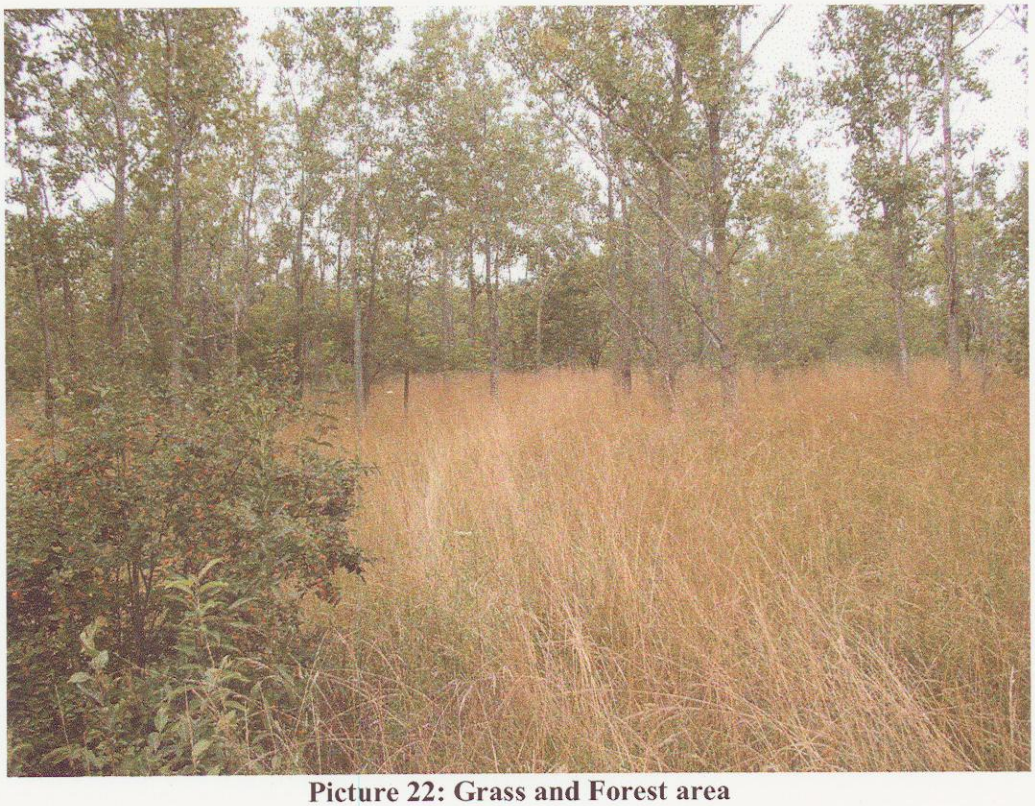
Picture 17: Bare spot in grid section #8

Picture 18: Red berry bush

Picture 19: Poison ivy

Picture 20: Catawba tree

Picture 21: Orange berry bush



Picture 22: Grass and Forest area

Picture 23: An example of a thin spot

Picture 24: Site Vegetation

Picture 25: Queen Anne's Lace

Picture 26: Mature trees

Picture 27: An example of a thin spot

Picture 28: Grassland

Picture 29: An example of a thin spot

Picture 30: IEL Monitoring Wells

Picture 31: Vegetation on perimeter fence

Picture 32: An example of a thin spot

Picture 33: Tree down on fence

Picture 34: Flowering vegetation

Picture 35: Flowering vegetation

Picture 36: Sweet pea

Picture 37: Section of fence on west side of site

Picture 38: Sweet pea

Picture 40: Wet area in western portion of site

Picture 41: Forest area

Picture 42: An example of a thin spot

Picture 43: Debris

Picture 44: Crab apple tree

Picture 45: Grassland and shrubs

Picture 46: Shrubs

Picture 47: Debris

Picture 48: Grass and Forest Area

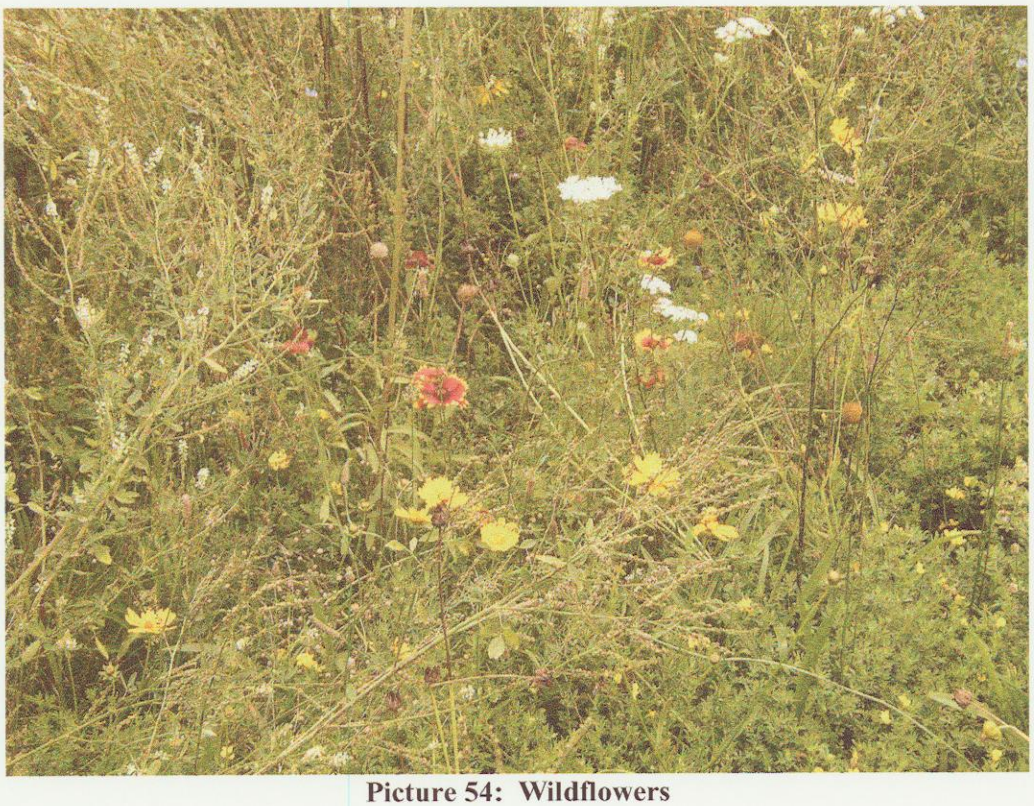
Picture 49: Day Lily

Picture 50: Forest area, grass, and shrubs

Picture 51: Brush pile

Picture 52: Wildflowers in area next to Cleveland Ave.

Picture 53: Wildflowers in field next to Cleveland Ave.



Picture 54: Wildflowers

Picture 55: Sweet peas along driveway

Picture 1. View NE from Cleveland Ave. across mowed wildflower area, former Uniontown Tire.

Picture 2. Inside fence near MW-1 (looking southeast) showing forested island beyond "grassland".

Picture 3. Same location as Picture 2, looking south along mowed path.

Picture 4. Same location as Picture 2, but looking east beyond another island to open grassland.

Picture 5. Just north of Picture 3 location, looking east toward forested island.

Picture 6. Same location as P5, but looking northeast across ~20' of grass toward island.

Picture 7. East of the forested island in P4, looking NE across grassland.

Picture 8. Same location as P7 but looking north. Trees emerging but few shrubs

Picture 9. 100 yards north of Picture 8, looking west. Trees but few shrubs in island.

Picture 10. Same location as Picture 9 but looking east. Island w/trees and few shrubs.

Picture 11. Same location as P9 and P10, looking NE toward emerging forested islands.

Picture 12. Emerging forested island: trees, few shrubs.

Picture 13. More-established island; some shrubs.

Picture 14. MVS pipeline and mowed area for access.

Picture 15. Lower-lying "grassland areas" have thick wildflower and similar vegetation.

Picture 16. Photo from MVS looking west; when mowed, can easily see across Cleveland Avenue.

5

Industrial Excess Landfill (IEL) Site (Site)
Remedial Action Contingency Plan for Groundwater Monitoring
September 22, 2003

This Remedial Action Contingency Plan (Contingency Plan) has been developed to describe the approach that The Responding Companies (Bridgestone/Firestone, Inc., BFGoodrich Company, The Goodyear Tire & Rubber Company, and GenCorp) will take to address any threat of an exceedance of remedial performance standards established for the Industrial Excess Landfill (IEL) Site (Site). The performance standard established as part of the remedial action(s) to be undertaken at the site is:

- No unacceptable threat to human health or the environment as a result of exposure to constituents that have migrated from the Site.

The principal potentially-complete exposure pathway is via migration through groundwater. As a result, the Responding Companies have instituted a groundwater monitoring program to ensure that affected groundwater from the Site does not pose any unacceptable threat. The potential for any completed groundwater exposure pathway is low because downgradient residents are all using the public water supply. In addition, groundwater downgradient from the Site has not been shown to be affected by migration of constituents from IEL.

In addressing groundwater issues, there are Remedial Action Objectives (RAOs) for the site, as follows:

1. No off-site downgradient well shall contain IEL-Site-related Constituents of Concern (COCs) at levels that exceed the respective USEPA Drinking Water Standard Maximum Contaminant Level (MCL); and
2. No monitoring well in the IEL network shall contain IEL-Site related COCs at levels that exceed MCLs.

Once these RAOs are met and shown to be likely to persist, the remedial action should be considered to be complete.

The groundwater-monitoring program is designed to monitor the groundwater to document progress toward meeting Site RAOs. This Contingency Plan is designed to describe how The Responding Companies will address any threat of an exceedance of the remedy performance standard or address groundwater quality trends that suggest problems in eventually meeting Site RAOs.

Introduction

Long-term monitoring of the groundwater in the vicinity of Industrial Excess Landfill Site shall continue until at least 2033 or until three consecutive sampling events (conducted no less frequently than annually) demonstrate continued attainment of Site Remedial Action Objectives. The intensity of this monitoring will depend, in part, upon the results of the monitoring program.

Should any groundwater monitoring show a threat of an exceedance of Site performance standards, the Responding Companies shall implement the Remedial Action Contingency Plan described herein. A threat of an exceedance of the performance standard is defined as:

- A statistically-significant increasing trend of any Site COC in any On-Site Well, Sentinel Well, or off-site Downgradient Well with concentrations greater than the respective MCL. This increasing trend (at >MCL) has the potential to eventually migrate off-site to beyond the homes supplied with public water.

Remedial Performance Standard

The Remedial Performance Standard for the IEL site is to protect human health and the environment from risks resulting from exposure to COCs from the IEL Site. This standard has already been achieved. As part of the remedy implementation, a groundwater-monitoring program is being established to verify that this protectiveness is maintained.

Under current site-use scenarios, the only plausible source of a threat to human health or the environment is via a groundwater pathway as demonstrated by previous investigations and a risk assessment. Should any additional investigation (e.g., methane investigation) identify the potential for exposure via any other pathway, Remedial Performance Standards shall be developed to address this potential and the Contingency Plan shall be expanded to incorporate monitoring for any additional RAOs.

In the absence of any change to the site use or any newly-identified threat to exposure, groundwater monitoring shall be sufficient to verify that the IEL remedy remains protective of human health and the environment. Any change to the site use shall be evaluated to determine whether that change has the potential to cause completion of any other exposure pathway.

Contingency Plan

Five year statutory reviews under Section 121(c) of CERCLA, 42 U.S.C 962(c) are required as long as hazardous substances remain on-site and prevent unrestricted use of the Site to assure that the remedy continues to be protective of human health and the environment. In addition to the 5-year reviews, The Responding Companies will implement a groundwater-monitoring program, as detailed in the Remedial Design Plan for the Site.

Should the results of analyses of samples from any of the wells show Site COC concentrations that exceed MCLs, the following response action process shall be initiated:

<u>Step 1: Evaluate Whether There is a Statistically-Significant Increasing Trend</u>

Within 45 days of receipt of final laboratory results that show an exceedance of an MCL, that result shall be subjected to an evaluation to determine whether there is a statistically significant

increasing concentration trend in that well according to the Mann-Kendall statistical treatment (or approved equivalent). If there is no increasing trend, no further action will be required.

If an increasing trend is found, the trend information shall be evaluated to determine whether the increasing trend results from migration of that COC from the IEL Site. The Responding Companies shall present the results of its evaluation to the USEPA. If the USEPA is convinced that a given exceedance is not evidence of an increasing trend due to migration from the IEL Site or that the exceedance does not pose a threat to human health or the environment, then no further action shall be required.

However, if the USEPA believes that the test results may be evidence of an increasing trend, then the well with the MCL exceedance shall be resampled / reanalyzed for the parameter(s) that exceed(s) the MCL (at a minimum) within 45 days of the USEPA's completion of their review of the exceedance evaluation. The Responding Companies will sample any other wells and analyze for any other parameters they believe are needed to identify the reason(s) for any MCL exceedance / increasing concentration trend. Re-sampling can be waived only if both the Responding Companies and the USEPA agree that a re-sample is not necessary.

Step 2: Exposure Pathway Analysis

If the re-sample result, when added to the Mann-Kendall statistical analysis, still identifies an increasing trend, the level of the exceedance shall be reviewed and analyzed (within 45 days) with respect to historical data to determine whether the exceedance has the potential to cause an off-site, downgradient (Tier D) monitoring well to exceed an MCL within the next calendar quarter. The results of the exposure pathway analysis shall be summarized and submitted in writing to the USEPA. Unless the USEPA is convinced that there is no realistic potential for exposure within one calendar quarter, the nearest downgradient wells shall be sampled / analyzed (within 45 days of completion of the Trustees' review of the exposure pathway analysis) and Step 3 of the contingency plan shall be initiated.

Step 3: Initiation of a Groundwater Response Plan

The Responding Companies shall develop and submit for USEPA approval, a response plan to identify an appropriate response to ensure mitigation of any exposure via a groundwater pathway and continued protection of the human health and the environment. The groundwater response plan consists of the following components, undertaken in a timely fashion to ensure protection of human health and the environment:

- Evaluation of the need for an Immediate Response (30 days)
- Focused Feasibility Study (FFS) (60 days),
- Focused Remedial Design (FRD) (60 days), and
- Focused Remedial Action (FRA) (60 days).

The Response Plan shall describe how to evaluate (within 30 days of initiating Step 3) whether there is a need for any immediate response to protect human health or the environment. An example of an immediate groundwater response option is the provision of an alternative water supply as necessary to address immediately-downgradient receptors at risk of exposure to groundwater affected by IEL. Other immediate response actions shall be evaluated as necessary to address the particular conditions detected at (and downgradient from) the Site. They may be implemented at any time during the process.

In Step 3, the Responding Companies shall conduct a Focused Feasibility Study to determine the best approach to mitigating the impacts of the detected exceedance of Site RAOs. This FFS shall include a review of relevant data including the results of the sampling of Tier D wells described in Step 2 to support the conceptual remedial design of potential remedies of the exceedance.

Based on the results of the FFS, the Responding Companies shall complete the Focused Remedial Design and implement the Focused Remedial Action.

Plan Implementation / Methodology

As part of the Remedial Design Plan, The Responding Companies will implement a groundwater-monitoring plan through 2033. Wells may be removed from the monitoring well network if they show no detections of Site COCs for three consecutive sampling events. In evaluating results of the monitoring, The Responding Companies may use statistical methods that are consistent with the following documents:

- Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York (Gilbert, 1997)
- Methods for Evaluating the Attainment of Cleanup Standards: Volume 2: Groundwater (USEPA, 1992)
- The Lognormal Distribution in Environmental Applications (USEPA-ORD-OSWER, 1997)

At any time throughout the planned monitoring program, The Responding Companies may meet with the USEPA to develop mutually-acceptable modifications to the program that better-document achievement of Site performance standards or RAOs.

As described above, a threat of an exceedance of the IEL Site performance standard is defined as a statistically-significant increasing trend of an IEL-Site COC due to migration from IEL at a level that exceeds its MCL and has the potential to cause an off-site downgradient well to exceed an MCL. There are several possible sources of an MCL exceedance that are not related to migration from the IEL Site. These may include:

- Inadvertent contamination by common lab contaminants (acetone, methylene chloride, etc.);
- Naturally-occurring constituents (metals) that cause an MCL exceedance at a downgradient well that doesn't have a similar exceedance at a well located between the subject well and IEL;

- Non-IEL Site sources of constituents (pesticides/herbicides from agricultural activities, septic system sources, etc.); and
- Other sampling anomalies (sporadic detections of constituents that are not duplicated).

The determination or what may not be related to migration from the IEL Site must be demonstrated to the reasonable satisfaction of the USEPA. Irrespective of potential non-IEL sources, all data collected using low-flow techniques shall be used in a Mann-Kendall statistical evaluation of any MCL exceedance to identify whether there is an increasing trend for that constituent in that well. Typically, once sufficient data are collected from each well, most of the above-listed non-IEL events shall be shown to not result in a statistically-significant increasing trend.

The Mann-Kendall evaluation is a nonparametric test for trend that does not require any particular data distribution, allows missing values, and can incorporate non-detect results. The Mann-Kendall test uses relative magnitudes of the data in a nonparametric test for zero slope of the linear regression of time-ordered data versus time. The Responding Companies shall use the Mann-Kendall test with all data (non-detectable results shall be included at the method detection limit) generated from ***low-flow*** testing. In addition, The Responding Companies shall also use data collected by other sampling techniques to the extent that these data are representative of site groundwater conditions. Any report on a Mann-Kendall evaluation shall describe the range of the data set evaluated.

6

INDUSTRIAL EXCESS LANDFILL (IEL) SUPERFUND SITE (SITE)

DRAFT EXPLOSIVE GAS INVESTIGATION FOR THE EASTERN FACILITY BOUNDARY

1 INTRODUCTION

The Industrial Excess Landfill (IEL) Site located in Uniontown, Ohio, is being addressed in accordance with a Record of Decision (ROD) that requires investigation of the potential for migration of explosive gases, including methane and non-methane hydrocarbons. Previous site remedial investigations and remedial actions included the installation of landfill gas monitoring wells, passive landfill gas vents, and an active methane venting system (MVS). The landfill gas investigations and monitoring, and the MVS installed at the site, focused on the north, south, and west facility boundaries while excluding the eastern facility boundary, in-part because there are no near-site receptors, and in-part because of the topography of the site. The purpose of this investigation is to provide a method to evaluate potential landfill gas migration at the eastern facility boundary.

2 SITE GEOLOGY

The site is a former sand and gravel pit operation that was used as a landfill after mining operations ceased. Waste materials were landfilled at the site from approximately 1966 through 1978. The Carlisle Muck soil series (Summit County Soil Survey, 1971) borders the entire eastern facility boundary. The Carlisle Muck soil series is characterized as 0 – 9 inches of muck, 9 – 22 inches of dark reddish-brown muck and partially decomposed peat, and 22 to 60 inches of dark yellowish-brown partly decomposed peat. Depth to the underlying mineral layer (sands, gravels, silts) ranges from 5 feet to 30 feet or more. The Carlisle Muck likely provides an effective barrier to gas migration from the site to the east. Additionally, the eastern facility boundary is bounded by Metzger Ditch. The water elevation in Metzger Ditch is also an effective barrier to gas migration to the east. Figure 1 shows the location of the Carlisle Muck and Metzger Ditch.

The depth of landfilled material averages 20 feet to 30 feet. The shallow water table elevation is about 1120 MSL and wets part of the landfill waste. Soils under the landfill include sand and gravel lenses, silts, silty-sands, and clayey-sands. Figure 2 provides a cross-section of the site.

3 METHANE MIGRATION PREDICTION

The theoretical migration distance from the edge of placed waste on the eastern facility boundary was calculated using *RCRA RFI Guidance Volume II, Appendix D.* This model allows migration prediction for the methane 100% Lower Explosive Limit (LEL) and the methane 25% LEL. The prediction model uses the age of the landfill, average waste thickness, geology, climate, and natural barriers to migration to provide a "corrected" distance to the 100% LEL and 25% LEL. The predicted migration distances are plotted on Figure 1. This prediction assumes a

homogenous site without the topographic relief or the presence of the Carlisle Muck and Metzger's Ditch.

The proximity of the Carlisle Muck and Metzger's Ditch at the eastern facility boundary, and the ability for any gas generated in the waste to outgas at the downslope face makes gas migration past this point unlikely. However, to confirm these evaluations, the following investigation is planned.

4 OUTLINE OF GAS MIGRATION INVESTIGATION

- Place five temporary monitoring points along the eastern facility boundary as shown in Figure 1. Note that these points will likely be located in the Carlisle Muck.
- Place two temporary monitoring points off site and in the Carlisle Muck series to determine background methane levels in the associated peat/organic material.
- Depth of the temporary monitoring points shall be to 6 feet or to groundwater whichever is encountered first.
- A gas sample will be extracted from the temporary monitoring point using a sampling pump connected to an onsite landfill gas analyzer (such as Lantec).
- The gas sample will be analyzed for methane, carbon dioxide, and oxygen. The analyzer shall also be capable of measuring static pressure.
- Prior to implementing the investigation, a sampling and analysis plan will be provided detailing construction methods, sampling protocol, analysis, data validation, and quality assurance and control.

5 DATA USAGE

- Background methane concentrations taken in the offsite Carlisle Muck will be compared to the onsite methane concentrations. Onsite methane concentrations will be adjusted accordingly.
- If the gas threshold limit is 100% of the LEL in any of the temporary onsite monitoring points, those points will be re-sampled to verify the results.
- Data from the initial monitoring will be used to establish the need for permanent and/or additional monitoring points.

CROSS SECTION A–A

REFERENCES

- X-SECTION 8+00 TAKEN FROM TETRATECH PLAN SHEET 13/37
- GEOLOGY FROM BORING LOGS PERFORMED BY C.C. JOHNSON & MALHOTRA AND GERAGHTY & MILLER
- DEPTH OF LANDFILL MATERIAL FROM BORING LOGS AND ESC, INC. DRAWING 5/5/97
- HORIZONTAL EXTENT OF CARLISLE MUCK FROM SOIL SURVEY, STARK COUNTY, OHIO 1971

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Project Reference: 2101

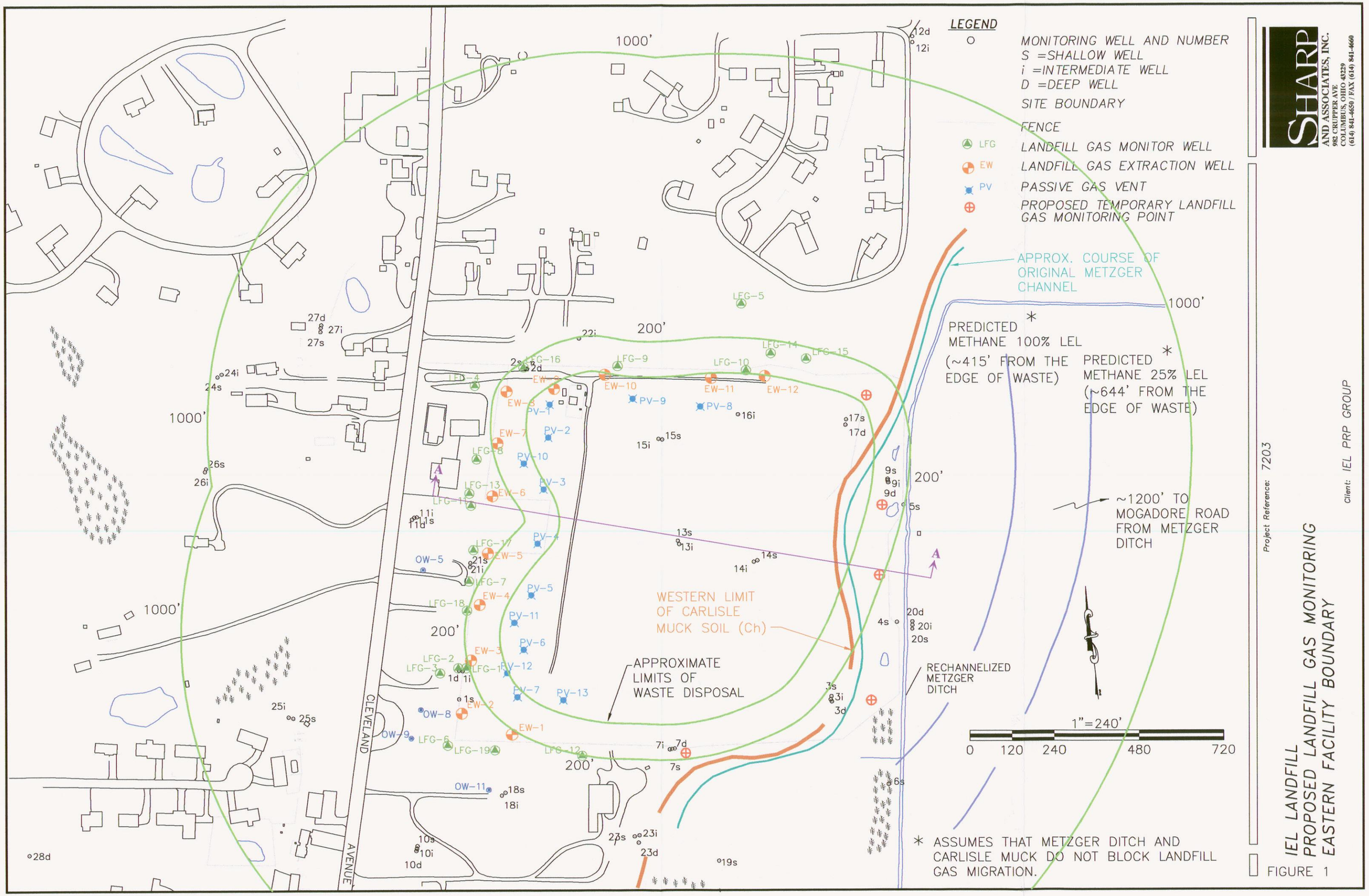
Client: IEL PRP GROUP

IEL LANDFILL

CROSS – SECTION, WEST TO EAST

FIGURE 2

I:\Colbusiness\Drafting\2101\8-03 ks\7203-p02.dwg, 2/23/2004 11:04:27 AM, jbale, 1:0.999685, CTB:2101-DL-01


LEGEND
MONITORING WELL AND NUMBER
S =SHALLOW WELL
i =INTERMEDIATE WELL
D =DEEP WELL
SITE BOUNDARY
FENCE
LFG LANDFILL GAS MONITOR WELL
EW LANDFILL GAS EXTRACTION WELL
PV PASSIVE GAS VENT
PROPOSED TEMPORARY LANDFILL GAS MONITORING POINT
APPROX. COURSE OF ORIGINAL METZGER CHANNEL
PREDICTED METHANE 100% LEL (~415' FROM THE EDGE OF WASTE) *
PREDICTED METHANE 25% LEL (~644' FROM THE EDGE OF WASTE) *
~1200' TO MOGADORE ROAD FROM METZGER DITCH
WESTERN LIMIT OF CARLISLE MUCK SOIL (Ch)
APPROXIMATE LIMITS OF WASTE DISPOSAL
RECHANNELIZED METZGER DITCH
CLEVELAND AVENUE
1000'
200'
1"=240'
0 120 240 480 720
* ASSUMES THAT METZGER DITCH AND CARLISLE MUCK DO NOT BLOCK LANDFILL GAS MIGRATION.
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Project Reference: 7203
Client: IEL PRP GROUP
IEL LANDFILL
PROPOSED LANDFILL GAS MONITORING
EASTERN FACILITY BOUNDARY
FIGURE 1
\\Colbusiness\Drafting\2101\8-03 ks\7203-p01.dwg, 2/23/2004 10:51:37 AM, jbale, 1:240.216, CTB:2101-DL-01

7

IEL DRAFT REMEDY CONSTRUCTION SPECIFICATION

Outline of anticipated tasks:

The planned implementation of the remedy for the Industrial Excess Landfill (IEL) Superfund Site (Site) includes the following construction activities / scope to be performed prior to December 2004:

1. Fence repair and signage.
    - Approximately 300 linear feet of 5'-high chain link fence requires repair;
    - 4 signs need to be prepared;
2. Debris removal and disposal.
    - Miscellaneous debris shall be removed as found. Majority of debris associated with landfill gas operation.
3. Rework of the groundwater monitoring well network.
    - Properly abandon 10 on-site wells in accordance with a to be developed and approved work plan,
    - Properly abandon 23 off-site wells in accordance with a to be developed and approved work plan,
    - Properly abandon 6 "observation wells" remaining from USEPA demolition activities in accordance with a to be developed and approved work plan,
    - Install 5 new/replacement wells on site in accordance with a to be developed and approved work plan,
4. Design a program for vegetative cover enhancement and management for habitat diversity.
    - Review Site conditions, WHC, ANS, CAG, and other site reports.
    - Coordinate with CAG.
    - Identify any enhancements or site management activities needed to accelerate the current pace of revegetation, as necessary.
    - Identify needed repair of bare spots.
5. Implement vegetative cover enhancements and habitat diversity activities
    - Plant vegetation: trees, shrubs, switch grass, hedgerow, wildflowers.
    - Rotational mowing for edge environments.
    - Invasive species removal.
    - Habitat enhancements: nest boxes, fox dens, raptor perches, brush piles.

DRAFT IEL REMEDY CONSTRUCTION SPECIFICATION

Division 1
GENERAL REQUIREMENTS

INDEX TO GENERAL REQUIREMENTS

1.0 SUMMARY
2.0 PRICE AND PAYMENT PROCEDURES
3.0 SCHEDULE
4.0 HEALTH AND SAFETY
5.0 QUALITY ASSURANCE
6.0 TEMPORARY FACILITIES AND CONTROLS
EXHIBIT 1 – PRICING SCHEDULE

1.0 SUMMARY

The Industrial Excess Landfill (IEL) Superfund Site (Site) is located in Uniontown, Ohio. In 1980, the site was covered with a sandy loam soil cap nominally two (2) feet in depth. Central portions of the site have begun succession to forest. The purpose of this project is to:

- Maintain site security by fence repair and signage improvements;
- Remove debris and dispose;
- Modify the monitoring well network;
- Enhance the habitat and aesthetic values of the site through planting of trees, shrubs, and grasses and the installation of nesting and cover structures.

2.0 PRICE AND PAYMENT PROCEDURES

Pricing and payment shall be in accordance with Exhibit 1. Payment shall be made within thirty (30) days of invoice approval by the Engineer. Invoices may be submitted upon completion of each pay item listed in Exhibit 1.

3.0 SCHEDULE

All work, with the exception of the maintenance period, shall be complete within six (6) months of award. Contractor will note date-specific planting restrictions contained in Division 2, Technical Specifications.

Contractor shall provide a gantt chart schedule with the bid. This schedule will be considered in making the Award and will be incorporated into the contract.

4.0 HEALTH AND SAFETY

All site personnel must have current be HAZWOPER training per 29 CFR 1910.120. Certificates of training must be provided to the engineer prior to site entry. Level D personal protective equipment (PPE) is anticipated for all project activities.

Contractor shall stop work and notify the Engineer immediately if unexpected conditions are encountered. *Over excavation, resulting in the exposure of waste and resultant work stoppages, and remediation and disposal costs shall be Contractor's responsibility.*

Contractor shall prepare a Project Health and Safety Plan for review by the Engineer prior to initiation of work.

5.0 QUALITY ASSURANCE

To be completed

6.0 TEMPORARY FACILITIES AND CONTROLS

Contractor shall provide all temporary facilities required for completion of the work. Contractor may locate a break / office trailer at the site. The location of the trailer must be approved by the Engineer.

Power and water are unavailable at the site. Contractor shall provide water required for planting and maintaining vegetation. Contractor shall install and maintain silt fence and other erosion control measures as required to protect surface waters.

7.0 PRICING SCHEDULE

Estimated quantities and pricing requirements are detailed in Exhibit 1.

EXHIBIT 1
PRICING SCHEDULE

BASE BID

Item	Unit	Quantity*	Unit Price	Extension
Repair fence (300')	ls	1		
Design/install 4 signs	ls	1		
Remove debris	ls	1		
Abandon wells 10 on-site wells 29 off-landfill wells	ls	1		
Install wells (5)	ls	1		
Habitat Enhancements				
Bird Nesting Box	ea	10	$	$
Fox Den	ea	1	$	$
Bat Box	ea	3	$	$
Raptor Perch	ea	3	$	$
Brush Pile	ea	5	$	$
Rock Piles	ea	4	$	$
Wildflower Meadow	ac	1.5	$	$
Hummingbird Garden	ac	0.125	$	$
Forested Islands	ac	4.5	$	$
Hedgerow Enhancement	ac	1.675	$	$
Switch Grass Border	ac	1.5		
Invasive Species Removal	ea plant	50	$	$
Site Restoration	ls	1	$	$
Site Maintenance	month	0-3	$	$
Mobilization	ls	1	$	$
Demobilization	ls	1	$	$
TOTAL			$	$

Habitat enhancement quantities are estimated at the median. Example, 0-20 bird nesting boxes will be installed; the quantity is = 10.

SUPPLEMENTAL UNIT PRICING

Item	Unit Price
Hybrid Poplar Pole, planted	$
Northern Red Oak, planted	$
Shrub (any listed specie as directed), planted	$
Switch Grass, planted per 1000 square feet	$
Reserved	$
Reserved	$

IEL HABITAT ENHANCEMENT PROJECT

Division 2
TECHNICAL SPECIFICATIONS

INDEX TO SPECIFICATIONS

1.0 BIRD NESTING BOXES
2.0 FOX DENS
3.0 BAT BOXES
4.0 RAPTOR PERCHES
5.0 BRUSH PILES
6.0 ROCK PILES
7.0 WILDFLOWER MEADOWS
8.0 HUMMINGBIRD GARDEN
9.0 FORESTED ISLANDS
10.0 HEDGEROW ENHANCEMENT
11.0 REMOVAL OF INVASIVE SPECIES
12.0 SITE RESTORATION
13.0 SITE MAINTENANCE

2.0 BIRD NESTING BOXES

2.1 Bird nesting boxes generally shall be located as shown on Sheet __. Actual field locations shall be approved by the Engineer prior to installation.

2.2 Contractor shall provide all labor, equipment, and materials required for fabrication and installation of the nesting boxes.

2.3 Any variation in design or materials of construction shall be approved by the engineer.

2.4 A sample box and mounting pole of each type listed in the Nesting Box Schedule shall be provided to the engineer for approval. Once approved, the box and pole will be returned to the Contractor.

2.5 The Nesting Box Schedule is shown on Sheet __.

2.6 Typical drawings for each nesting box type are shown on Figures 4 and 5.

2.7 Pole installation details are shown on Sheet __.

2.8 Contractor shall protect existing vegetation from damage during installation of nesting boxes, except as provided in Section 11.

3.0 FOX DENS

3.1 Two (2) fox dens generally shall be located as shown on Sheet __. The actual field locations shall be approved by the Engineer prior to installation.

3.2 Contractor shall provide all labor, equipment, and materials required for fabrication and installation of the fox dens.

3.3 Any variation in design or materials of construction shall be approved by the engineer.

3.4 Materials of construction shall be approved by the engineer.

3.5 Typical drawings for each fox den are shown on Figure 6.

3.6 Contractor shall construct an earthen mound over each den, as provided on Sheet __. Contractor shall limit subsurface excavation to no more than one (1) foot below existing ground surface. Contractor shall seed the mound per Section __.

3.7 Contractor shall protect existing vegetation from damage during installation of fox dens, except as provided in Section 11.

4.0 BAT BOXES

4.1 Bat boxes generally shall be located as shown on Sheet __. Actual field locations shall be approved by the Engineer prior to installation.

4.2 Contractor shall provide all labor, equipment, and materials required for fabrication and installation of the bat boxes.

4.3 Any variation in design or materials of construction shall be approved by the engineer.

4.4 A sample box and mounting pole shall be provided to the engineer for approval. Once approved, the box and pole will be returned to the Contractor.

4.5 The Bat Box Schedule is shown on Sheet __.

4.6 Typical drawings for the bat boxes are shown on Figure 2.

4.7 Pole installation details are shown on Sheet __.

4.8 Bat boxes shall be located to provide an obstruction free radius within twenty (20) feet of the box.

4.9 Bat boxes shall be located to receive eight (8) full hours of sun.

4.10 Contractor shall protect existing vegetation from damage during installation of bat boxes, except as provided in Section 11.

5.0 RAPTOR PERCHES

5.1 Raptor Perches generally shall be located as shown on Sheet __. Actual field locations shall be approved by the Engineer prior to installation.

5.2 Contractor shall provide all labor, equipment, and materials required for fabrication and installation of the raptor perches.

5.3 Any variation in design or materials of construction shall be approved by the engineer.

5.4 A raptor perch and mounting pole shall be provided to the engineer for approval. Once approved, the perch and pole will be returned to the Contractor.

5.5 The Raptor Perch Schedule is shown on Sheet __.

5.6 Typical drawings for the raptor perches are shown on Figure 8.

5.7 Pole installation details are shown on Sheet __.

5.8 Contractor shall protect existing vegetation from damage during installation of raptor perches, except as provided in Section 11.

6.0 BRUSH PILES

6.1 Brush piles generally shall be located as shown on Sheet __. Actual field locations shall be approved by the Engineer prior to installation.

6.2 Contractor shall provide all labor, equipment, and materials required for installation of the brush piles.

6.3 Existing on site deadfall may be used <u>only</u> if other activities included in this project require relocation or removal of existing deadfall. Non-native invasive species removed under Section __ may <u>not</u> be used in the construction of brush piles.

6.4 Imported brush must be native to the area.

6.5 Typical drawings for the brush piles are shown on Sheet __.

6.6 Brush piles shall be supported by concrete blocks. Bottom layer shall be no more than four (4) inches above the existing ground surface.

6.7 Contractor shall protect existing surrounding vegetation from damage during installation of brush piles, except as provided in Section 11.

7.0 ROCK PILES

7.1 Rock piles generally shall be located as shown on Sheet __. Actual field locations shall be approved by the Engineer prior to installation.

7.2 Contractor shall provide all labor, equipment, and materials required for installation of the rock piles.

7.3 Existing on site rocks may be used <u>only</u> if other activities included in this project require relocation or removal of existing rocks.

7.4 Imported rocks shall be Type B riprap meeting ODOT specification 601.07. Larger rocks shall be placed in the base of the pile.

7.5 Rock piles shall be asymmetrical, with average dimensions of ten feet in diameter and four feet in height.

7.6 Contractor shall protect existing surrounding vegetation from damage during installation of rock piles, except as provided in Section 11.

8.0 WILDFLOWER MEADOWS

8.1 TBD wildflower meadows of approximately # acre each shall be located as shown on Sheet __. The Engineer will field stake meadow boundaries prior to construction. Contractor shall replace stakes lost during planting activities.

8.2 Contractor shall provide all labor, equipment, and materials required for construction of the wildflower meadows.

8.3 Seed mixtures and application rates are shown on Sheet __.

8.4 Immediately prior to seeding, Contractor shall mow existing grasses to a height of no more than three (3) inches.

8.5 Contractor shall plant the meadow using no-till drill seeding equipment such as that manufactured by Truax, or an approved equal.

8.6 Contractor shall accomplish this work between October 1 and October 15 or between May 1 and May 15.

8.7 Contractor shall provide and install signage as shown on Sheet __.

8.8 Contractor shall protect existing surrounding vegetation from damage during installation of meadows, except as provided in Section 11.

9.0 HUMMINGBIRD GARDEN

9.1 One (1) hummingbird garden of approximately # acre shall be located as shown on Sheet __. The Engineer will field stake garden boundaries prior to construction. Contractor shall replace stakes lost during planting activities.

9.2 Contractor shall provide all labor, equipment, and materials required for construction of the hummingbird garden.

9.3 Seed mixtures and application rates are shown on Sheet __.

9.4 Immediately prior to seeding, Contractor shall import topsoil to raise the garden area approximately TBD feet above existing elevations. Topsoil shall meet ODOT Specification 02200. Side slopes of the raised garden bed shall be 3:1 and stabilized with Type C riprap meeting ODOT specification 601.07.

9.5 Contractor shall plant the garden using no-till drill seeding equipment such as that manufactured by Truax, or an approved equal.

9.6 Contractor shall accomplish this work between October 1 and October 15 or between May 1 and May 15.

9.7 Contractor shall install three (3) free standing sections of treated wood lattice measuring six (6) feet high by twelve (12) feet long as shown on Sheet __. Posts shall be 4"X4"X10' treated lumber and set to a minimum depth of three (3) feet in concrete. Refer to Post Detail on Sheet __.

9.8 Contractor shall plant native vine species, per the Planting Schedule on Sheet __ , along the entire base of each lattice section.

9.9 Contractor shall provide and install signage as shown on Sheet __.

9.10 Contractor shall protect existing surrounding vegetation from damage during construction of the hummingbird garden, except as provided in Section 11.

10.0 FORESTED ISLANDS

10.1 Contractor shall plant forested islands to supplement existing trees and shrubs within the landfill boundaries. The total planting area to be included in new forested islands is approximately ____ acres. Forested islands shall be located as shown on Sheet __. The Engineer will field stake forested island boundaries prior to construction. Contractor shall replace stakes lost during planting activities.

10.2 Contractor shall provide all labor, equipment, and materials required for planting of the trees and shrubs.

10.3 Trees shall be planted TBD feet apart.

10.4 Shrubs shall be planted TBD feet apart, and no closer than TBD feet from any tree.

10.5 Trees shall be fifty (50) percent hybrid poplar specie Populus nigra x Populus maximowiczi, twenty (20) percent common locust (Robinia pseudoacacia), ten (10) percent frosted hawthorn (Crataegus pruinosa), ten (10) percent northern red oak (Quercus borealus), and ten (10) percent red maple (Acer rubrum).

10.6 Trees shall be unrooted or rooted "poles" at least 10 feet in length planted to a depth of three (3) feet, as shown on Sheet __. The first eighteen (18) inches of depth shall be hand dug or augered to a diameter of two (2) feet. The hole shall be backfilled with amended soils and the pole pushed to a depth of three (3) feet. A pilot hole of the approximate diameter of the pole may be installed using mechanical or manual means.

10.7 Shrubs shall be planted to a depth of eighteen (18) inches, unless otherwise approved by the Engineer. The eighteen (18) inches of depth shall be hand dug or augered to a diameter of two (2) feet. The bottom of the hole shall be backfilled with twelve (12) inches of amended soils, the shrub centered in the hole, and the surrounding void backfilled with amended soil.

10.8 Shrubs shall be as shown on the Planting Schedule (Sheet __).

10.9 Poles shall be maintained in a dormant state prior to planting.

10.10 Contractor shall amend tree planting soils as follows:

- 10.10.1 115 lbs. of slow release 10-20-20 fertilizer per tree
- 10.10.2 3 lbs. of agricultural lime per tree
- 10.10.3 5 cubic feet of peat per tree.

10.11 Contractor shall amend shrub planting soils as follows.

- 10.11.1 115 lbs. of slow release 10-20-20 fertilizer per shrub.
- 10.11.2 3 lbs. of agricultural lime per shrub.
- 10.11.3 5 cubic feet of peat per shrub.

10.12 Contractor shall fully blend amendments with excavated soils used for backfilling. Excess soils may be spread in barren or disturbed areas. Locations must be approved by the Engineer.

10.13 Contractor shall accomplish this work between April 1 and June 1 or between October 1 and October 15.

10.14 Contractor shall protect existing surrounding vegetation from damage during installation of forested islands, except as provided in Section 11.

10.0 HEDGEROW ENHANCEMENT

10.1 Contractor shall plant trees, shrubs and switch grass (Panicum virgatum) to expand and enhance existing hedgerows on the northern, western and southern borders of the site, outside the limits of the fill area, as shown on Sheet __. The total planting area to be included in hedgerow enhancement is approximately ____ acres. The Engineer will field stake planting boundaries prior to construction. Contractor shall replace stakes lost during planting activities.

10.2 Contractor shall provide all labor, equipment, and materials required for planting of the trees and shrubs.

10.3 Trees shall be planted twelve (12) feet apart.

10.4 Shrubs shall be planted three (3) feet apart, and no closer than twelve (12) feet from any tree.

10.5 Trees shall be thirty (30) percent hybrid poplar specie Populus nigra x Populus maximowiczi, twenty (20) percent wild black cherry (Prunus serotina), ten (10) percent green ash (Fraxinus pennsylvanic), five (5) percent smooth or staghorn sumac (Rhus glabra or Rhus typhina), ten (10) percent northern red oak (Quercus borealus), ten (10) percent common hackberry (Celtis occidentalis) and fifteen (15) percent shagbark hickory (Carya ovata).

10.6 Trees shall be saplings at least seven (7) feet in length and planted according to written nursery specifications.

10.7 Shrubs shall be as shown on the Planting Schedule (Sheet __).

10.8 Shrubs shall be planted according to written nursery specifications.

10.9 Contractor shall amend tree and shrub planting soils according to written nursery specifications.

10.10 Contractor shall fully blend amendments with excavated soils used for backfilling. Excess soils may be used in construction of the hummingbird garden.

10.11 Contractor shall accomplish this work between April 1 and June 1 or between October 1 and October 15.

10.12 Contractor shall protect existing surrounding vegetation from damage during installation of forested islands, except as provided in Section 11.

11.0 REMOVAL OF INVASIVE SPECIES

11.1 Contractor shall remove invasive species identified and tagged by the Engineer for removal.

11.2 Contractor shall provide all labor, equipment, and materials required for removal of invasive species by the methods described below.

11.3 Identified and tagged plants with stems one inch in diameter or less shall be dug out if the root depth does note exceed eighteen (18) inches within the limits of the fill area. Plants with depths exceeding eighteen (18) inches within the fill area shall be cut at the target depth and a non-persistent glyphosphate herbicide carefully applied directly to the cut stump or roots according to manufacturer instructions.

11.4 Identified and tagged plants with stems greater than one inch in diameter shall be cut at the ground surface and a non-persistent glyphosphate herbicide carefully applied directly to the cut stump according to manufacturer instructions.

11.5 Removed invasive species shall be disposed by the Contractor.

11.6 Contractor shall accomplish this work between August 15 and October 1.

12.0 SITE RESTORATION

12.1 Contractor shall seed all disturbed areas not specifically identified on Sheet __.

12.2 Seed mixture to be used in site restoration shall be at the rate of two (2) lbs / 1000 square feet and shall consist of the following:
60% Brome grass (Bromas inermis)
18% Red Clover (Trifolium pratense)
22% Perennial Ryegrass (Lolium perenne)

12.3 Seed shall be fully mixed and evenly sewn by drill seeing

12.4 Mulching materials shall conform to ODOT Specification 659.06. Application rates shall be two (2) tons per acre for straw or three (3) tons per acre for hay.

12.5 Contractor shall seed using no-till drill seeding equipment.

12.6 Fertilizing, liming and watering shall be per the seed manufacturer instructions.

13.0 SITE MAINTENANCE

13.1 Contractor shall be responsible for watering and maintenance of vegetation from the time of planting through three months following the completion of final site restoration.

13.2 During this maintenance period, Contractor shall reseed areas as required by the Engineer.

IEL HABITAT ENHANCEMENT PROJECT

PHYSICAL STRUCTURES SCHEDULE			
Symbol	**Description**	**Quantity**	**Figure #**
A	Bird Nesting Box	0-20	4, 5, 7
B	Fox Den	0-2	6
C	Bat Box	0-6	2, 3
D	Raptor Perch	0-6	8
E	Brush Pile	0-10	TBD
F	Rock Pile	0-8	TBD

PLANTING SCHEDULE			
Symbol	**Description / Species**	**Quantity**	**Ref. Detail / Sheet #**
FI	Forested Islands		
	Hybrid Poplar Tree	0-1000	Detail FI-1 / 3
	Common Locust Tree	0-400	Detail FI-2 / 3
	Frosted Hawthorn Tree	0-200	Detail FI-2 / 3
	Northern Red Oak Tree	0-200	Detail FI-2 / 3
	Red Maple Tree	0-200	Detail FI-2 / 3
	Total (based on median ea.)	**1000**	
HE	Hedgerow Enhancement		
	Hybrid Poplar Tree	0-100	Detail FI-1 / 3
	Wild Black Cherry Tree	0-70	Detail FI-2 / 3
	Green Ash Tree	0-30	Detail FI-2 / 3
	Sumac Tree	0-20	Detail FI-2 / 3
	Northern Red Oak Tree	0-30	Detail FI-2 / 3
	Common Hackberry Tree	0-30	Detail FI-2 / 3
	Shagbark Hickory Tree	0-50	Detail FI-2 / 3
	Jerseytea Shrub	0-120	Detail HE-1 / 3
	Common Buttonbush Shrub	0-120	Detail HE-1 / 3
	Blackcap Raspberry Shrub	0-120	Detail HE-1 / 3
	Total (based on median ea.)	345	
SG	Switch Grass	lb/ac.	NA

IEL HABITAT ENHANCEMENT PROJECT

LIST OF DRAWINGS

Sheet No.	Title	Contents
1	Title Sheet	❑ Project Title ❑ Site Location Map ❑ Project Area Map
2	Site Plan	❑ Planting Areas Boundaries ❑ Structure Locations ❑ Existing Vegetative Cover ❑ Existing Topography ❑ Existing Fence Location ❑ Limits of Waste Delineation ❑ Contractor Staging Area Location
3	Details	❑ Physical Structure Details (Figures 2-8) ❑ Excavation/Planting Details (Figures TBD) ❑ Hummingbird Garden Crossection (Figure TBD)
4	Schedules and General Plan Notes	❑ Physical Structures Schedule ❑ Planting Schedule ❑ General Plan Notes

IEL HABITAT ENHANCEMENT PROJECT

MONITORING AND MAINTENANCE PLAN OUTLINE

1.0 Introduction and Purpose
2.0 Site Location and History
3.0 Precautions
- 3.1 excavation during maintenance
- 3.2 invasive species removal methods
- 3.3 replanting methods
- 3.4 consumption of vegetative yields from within site boundaries
- 3.5 fence maintenance
- 3.6 removal of materials from within the site boundary

4.0 Health and Safety
- 4.1 Overview of issues of concern
- 4.2 Applicable OSHA requirements
- 4.3 Emergency contacts
- 4.4 Reference / location of Project Health and Safety Plan

5.0 Monitoring
- 5.1 Nest monitoring procedures and frequency
- 5.2 Invasive species monitoring procedures and frequency
- 5.3 Species diversity inventory procedures and frequency
- 5.4 Vegetative growth and cover monitoring procedures and frequency

6.0 Maintenance
- 6.1 Mowing schedules by area and sub area
- 6.2 Replanting / restoration criteria
- 6.3 Nest / physical structures maintenance procedures and frequency

7.0 Reporting
- 7.1 Responsibilities
- 7.2 Frequencies
- 7.3 Contents

Table 1. Summary of WHC Recommendations for IEL Site

Nest Monitoring Program

- European starlings and English house sparrows to be eliminated if compete for boxes
- Nests should removed after eggs hatch and boxes checked for parasites
- Target species are eastern bluebird, tree swallow, American kestrel

Eastern Bluebird

- Like open field habitats and tights of way with scattered trees
- Diet on insects in summer and berries and seeds in winter
- Place nesting boxes along trails in grassy open areas
- See box design in Appendix F of Eastern Bluebird Habitat Management Leaflet (get further spec reference)
- Install cone shaped predator guards as shown in same appendix

Tree Swallow

- Can use same box as Eastern Bluebird
- Place boxes near Metzger Ditch to assist in insect control
- Like boxes in open areas
- Can use paired boxes for both species since do not compete with each other
- See Tree Swallow Habitat Management Leaflet in Appendix F

American Kestrel

- Feed on mice, lizards, and large insects
- Can be attracted to nest boxes
- Must monitor from afar because Kestrels sensitive to humans
- Place boxes in open areas, near brush or forest edges
- Do not place near songbird boxes as Kestrels could feed on them
- See American Kestrel Habitat Management in Appendix F

Red Fox

- Carnivorous but also eat berries & nuts
- Use dens during breeding season (March to June)
- Dens near water sources and have two entrances
- Dens not near human activity
- Install near center of property or along the hedgerow areas
- Site will only support 1 breeding pair
- Home ranges is 250 ha.
- Foxes use multiple dens so create 2
- See drawing on page 18 - VIP
- Stabilize tunnel entrances with vegetation

Wildflower Meadow

- Increases diversity
- Develop 1 acre test plots to determine which species will best survive
- Plant in grassy meadow to right of entrance gates
- Will make positive aesthetic impression on visitors
- *Planting Area Preparation*
    - Drill seed into existing vegetation
    - First mow area to height of 3 inches to limit initial competition from grasses
    - Use no-till seed drill such as Truax

- Plant in May, following mowing or as second choice, early October
- Truax drills sew into existing veg without requiring disturbance of the soil
- Seed rate should be 12 to 20 l;bs / acre for meadow grass/forb mixtures
- Keep wildflower seeds and grass seeds separate in different compartments of the seeder to ensure proper dispersion
- Place signage to prevent mowing

- *Seed mixes*
  - See Table 2
  - Use high percentage of perennials
  - Mix in some annuals for color
  - Need to check table 2 to see what is native to Ohio
  - Shannon researching the species in table 2 native to Ohio
- *Maintenance of wildflower meadow*
  - Mow to 6 inch height from spring to fall of first year
  - Plants focus energy in first year on root growth rather than flowering
  - Yearly mowing or burning program after first year
  - Mow in second year in late winter or early spring, before nesting season of ground species
  - After second year, mow ½ per year
  - See Meadow Management Habitat Management in Appendix F

Bat

- Can use manmade bat boxes if properly constructed
- Place on posts or in trees 15-30 feet above the ground
- Clear of obstacles for 20 foot radius
- Place in open areas around the lagoon
- Box must receive 8 full hours of sun
- Paint inside black to increase temperature
- Place at least ¼ mile from water
- Move boxes after two years if bats not moved in
- See North American Bat Conservation Habitat Management Series in Appendix F

Field Border Management

- *Rotational Mowing*
  - Mow in sections in alternate years, like the wildflower meadow
  - See Figure 4 for layout
  - Mow every three years
  - Do not mow in May through September due to nesting
- *Enhance Hedgerow*
  - Plant trees and shrubs to widen the hedgerows
  - Plant switch grass bordering the hedgerow
  - See Table 3

Forested Islands

- Center of IEL is in early stages of succession to forest
- Tall poplars on site
- Use species that produce fruit or hard mast (oaks & hickories)
- Plant seedlings / saplings in early spring\
- Plant what is listed in Table 3
- See Figure 5
- Plant trees 12 feet apart

- Plant shrubs 3 feet apart

Hummingbird Garden

- Use wildflower species from Table 2
- Construct on a raised bed
- Supplement watering may be needed
- Plant near entrance
- May want to have free standing fence for vines to climb so do not damage actual gate
- Plant vines on fence. They benefit hummingbirds by providing cover from predators
- See table 4 for vine species

Manage for balanced predator / prey population

- Build brush piles to provide cover for prey
  - Brush pile has two parts – base and top
  - Build bottom with larger, weather resistant logs
  - Lay on cider blocks to reduce rot
  - Keep base logs no higher that 4 inches off ground
  - Stack in log house design
  - Cover top with twigs and brushy branches
  - Build along grassy paths
  - See fig 5 and Appendix F
- Build Rock Piles
  - Use rocks larger than 30 cm
  - Place larges along foundation
  - Do not create symmetrical pile
  - Construct multiple piles rather than one large one
  - Place in open areas near lagoon
- Build raptor perches for avian predators
  - See Figure 7
  - Serve kestrels, red-tailed hawks and broad winged hawks
  - Place in open areas

Control Invasive Species

- Observed invasive species include:
  - Phragmites, autumn olive, sumacs
- Dig out and physically remove smaller plants
- Use herbicide (glyphospate) on larger stumps after cut

Use herbicide in late fall

SHARP AND ASSOCIATES, INC.
982 CRUPPER AVE
COLUMBUS, OHIO 43229
(614) 841-4650 / FAX (614) 841-4660

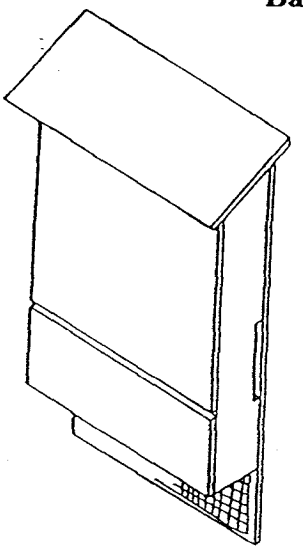
Project Reference: 2101

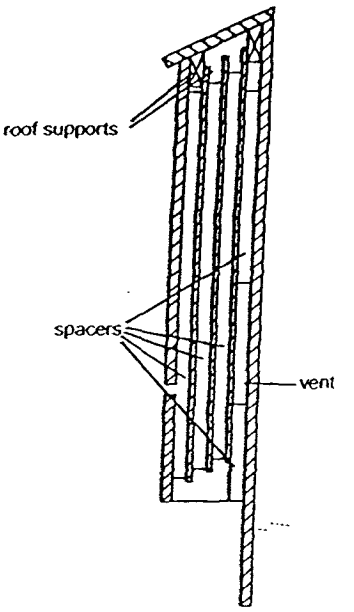
Client: IEL PRP GROUP

IEL SITE
FUTURE ECOLOGICAL REGIMES

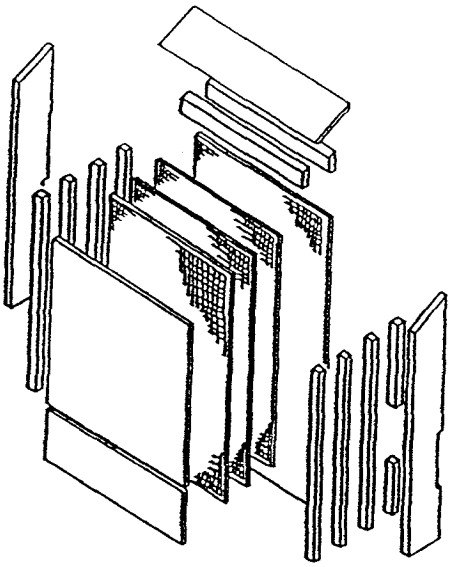
FIGURE 1

Bat house design





Side View



Bottom View

1. Measure and mark all wood as per cutting diagrams on page seven. Cut out all parts.
2. Cut six pieces of netting 14" x 21". Staple to partitions.
3. Screw back to sides, caulking first. Be sure top angles match.
4. Cut a piece of netting 16" x 30" and staple to inside surface of back. Be sure netting lies flat and does not pucker.
5. Construct house as per drawings above. Place spacers on partitions, screw top front piece to sides first then screw bottom front piece to sides to create a 1/2" vent between the two, attach roof supports, attach roof.
6. Caulk between roof and sides, sides and front pieces, and sides and back piece so as to seal house airtight. Do not allow screws to protrude into roosting chamber. Paint exterior at least twice with appropriate color.

(Excerpted from *The Bat House Builder's Handbook*, 1997 Revision. ©1993 Bat Conservation International. Used with permission.)

Source: Wildlife Habitat Council

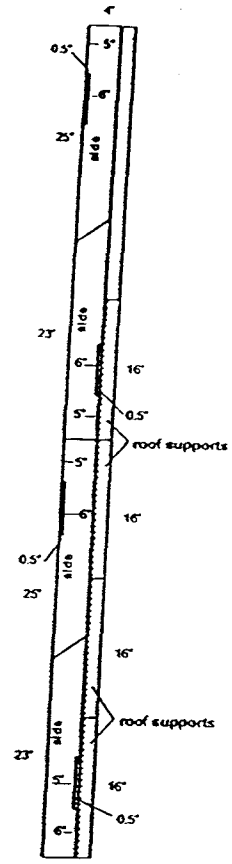
SHARP AND ASSOCIATES, INC.

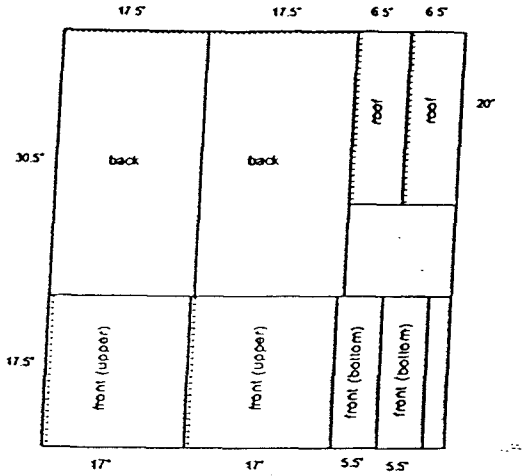
ARTIFICIAL NESTING STRUCTURES

FIGURE 2

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26/03	2101-F2	NONE

Nursery house sawing diagrams

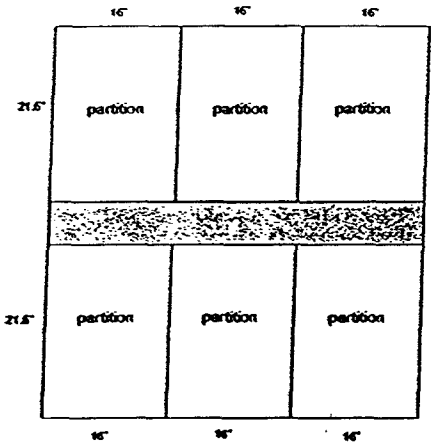




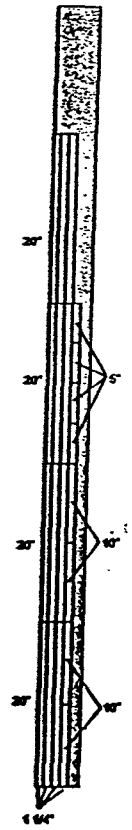
4' x 4' x 1/2" plywood

extra material

25 degree bevel



4' x 4' x 1/4" plywood



Spacers:
- 5" spacers = back bottom
- 10" spacers = back top
- 20" spacers = others

1" x 6" x 8' sheeting

Source: Wildlife Habitat Council

SHARP AND ASSOCIATES, INC.

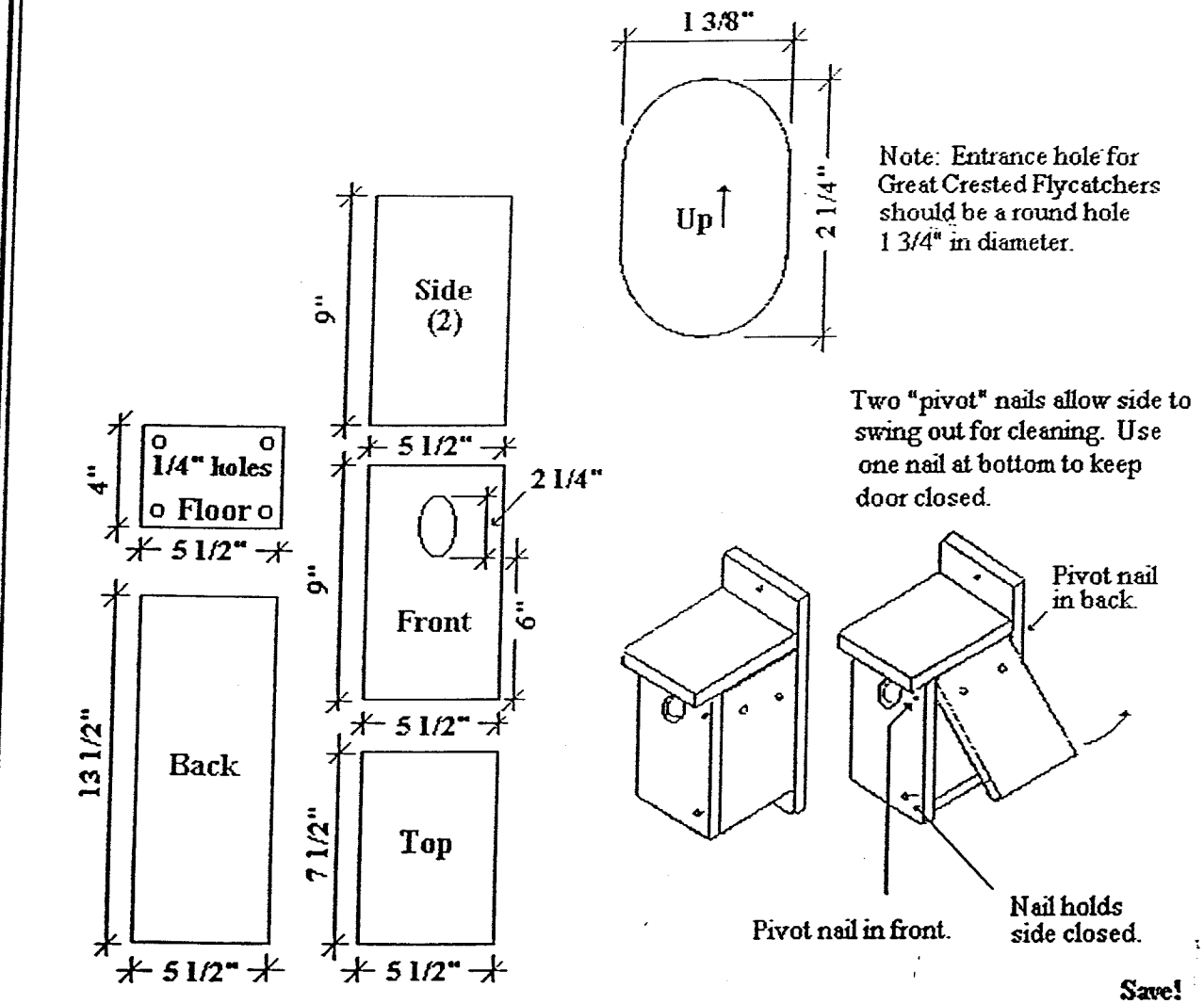
ARTIFICIAL NESTING STRUCTURES

FIGURE 3

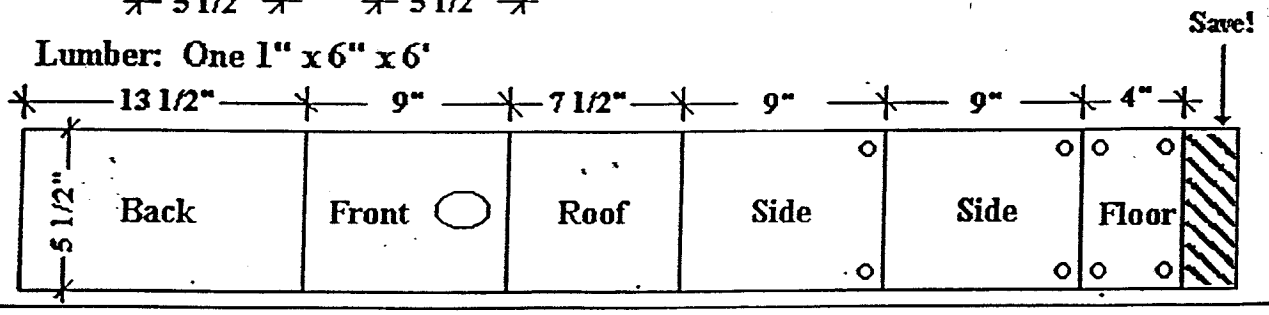
PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26/03	2101-F3	NONE

Tree Swallow and Eastern Bluebird

Eastern bluebirds nest throughout North Dakota. The best habitat consists of areas comprised of short grasses with nearby fence posts, high line wires, or sparse trees where birds can perch. Bluebirds normally will not nest within city limits or farmsteads where competition from house sparrows is intense. For best results, nest boxes should be placed in pairs about 10-25 feet apart and 100-200 yards between pairs. They should be put 4-6 feet above the ground on steel posts or wood posts with predator guards. The entrance hole should face in a general northeast direction to prevent sun from shining in and over-heating the box.



Lumber: One 1" x 6" x 6'



Source: Wildlife Habitat Council

SHARP AND ASSOCIATES, INC.

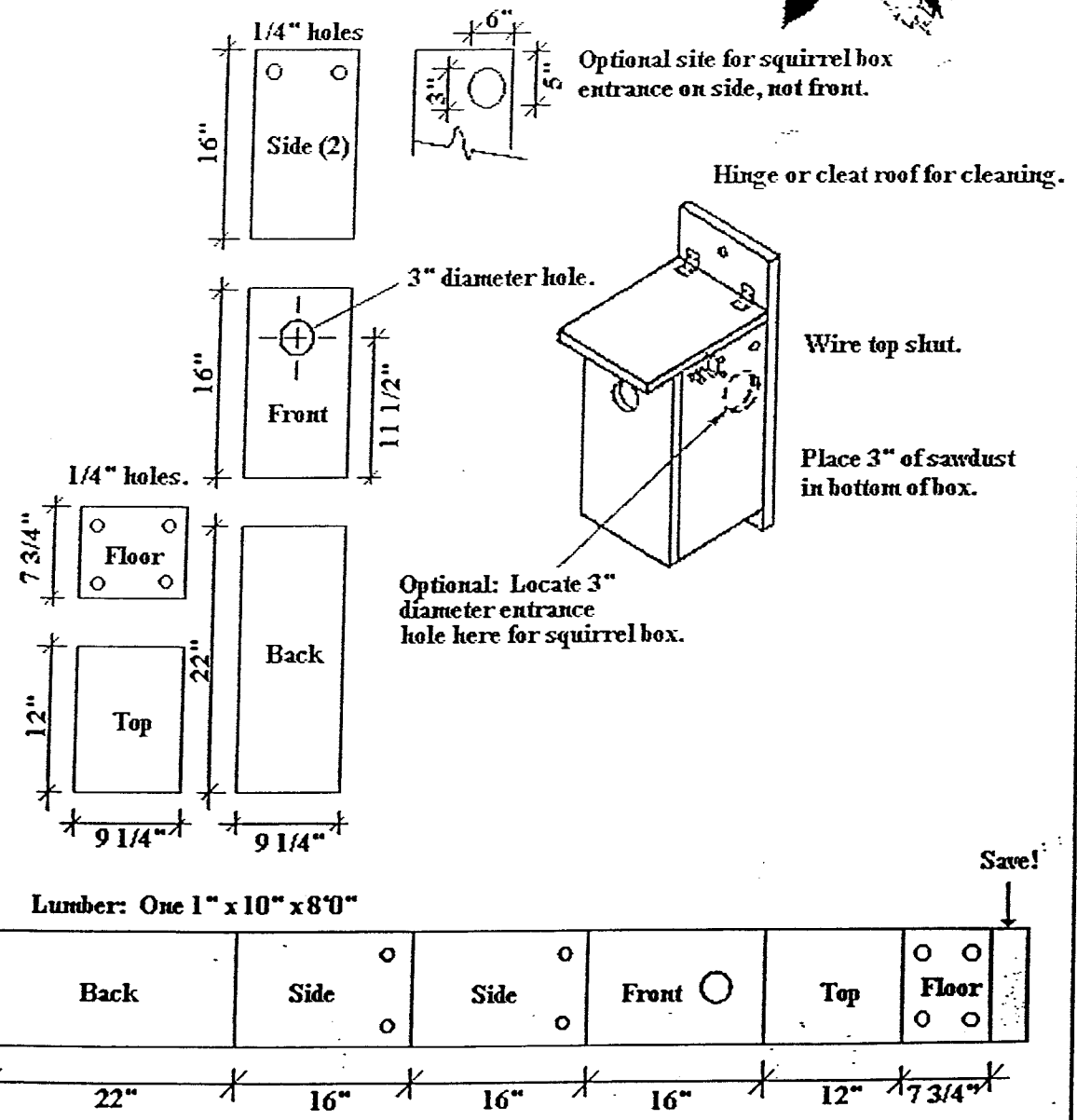
ARTIFICIAL NESTING STRUCTURES

FIGURE 4

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26/03	2101-F4	NONE

American Kestrel, Northern Screech-owl, Gray Squirrel, Red Squirrel, and Fox Squirrel Nest Box

To attract kestrels, place the box in relatively open country on a tree or post 10-30 feet high with grassy habitat nearby. Screech-owls can be attracted along the edges of hardwood forests adjacent to fields or wetlands. Boxes should be placed at least 10 feet high. Both the kestrel and owl boxes should include a predator guard to keep squirrels from using the nest boxes. Squirrels can be attracted by using this box and filling it half full of leaves and mounting at least 30 feet above the ground on a tree at least 10 inches in diameter. It is not necessary to clean out squirrel boxes.



Source: Wildlife Habitat Council

SHARP AND ASSOCIATES, INC.

ARTIFICIAL NESTING STRUCTURES

FIGURE 5

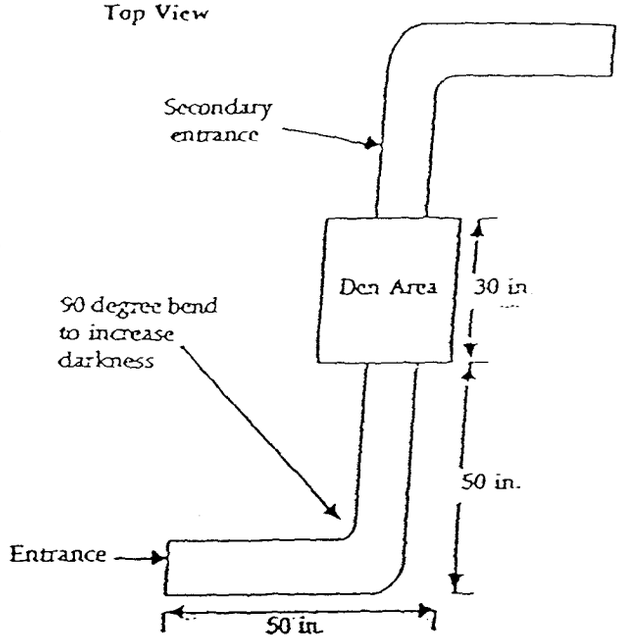
PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26/03	2101-F5	NONE

Artificial Fox Den

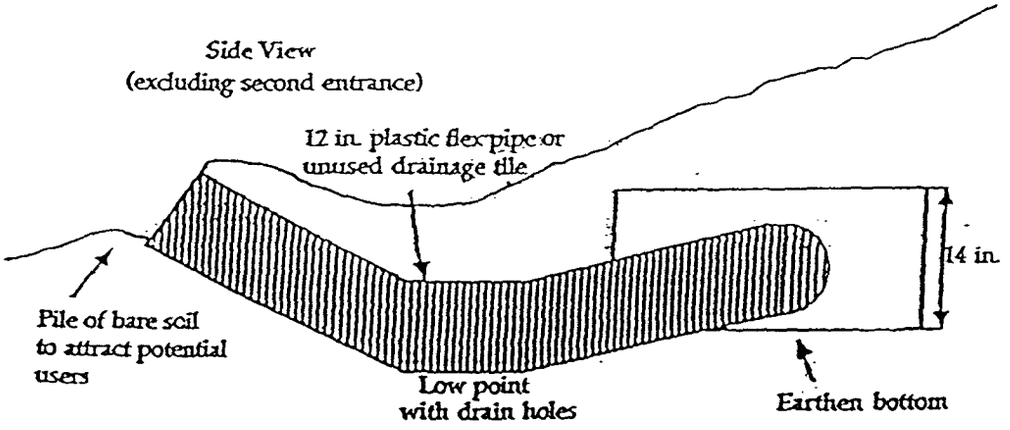
Construction Notes:

- Tunnels made of 12" plastic flex pipe or unused drainage tile
- Den made of 1/4" plywood (no bottom)
- Top may be removable for cleaning *
- Den area should be higher than tunnels to facilitate drainage

Top View



Side View
(excluding second entrance)



- For safety, if a removable top is installed, the den should only be opened when the den is not occupied.

Source: Wildlife Habitat Council

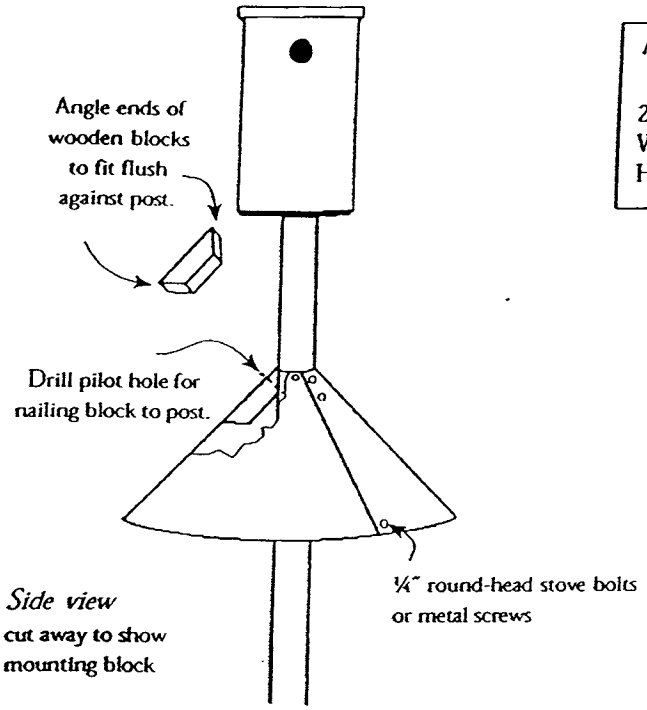
SHARP AND ASSOCIATES, INC.

ARTIFICIAL NESTING STRUCTURES

FIGURE 6

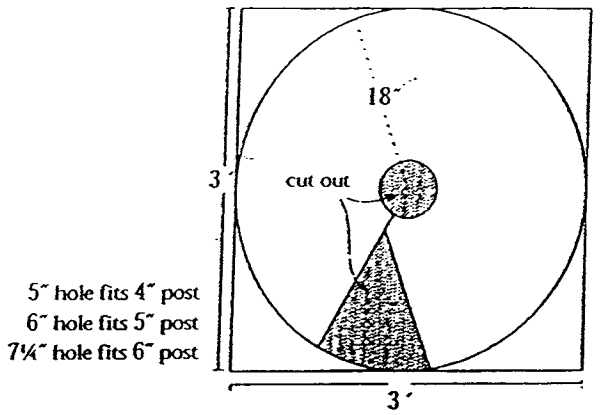
PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	x/26/03	2101-F6	NONE

A Plan for a Conical Predator Guard



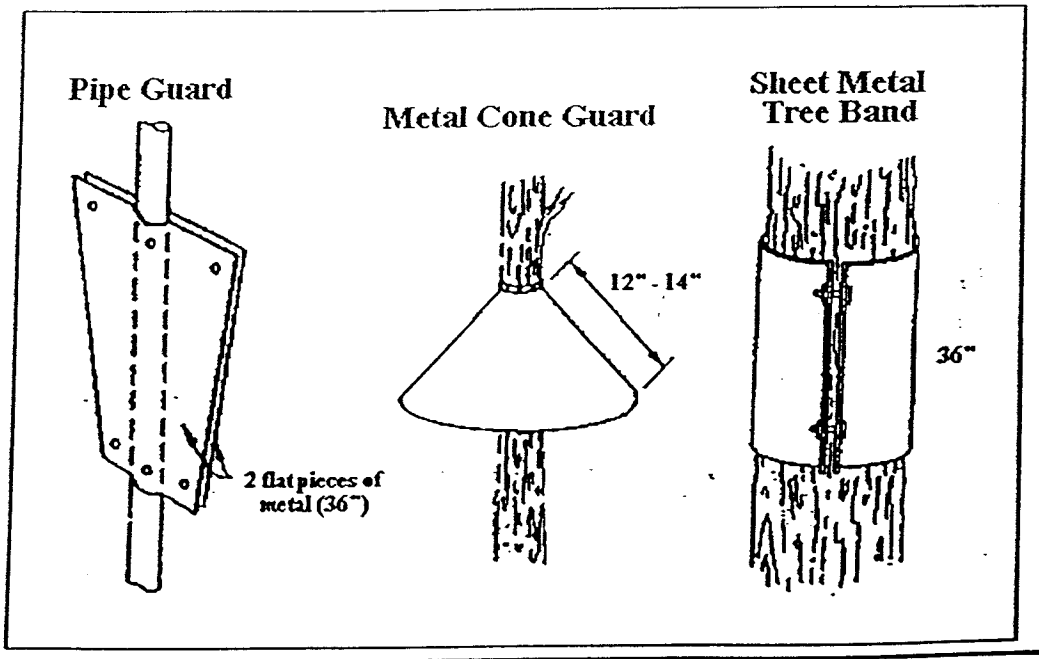
Materials List

24- or 26-gauge galvanized sheet metal	3′ × 3′
Wood mounting blocks (3)	4" × 1½" × 1½"
Hardware	¼" round-head stove bolts or metal screws



Cut predator guard from a 3′ x 3′piece of 24- or 26-gauge galvanized sheet metal. Join sides with ¼" round-head stove bolts or metal screws. Use angled wooden blocks to nail guard in place.

Printed with permission from *Bluebirds Forever* (Toops 1994)
Plans adapted from designs by the U.S. Fish & Wildlife Service and from *The Bluebird: How You Can Help Its Fight For Survival* (Zeleny 1976)



Source: Wildlife Habitat Council

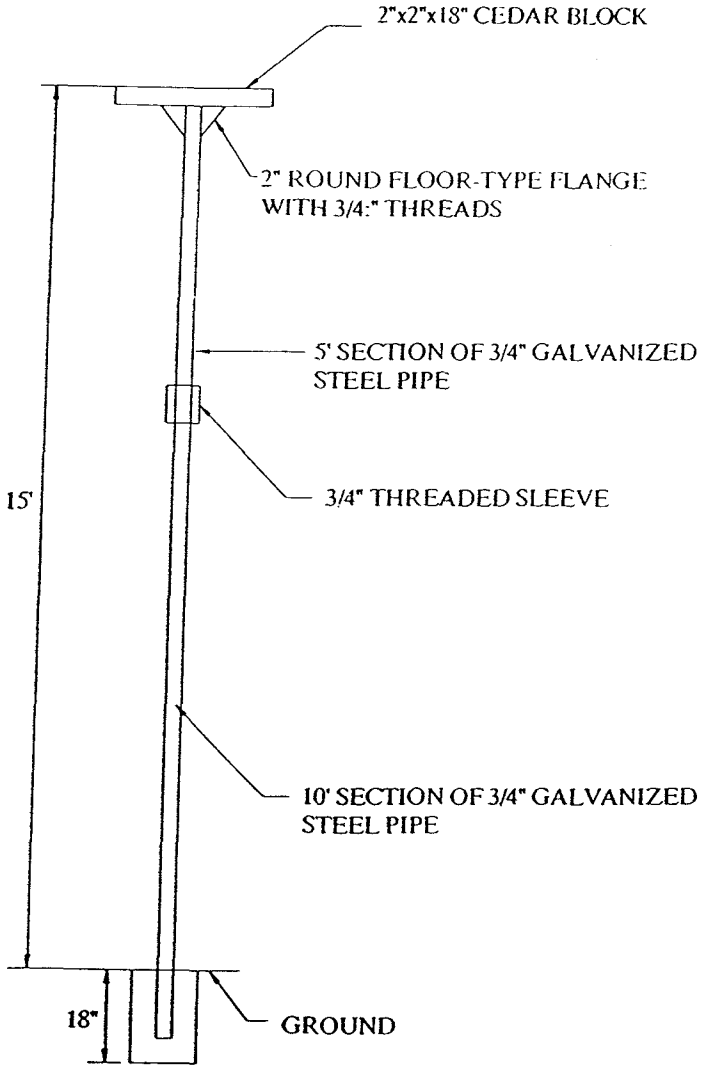
SHARP AND ASSOCIATES, INC.

ARTIFICIAL NESTING STRUCTURES

FIGURE 7

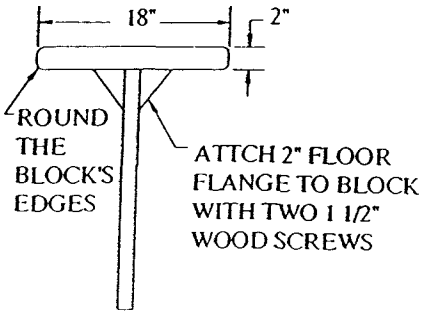
PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26 03	2101-F7	NONE

DIAGRAM OF RAPTOR PERCH CONSTRUCTION



CREATE A 18"DEEP x 15" WIDE HOLE AND THEN FILL WITH AND APPROPRIATE AMOUNT OF READY MIX CONCRETE

Source: The Wildlife Society Volume 2. Number 4, Winter 1991 pages 293-298



BLOCK DETAIL

MATERIALS:

A. TWO 10'SECTIONS OF GAVANIZED STEEL PIPE, 3/4" DIAMETER.

B. ONE 2"x2"x18" CEDAR BLOCK

C. TWO 1 1/2" WOOD SCREWS

D. ONE CUBIC FOOT READY MIX CONCRETE

E. ONE 2"x3/4" FLOOR FLANGE

F. ONE 3/4" THREADED SLEEVE

G. RUST PREVENTIVE PAINT FOR PIPES AND WATER TREATMENT FINISH FOR WOOD

NOTES:

1. COAT ALL OF THE ABOVE GROUND STEEL WITH RUST PREVENTIVE PAINT AND ALL EXPOSED WOOD WITH THE WATER TREATMENT FINISH.

2. MIX THE CONCRETE AS RECOMMENDED BY THE MANUFACTURER.

SHARP AND ASSOCIATES, INC.

ARTIFICIAL NESTING STRUCTURES

FIGURE 8

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	8/26/03	2101-FX	NONE

8

Reclamation Master Plan

A Proposed Land Use Plan:

Surrounding 17 Acres of the closed Industrial Excess Landfill

Lake Township-Stark County, Ohio

January 2003

Acknowledgements

IEL Community Advisory Group (CAG)

Mission Statement:

To provide informed community input into the remediation plan and the ultimate return to community use of the Industrial Excess Landfill Superfund Site and the surrounding acreage

In November 2002, USEPA announced an amended record of decision to use natural attenuation as the primary clean-up method

Lake Township

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Don Myers, Township Trustee

Lake Township Community Advisory Group

Dan Clay, President
Roy Leckonby, Ph.D. Vice President
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Welcome

The development and publication of this information was made possible through a USEPA grant to the Board of Lake Township Trustees. The grant was awarded to the Board to study reuse of the IEL, a USEPA Superfund site and surrounding property located in Uniontown, Lake Township, Ohio. A Community Advisory Group (CAG) was formed to assist in the effort to solicit community input into various reuse scenarios. The IEL and one surrounding property is privately owned while all of the other surrounding properties are owned by the U.S. Government. Once the final remedy for the site is implemented, the properties, by past agreement with the state of Ohio, will be deeded to and maintained by the State. However, the Board of Lake Township Trustees has asked for either ownership or control over the surrounding properties to provide for local oversight of the area.

To the extent permitted by law and regulations, this Reclamation Master Plan is the property of the Board of Lake Township Trustees. No reproduction or reuse of any portion of the plan is permitted without express written permission from the Board of Lake Township Trustees.
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Introduction

- The Lake Township Community Advisory Group (CAG) was formed in 2000 after the Federal Government granted $100,000 to Lake Township to study the potential redevelopment of the landfill and surrounding properties
- Kerr+Boron Associates was selected to provide a master plan for the reclamation of the IEL surrounding properties

What is IEL?

The Industrial Excess Landfill (IEL), a former sand and gravel quarry, occupies a thirty-acre site on the East Side of Cleveland Avenue in Uniontown, Ohio. Beginning in the 1960's, the site obtained permits to accept industrial, commercial, and residential waste. More than three hundred entities deposited waste at the landfill during its operation. Companies in the Akron and Canton area used the landfill for the deposit of industrial waste in both liquid and solid form. After a fire occurred at IEL in 1972 the Stark County Board of Health ordered that all liquid dumping be stopped. The IEL continued to accept solid waste and residential trash thereafter until the site was closed in 1980.

Introduction

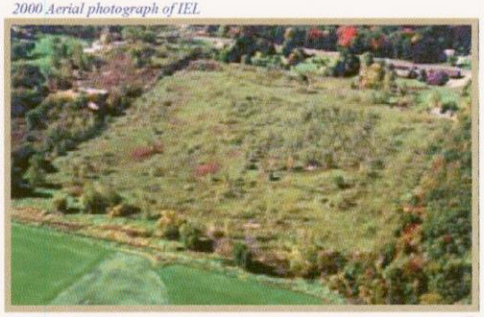
The purpose of this land use study is to investigate the redevelopment of approximately seventeen acres surrounding the Industrial Excess Landfill and to integrate it with the remedial work that will be developed as a result of the amended Record of Decision (ROD) issued for the site by USEPA in 2002. The scope of the project is to develop a master plan that primarily addresses the potential reuse of the surrounding seventeen acres while also considering the proposed design for the landfill and neighborhood and community issues.

Goals

The goals of this land use study and master plan are to recommend comprehensive solutions that educate the community concerning the previous impacts of the IEL and inspire the highest and best reuse of the surrounding property.

IEL Superfund site sign

2000 Aerial photograph of IEL

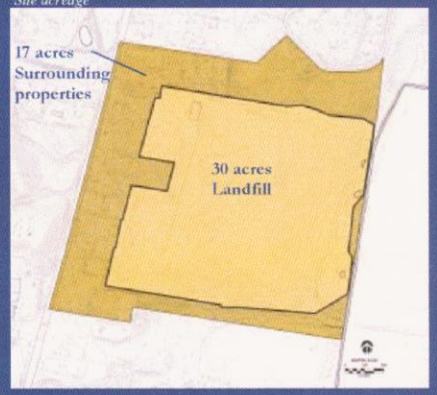


http://www.ielcleanup.com/

NORTH

Street map of IEL location

Site acreage



Arriving at the Design

Landscape Ecology

- Context
- Data Collection
- Analysis
- Synthesis
- Discovery
- Vision
- Strategies

Process

The process for a land use study and master planning project begins by understanding the fundamentals of landscape ecology.

> *Landscape ecology is the investigation of landscape elements and their related functions; while seeking the revelation of the diverse systems within landscape typologies. The objective of landscape ecology is the comprehensive understanding of a landscape that guides the decision process for either preservation or alteration of a landscape. The process for this understanding can be described in the following seven tasks:*

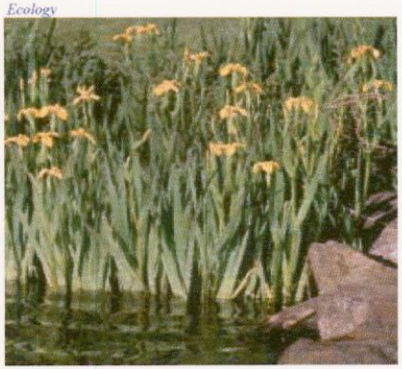
- *Contextual influences: insight to a specific idea*
- *Data collection: the process of gathering information*
- *Analysis:the examination of parts*
- *Synthesis: the putting together of elements*
- *Discovery: the act of revealing*
- *Vision: a mental images produced by the imagination*
- *Strategies: a proposed course of actions*

If a design process follows the fundamentals of landscape ecology, then the results should be design solutions that evolve from the site and respects the future.

These photographs illustrate various landscape elements. The images were used to influence the process of landscape ecology and the creation of the reclamation plans for the IEL surrounding properties.

Activity

Ecology



Flora

Towers

Fauna

Boardwalk

Inspiration

Case Studies

Gas Works Park - Seattle, Washington

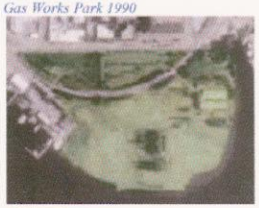
Gas Works Park was an abandoned industrial facility in Seattle, Washington. It was turned into a park in 1975. The designer, Richard Haag, wanted to include pieces of industrial relics. The costs of removing all of these relics was prohibitive so they stayed on the site as a reminder of the industrial past. This park was used as a precedent because of these relics and the possibility of historical interpretation.

Fresh Kills - Staten Island, New York

Fresh Kills was the landfill that received all of N.Y.C. municipal wastes. It was officially closed in March of 2001, but was reopened after September 11, 2001 because of the need to use it as controlled storage of the debris from the World Trade Center Towers. This was used as a precedent because, prior to the attacks, the final master plan for the site was a combination active and passive recreation space. This would have included large areas for ecological restoration and habitat enhancement.

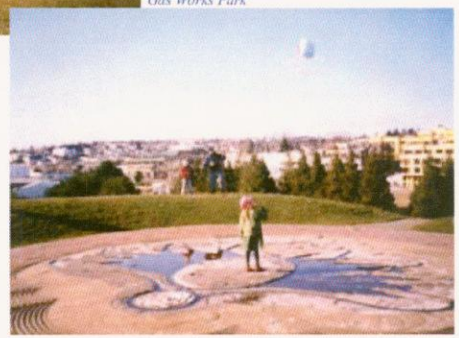
Gas Works Park

Gas Works Park 1990



USGS aerial map

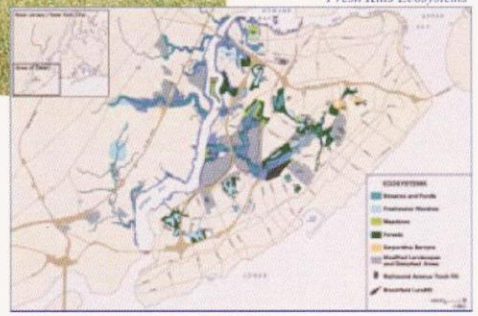
Gas Works Park



Fresh Kills Landfill

http://www.nyc.gov/html/dcp/html/fkl/ada/about/large-ecosystems.html

Fresh Kills Ecosystems



http://www.nyc.gov/html/dcp/html/fkl/ada/about/1_2_2.html

Regional Context

2000 Lake Township Census Data

- 25,892 total population
- 9,166 total households
- 7,509 Owner-occupied Households
- 3,775 Households with individuals under 18
- 1,731 Households with individuals 65 years and older
- Average family size 3.16

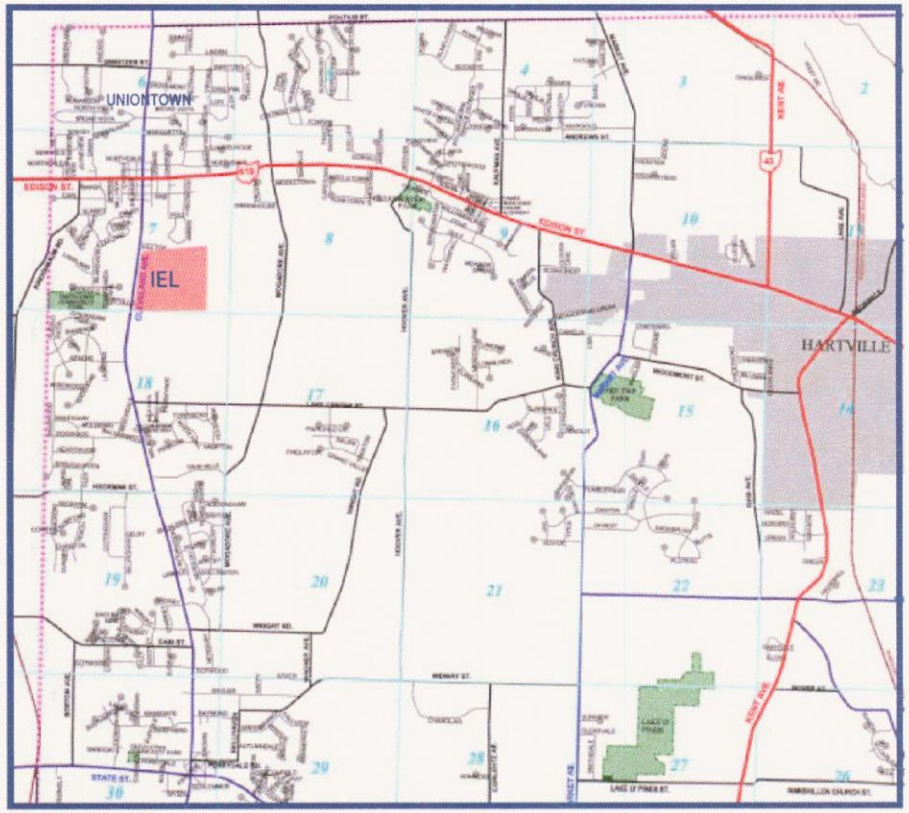
Regional Context

The regional context focused on Lake Township and the Village of Hartville. The Township is situated in Northern Stark County and shares boundaries with both Summit and Portage Counties. The Township is primarily zoned for low density housing. The majority of current land-uses are agriculture and single-family detached homes. Despite its rural characteristics, Lake Township is one of the fastest growing residential communities in the State of Ohio. The Village of Hartville is situated in the Northeast quadrant of the Township. The major roads for the Township are SR 619 (Edison Street) and SR 43 (Kent Avenue/Prospect). Another important north-south thoroughfare is Cleveland Avenue. The Township is in the Erie/Ontario Drift and Lake Plain Eco Region. The ecosystem is the Summit Interlobate Plateau. The physiographic description includes numerous lakes, wetlands, sphagnum bogs, sluggish streams, kames, and kettles. The substrate is often sandy outwash and till. Mixed oak forest originally dominated well-drained areas. The land use characteristics today are woodland, peatland, agriculture, gravel quarries, and urban/suburban development.

Reference Maps

Stark County Map

Source: State of Ohio



Lake Township Map

Source: Lake Township

Regional Greenway Connections

- IEL Site is within one mile of two major trail systems
- Buckeye trail is a 1300 mile state wide trail
- Scenic Rail Trail connects Cleveland, Akron, and Canton along a 40 mile railroad corridor
- IEL site may connect with the Quail State Park via the Buckeye Trail

Linking to the Regional Greenway & Park Systems

The potential for linking to regional greenways and park systems is an important consideration for the project. While, some of these systems are existing and others are proposed, potential connections need to be thoroughly examined. The primary objective is to increase awareness for the project and to provide for the opportunity of the project to link up with these greenways.

Buckeye Trail—Statewide Loop Trail

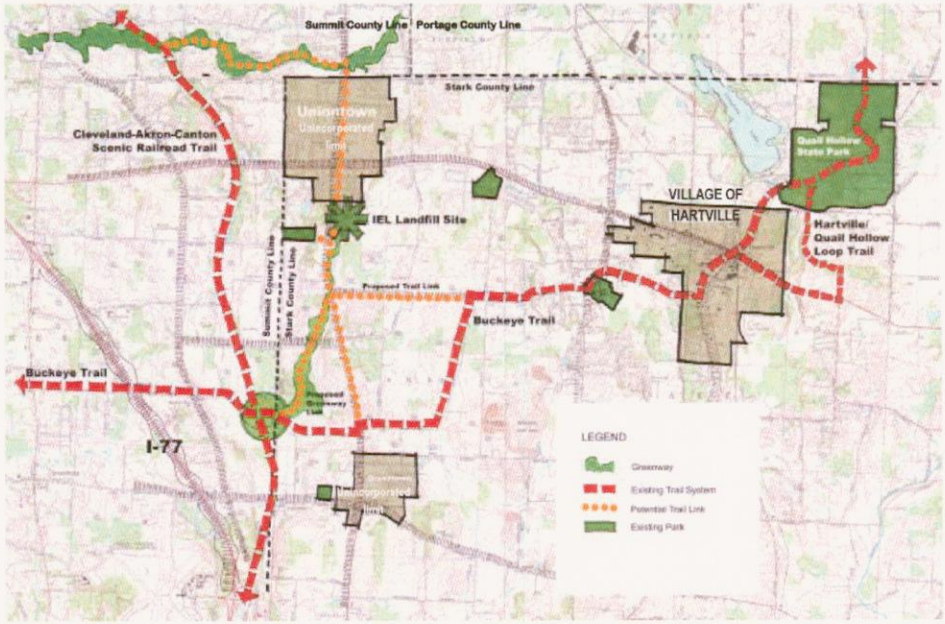
For nearly 1300 miles, the Buckeye Trail winds around Ohio, reaching into every corner of the state. From a beachhead on Lake Erie near Cleveland, to a hilltop overlooking the Ohio River in Cincinnati, a hiker can experience some of what Ohio has to offer.

Scenic Railroad Trail—Cleveland/Akron/Canton

The Scenic Railroad Trail is a proposed connection from Cleveland to Canton via Akron. This trail is being pursued by the Cleveland MetroParks, as well as MetroParks serving Summit County, and Stark County Parks. This trail will be located approximately 1.5 miles from the site with a strong possibility for a connection to it .

Quail Hollow State Park

Quail Hollow State Park, located outside Hartville, Ohio, is a wonderful example of rolling meadows, marshes, pine and deciduous woods surrounding a 40-room manor. Scenic woodland trails, gardens and the house offer a variety of natural and cultural experiences for visitors.



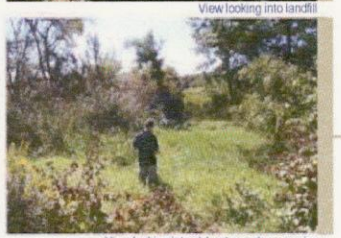
Potential Greenways and Connections

Existing Conditions (2000-2002)

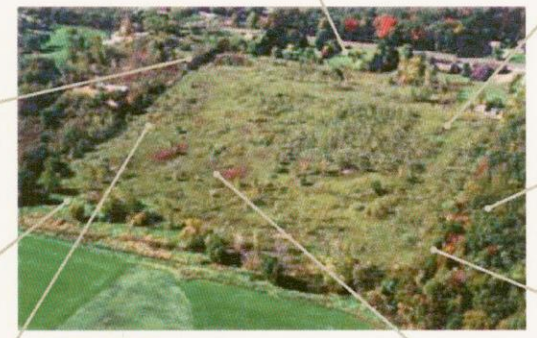
- Upland Young-Mature Forest
- Successional Old Field and scrub/ shrub vegetation
- Agriculture Ditch and Wetlands Complex
- Remnant residential Landscape Tree and Shrubs

View looking into old homestead sites

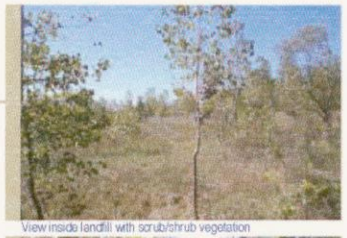
View looking into landfill


View looking into old wet meadow complex

View looking along fence line looking back to wet meadow


http://www.telcleanup.com

The IEL is a 47 Acre site (30 acres of the former landfill and 17 acres of primarily US Government-owned properties around the landfill) consisting of three ecosystems. The north and south edges are a upland young/mature forest, the former landfill is a successional old field/woods with some scrub/shrub areas while the east edge is Metzger's Ditch, an agriculture channel and wetland complex. The west edge contains mature landscape trees and plant material left over from previous residential sites.


View inside landfill with scrub/shrub vegetation

View looking into young/mature forest

View at edge of young/mature forest looking into landfill

View inside landfill looking at upland old field vegetation

Site Analysis

- Access: a means of approaching, entering, exiting, communicating with, or making use of
- View and Vistas: a way of showing or seeing something, as from a particular position or angle; a distant view or prospect, especially one seen through an opening
- Spatial Sequences: of relating to, involving, or having the nature of space; an order of succession; an arrangement

Access

Access to the site currently has one primary component. It is from Cleveland Avenue with two curb cuts that lead into a general parking area to the west of the landfill. There is no apparent pattern for the parking and its current condition is poor. There is a an access road leading into the landfill that is secured by a gate. The landfill is enclosed by a chain-link fence with a few access points. Since the condition of this fence is fair-poor, the present security for the landfill is an issue. The perimeter of the landfill has many access points from the neighborhoods surrounding the site.

There is an overhead electric utility line that transverses the site from west to east generally. The purpose of this line is to supply power to the methane collection system and to the sod farm to the east of the landfill.

Site Analysis: access, views and vistas, drainage

Views & Vistas

There are two prominent vistas on the site. These are on the northern and southern edges of the landfill, each looking back into the landfill. The views of the site range from broad panoramas of the surrounding landscapes like the views to Metzger's ditch and valley, to the views within the smaller ecosystem rooms.

Spatial Sequenece

The spatial sequence of the site is interpreted as four elements. The first element provides for both passage and gathering. The second deals with just passage through the perimeter areas. The third includes views into the area but with limited possibilities of access in the future. Finally the fourth regards only views into the area without the possibility of access in the near future.

Spatial Sequencing

Site Analysis

Design Issues

- Topography: slope ratios of over 15% will limit uses and begin to require special construction techniques for trails
- Limit of Buried Waste: will determine where and how major areas of the site are developed
- Vegetation: the design intent is to acknowledge existing vegetation patterns and to preserve and limit the impacts to existing vegetation as much as possible

Topography

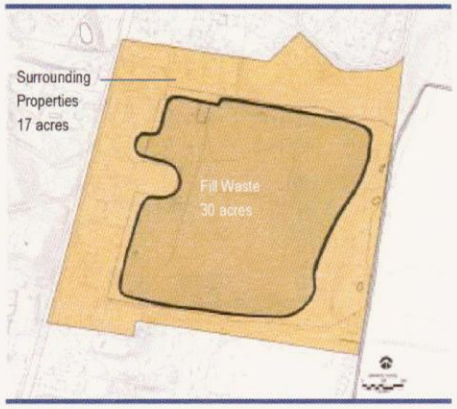
The topography is generally flat to rolling on the northern, western, and central parts of the site. The southern and eastern sections of the site have topography range from 10% to 35% slopes. There are two areas where special attention is required due to significant slope ranges. These are located on the southern edge and northeastern corner of the site.

Limit of Waste Fill

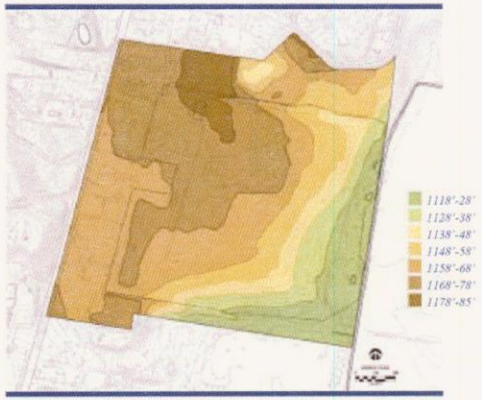
The limit of waste diagram reveals that the fill area is within the existing fence line except along the western border. There are three locations in which the limit of waste might be slightly beyond the fence line. Conversely, along the eastern border, the fill area is inside the fence line 90' to 160'. This is the area within the landfill that has the most mature vegetation

Vegetation

The landfill and adjacent 17 acres primarily consist of four ecosystems. The north and south edges are an upland young/mature forest, the former landfill is a successional old field/woods with some scrub/shrub areas while the east edge is Metzger's Ditch, an agriculture channel, and wetland complex. The west edge contains mature landscape trees and plant material left over from previous homesteads.



Limit of Waste



Topographic Analysis

Vegetation Ecosystems

Conceptual Site Diagram

Conceptual Site Diagram

The design intent consists of two principal ideas. The first deals with the existing and proposed vegetation for the 17 acres of surrounding properties and the 30 acres within the landfill. The primary existing ecosystems are:

- an upland young-mature forest
- successional grasses and scrub/shrub vegetation
- agriculture ditch and wetlands complex
- remnant homesteads landscape trees and shrubs

Vegetation proposed under the 2002 Amended ROD for the 30-acre landfill will be added to the existing vegetation and will start off as a successional woods ecosystem; that will ultimately evolve into a mature forest.

These four ecosystems are proposed to be re-created on the western side of the site. The purpose for this is to provide opportunities for education concerning the larger ecosystems by representing these as smaller systems. The result will be several diverse ecosystems at different scales. Access to the landfill proper will continue to be restricted and may not allow for human access for many years. Thus, the intention for the smaller ecosystem "rooms" is to integrate the nature preserve at a smaller scale on the surrounding properties. This will extend inaccessible ecosystems to locations where access is permitted.

The second idea is engagement with these various ecosystems. The loop trail will be the primary device for this engagement. It is proposed to be constructed on top of the linear mounds for the upper trail and as mostly boardwalks for the lower trail. The resulting trails will allow for both passage through the ecosystems and for selected opportunities for solitude and contemplation while viewing selected portions of the ecosystems.

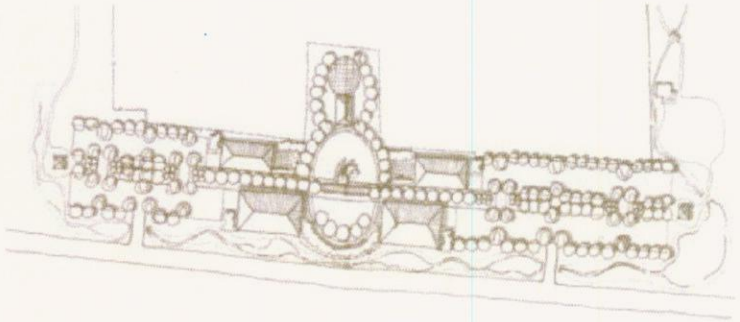
Conceptual Site Diagram: circulation, vistas, and spaces

Conceptual Studies

- Concept A: Western Reserve Civic Buildings
- Concept B: Commercial Strip Retail
- Concept C: Passive Recreation
- Concept D: Active Recreation

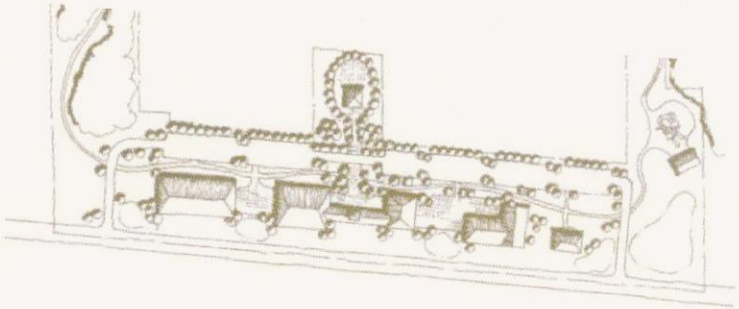
CONCEPTS

The concepts developed for the project addressed two primary issues of potential future program uses of the site. The concepts A and B considered architectural responses; while the concepts C and D dealt with issues of passive and active recreation.



Concept A: Western Reserve Civic Buildings

PROS	CONS
Formal historical interpretation	Township must develop to control outcome
Control of design (spaces/ material/ program)	Township must maintain and assume responsibility
Township identity	Similar cultural institutions nearby and may not need/ want to move
Centralize Township service	Cost to public
Other cultural institutions can help anchor complex	If landfill must be clay capped in the future, this area would need to be vacated and demolished for cap.



Concept B: Commercial Strip Retail

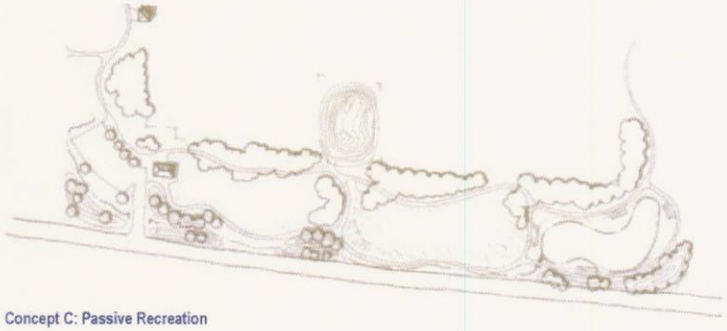
PROS	CONS
Revenue source for Township	Limited Township public/ civic spaces
Built edge between landfill and Cleveland Ave.	Developer may not like or be able to build it as proposed
Developer builds and is responsible for	If landfill must be clay capped in the future, this area would need to be vacated and demolished for cap.
Future growth opportunities for Township	Cost of development
	Cost to public

Conceptual Studies

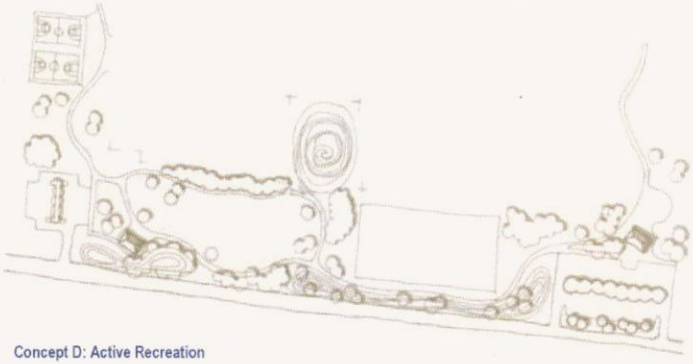
- Concept A: Western Reserve Civic Buildings
- Concept B: Commercial Strip Retail
- Concept C: Passive Recreation
- Concept D: Active Recreation

Concepts

The concepts developed for the project addressed two primary issues of future program uses of the site. The concepts A and B considered architectural responses; while the concepts C and D dealt with issues of passive and active recreation.



Concept C: Passive Recreation



Concept D: Active Recreation

PROS	CONS
Lower cost , lower maintenance	Limited active recreation
Expanding proposed habitats for landfill	
Multiple park uses	
Potential ADA trails	
Increased opportunity for diverse flora and fauna	
Multiple views/vistas	
Potential facilities (shelters, restrooms, educational kiosks)	
Location for family/community events	
Allows for future access into landfill	

PROS	CONS
Various active recreational program elements	Useable area that results in sub-standard recreational sizes
Multiple park uses	Proximity to Cleveland Ave
Limited facilities possible	Future growth/expansion will be determined by access onto landfill
Views into landfill (proposed habitats) and surrounding area	Limited trails

Final Proposed Design—'Earthscape'

Earthscape Design Intentions

- Engagement of ecosystems
- Take advantage of strategic overlooks
- Trail location that completes a circuit of the site
- Community gathering areas
- Mounding that defines access and frames views
- Sustainable stormwater management

Earthscape

The final design recommendation is the concept of Earthscape. This is an evolution of the earlier passive recreation idea; however, the concept now promotes the notion of re-creating the various existing/proposed ecosystems and allows passage through these systems. The intention is to connect with the site via trails and ecosystem rooms that promote engagement with the past and present conditions, while allowing for educational opportunities that speak to our future

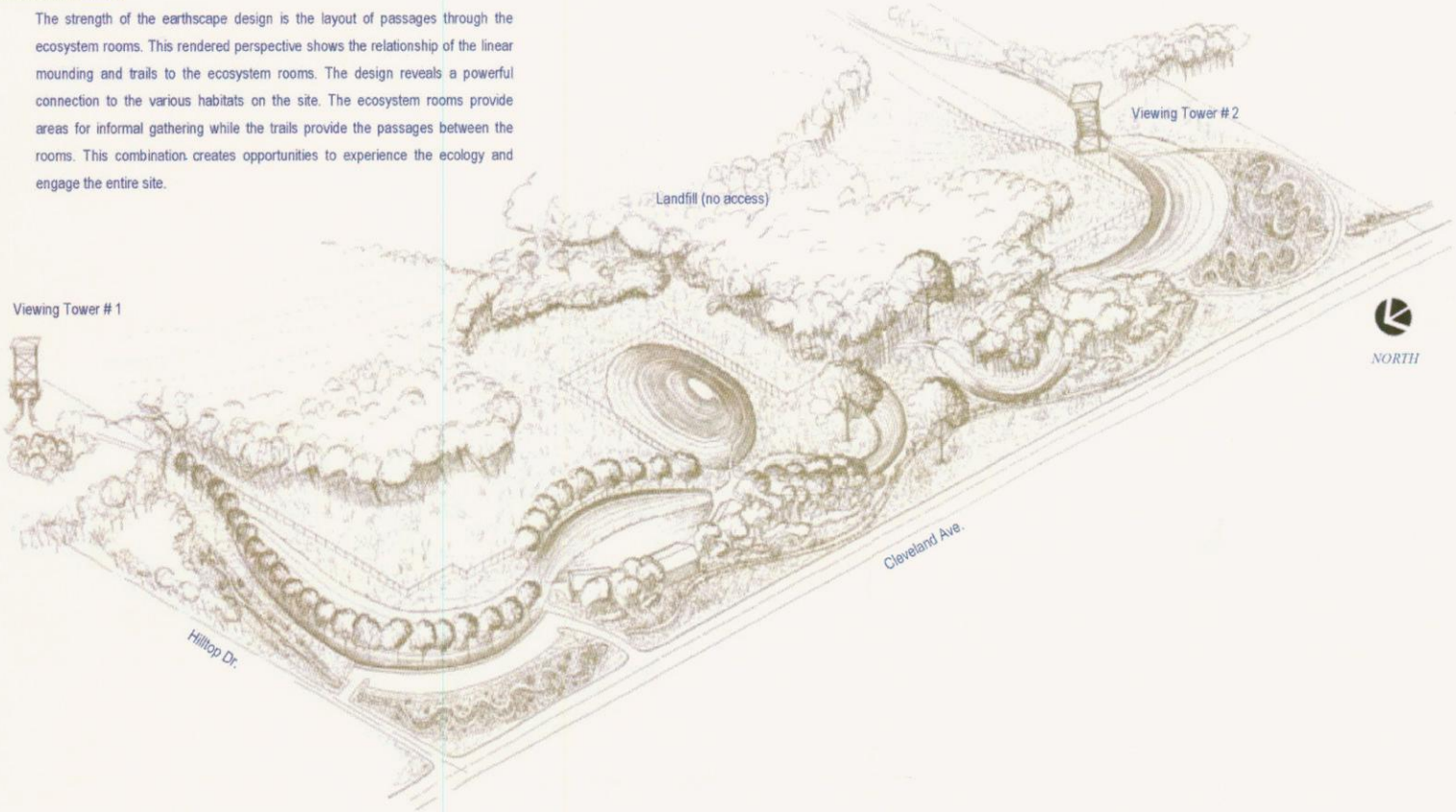
A. Main Parking Lot
B. Diversion Wetland
C. Lawn Amphitheatre
D. Grassy Commons
E. Community Shelters
F. Overlook Mound
G. Wildflower Meadow
H. Upland Forest
I. Ephemeral Stream
J. Stormwater Diversion Wetland
K. Crescent Berm
L. Tower Overlook
M. Grass Prairie
N. Wetland Boardwalk and Trail
O. Wet Meadow
P. Neighborhood Trailhead
Q. Woodland Bowl
R. Memorial Tree Planting
S. Hybrid Successional Forest
T. Trail

Rendered Master Plan

Final Proposed Design—'Perspective'

Earthscape

The strength of the earthscape design is the layout of passages through the ecosystem rooms. This rendered perspective shows the relationship of the linear mounding and trails to the ecosystem rooms. The design reveals a powerful connection to the various habitats on the site. The ecosystem rooms provide areas for informal gathering while the trails provide the passages between the rooms. This combination creates opportunities to experience the ecology and engage the entire site.

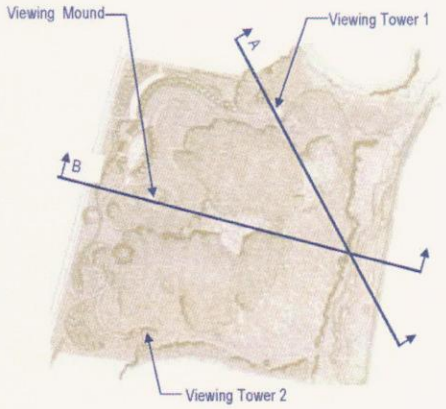


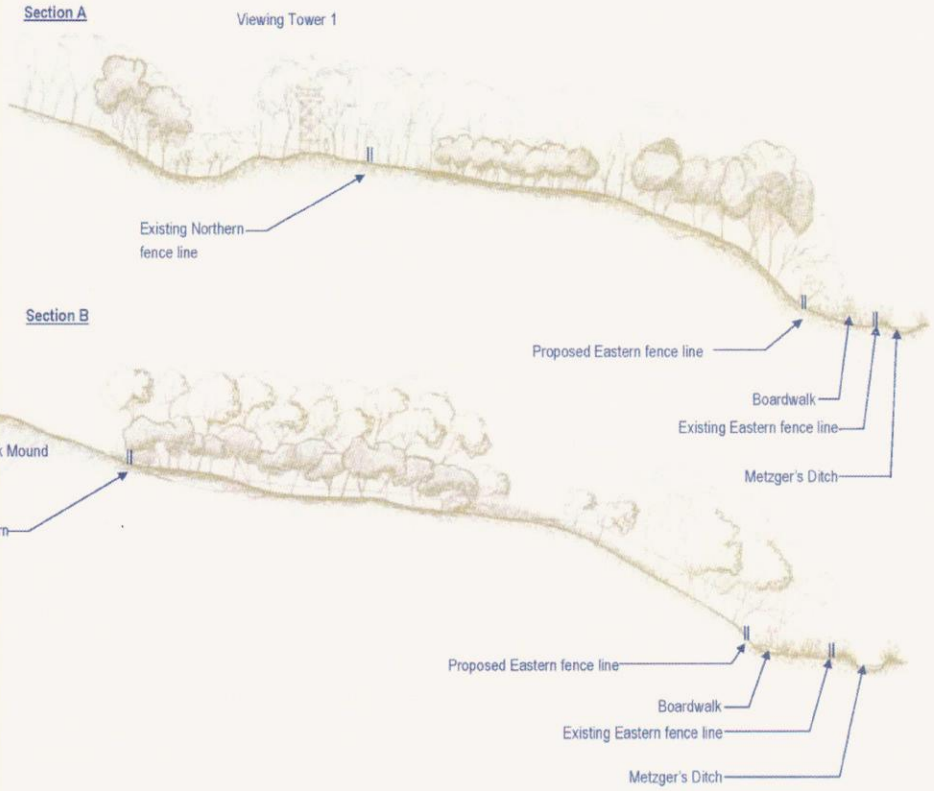
Rendered Site Plan

Cross Sections

Earthscape

The sections reveal two of the three viewing points. There are two tower overlooks proposed. One is located on the northern edge of the site and the other is located on the southern edge. Both tower overlooks would mark the extent of the upper trail. Section A shows the relationship of the northern tower overlook to the landfill vegetation and riparian corridor. The third viewing point is the overlook mound. It is proposed to be located on the western side of the site. The intention of the mound is to continue the landform design strategies of defining passage and views. Section B shows the proposed height relationships beginning at the knoll, progressing through the landfill, and finally into the wet meadow and Metzger's Ditch



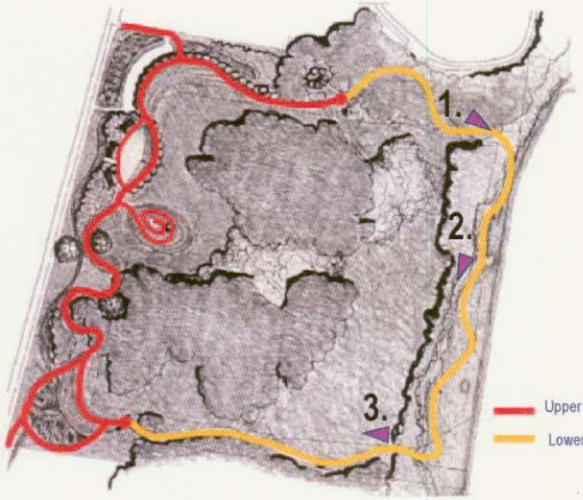


Loop Trail

- There will be approximately one mile of trails around the landfill on the surrounding properties
- The upper trail will be defined by a series of linear mounds
- The lower trail will include boardwalks for limited impacts to wetlands
- Both upper and lower trails will have educational markers and observation areas

Loop Trail

The proposed loop trail completes a circuit around the entire site. It is segmented into an upper trail and a lower trail. The upper trail will be an accessible paved material. This segment allows passage through and engagement with the proposed ecosystems. The upper trail will almost entirely be on the proposed linear mounding. The intention of the upper trail is to provide a sequence of framed views of the ecosystem rooms within the landfill and surrounding properties while also allowing for moments of solitude. The lower trail will allow access into the riparian corridor and wet meadow complex. The major issues for this segment regard topography and water. There is approximately 62 feet in elevation change from the upper trail to the lower trail. In the wet meadow area standing water, saturated soils and seasonal flooding will be design considerations. The lower trail is also designed for framing views and solitude.

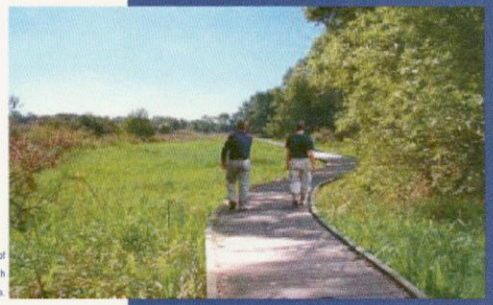


Upper Trail: paved path (Potentially Accessible)

Lower Trail: limestone path and boardwalk

Loop Trail Systems

1. Computer overlay of view of trail leading into the riparian corridor and Metzger's Ditch.



2. Computer overlay of view of boardwalk within Metzger's Ditch and surrounding wetlands.

3. Computer overlay of view of trail leaving the riparian corridor looking along the edge of the landfill.

Cost Estimate & Funding Resources

Funding Resources

There may be a number of potential funding sources for the reuse scenario for the IEL surrounding properties. These include the following possibilities for the following proposed redevelopment costs.

Clean Ohio Trail Fund

The Ohio Department of Natural Resources will administer the $25 million Clean Ohio Trail Fund (COTF) over the next four years for land acquisition and the construction of recreational trails. Approximately $6.25 million will be available in each year.

Recreational Trails Program

Up to 80% matching federal funds (reimbursement) are available for development of urban trail linkages, trail heads, and trailside facilities, maintenance of existing trails, restoration of trail areas damaged by usage, improving access for people with disabilities, acquisition of easements and property, development and construction of new trails, purchase and lease of recreational trail construction and maintenance equipment, environment and safety education programs related to trails.

NatureWorks (Parks)

Local governments can apply for up to 75% reimbursement grants (state funding) for acquisition, development or rehabilitation of public park and recreation areas. The agency must have proper control (title or at least a 15-year non-revocable lease) to be eligible for development or rehabilitation grant. Eligible government agencies within each county compete for grants. All projects must be completed within one-and-a-half to two years.

Ohio Environmental Education Fund

Monies credited to the Environmental Education Fund consist of half of all penalties collected by Ohio EPA air and water pollution control programs, as well as gifts, grants, and contributions. The Director of Ohio EPA, under the advice and assistance of the Advisory Council, may award grants totaling in excess of $1 million annually. The fund must be used to enhance the public's awareness and understanding about issues affecting environmental quality in Ohio.

Five-Star Restoration Challenge Grants

The National Association of Counties, the National Fish and Wildlife Foundation, and the Wildlife Habitat Council, in cooperation with the U.S. Environmental Protection Agency (USEPA), the Community-Based Restoration Program within NOAA Fisheries, and other sponsors, are pleased to solicit applications for the Five-Star Restoration Challenge Grant Program. The Five-Star Restoration Program provides modest financial assistance on a competitive basis to support community-based wetland, riparian, and coastal habitat restoration projects that build diverse partnerships and foster local natural resource stewardship through education, outreach, and training activities.

Preliminary Cost Estimates

Surrounding 17 Acre Properties

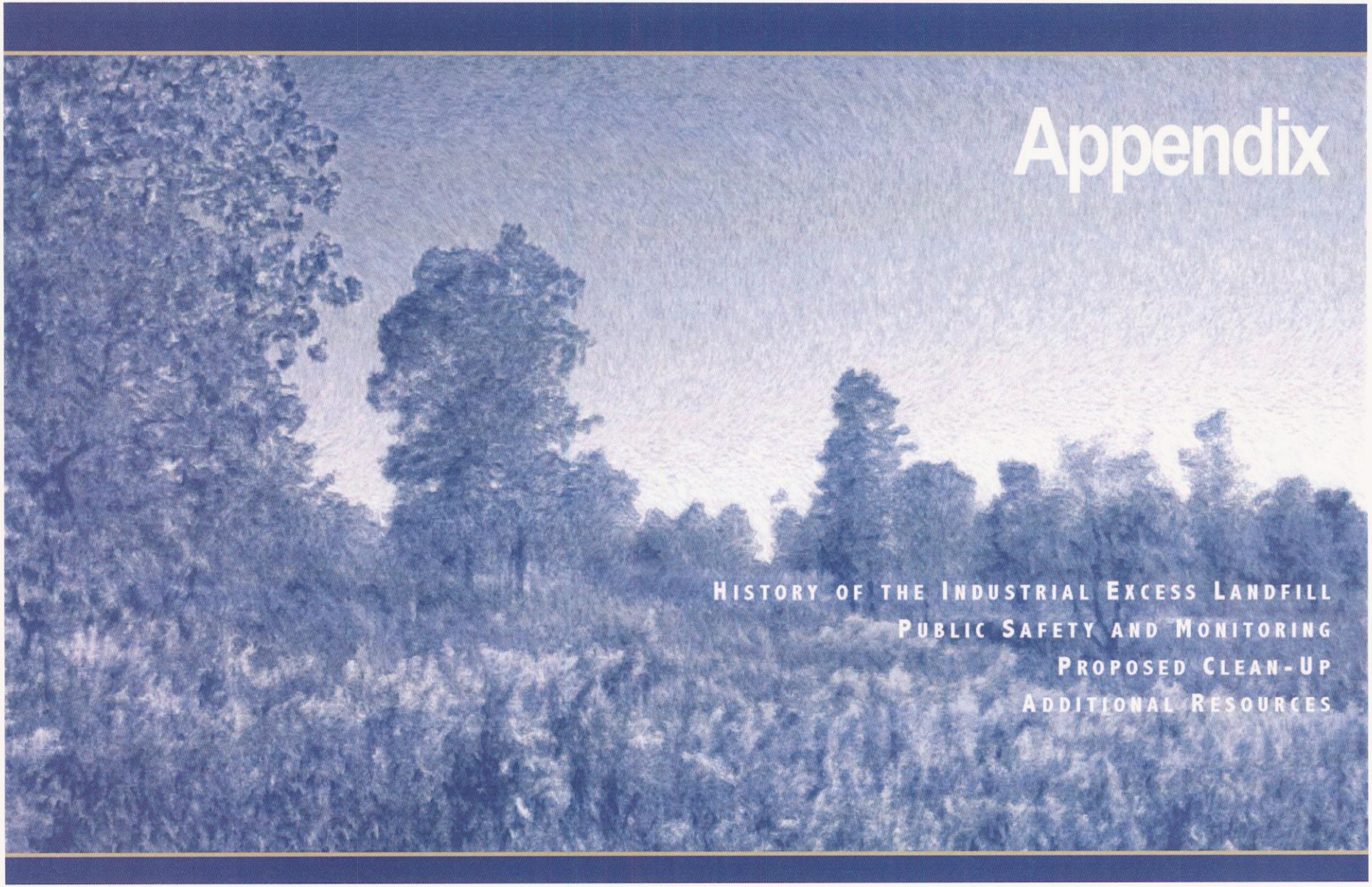
This is an estimation of construction costs, not a guarantee of actual bid prices

Date: January, 2003

ITEM	DESCRIPTION	QUANTITY	$/Unit	Total Price
1	Demolition	1 LS	$20,000	$20,000
2	General Grading & Earthwork	1 LS	$50,000	$50,000
3	Mounding	25,000 CY	$5.00	$125,000
4	Asphalt Parking Lot	2,000 SY	$35.00	$70,000
5	Paved Walk (5')	4,000 LF	$17.50	$70,000
6	Limestone Walk (5')	2,000 LF	$8.00	$16,000
7	Boardwalk (4')	900 LF	$100.00	$90,000
8	Native plantings & seeding	1 LS	$50,000	$50,000
9	Trees & Shrubs	1 LS	$30,000	$30,000
10	Lighting (security only)	1 LS	$30,000	$30,000
11	Picnic Shelter Pavilion(s)	3 EA	$50,000	$150,000
12	Towers	2 EA	$40,000	$80,000
13	Site Improvements (signage, benches, trash)	1 LS	$30,000	$30,000
			Contingency (20%)	$162,200
			Total	**$973,200**

*This estimate does not include utility extension, demolition for underground structures, work within the IEL fence line, or fence replacement.

* Cost opinion assumes 2002 pricing



Appendix

History of the Industrial Excess Landfill
Public Safety and Monitoring
Proposed Clean-Up
Additional Resources

Appendix/ History

- Located in Uniontown, 1/2 Mile south of State Route 619
- Former 30 Acre site of a Sand & Gravel Pit
- Beginning in the 1960's the site was used for industrial, commercial, and residential wastes
- 1971 Ohio Dept. of Health approved the landfilling of liquid wastes
- 1972 IEL stopped accepting liquid wastes but continued to accept solid and residential wastes
- The IEL landfill was closed in 1979

A Brief History of the Industrial Excess Landfill

Located in Uniontown, Ohio, about halfway between Akron and Canton, the Industrial Excess Landfill, a former sand and gravel quarry, occupies a thirty-acre site on the East Side of Cleveland Avenue, about a half-mile south of State Route 619.

In the latter half of the 1960's, those who then owned the site obtained permits to accept industrial, commercial, and residential waste. The original local permit allowed wastes such as fly ash, masonry rubble, paper, scrap lumber and other non-toxic material to be dumped on site. More than three hundred entities deposited waste at the landfill during its operation. Many companies in the Akron and Canton area used the landfill for the disposal of industrial waste in both liquid and solid form.

About 1971, The Ohio Department of Health approved a procedure for the landfilling of liquid wastes at the IEL. Liquids were to be lagooned (in a bed of fly ash) and then mixed with soil before burial. On at least one occasion, before the liquids could be mixed with soil, the liquids caught fire with an associated loss of liquid wastes. The immense fire burned for three days at the site. In 1972 the Stark County Board of Health ordered that all liquid dumping be stopped. The IEL continued to accept solid waste and residential trash thereafter until the site was closed in 1979. The U.S. Environmental Protection Agency (USEPA) placed the IEL on the National Priorities List in October 1984.

In 1985, the USEPA began remedial investigations to determine the extent of contamination at the IEL. According to the EPA's history of the site, in 1988 the Agency determined at that time that the most extensive body of contaminated material was the waste and waste-soil mixture in the landfill portion of the site; the ground water beneath and west of the site contained organic and inorganic compounds; and methane gas and other organic vapors were detected around the perimeter of the landfill. A methane venting system was installed by USEPA in 1985.

Landfill Operations in the 1960's-70's

Source: Lake Township

Source: Lake Township

Source: Lake Township

The USEPA decided in September of 1987 that about one hundred homes near the IEL should be provided with municipal water. Currently, almost every residence in the vicinity of the IEL is connected to municipal water. In 1988, the USEPA conducted a study to evaluate feasible methods for cleaning up the site. In December of that year, the USEPA first presented to the public a proposal for remediation. In conjunction with what was proposed, the U.S. Government purchased a number of properties immediately surrounding the IEL to the north, west, and south sides of the site. The US Government now owns all but one of these properties surrounding the IEL. The surrounding properties, approximately seventeen acres, formerly consisted mostly of single family residential homes or vacant land. Two of the parcels along Cleveland Avenue formerly consisted of a restaurant and a gas station/tire store. However, all structures from these two parcels have been removed and the property is now vacant.

During a USEPA public comment period in early 1989, interested parties expressed concerns about the data used to determine the proposed cleanup. The USEPA signed a Record of Decision (ROD) in July 1989, proposing a clay cap with a pump-and-treat system for the underlying ground water. as the remedy. However, in the 1990's ground water testing revealed that no contaminants above Maximum Contaminant Levels (MCLs) (drinking water standards) were detected in the groundwater off the site. Furthermore, the data indicated that natural attenuation processes were occurring at the IEL, thus reducing the number and concentration of the contaminants.

History

- USEPA placed the IEL on the National Priorities "Superfund" list in 1984
- In 1985 the USEPA began remedial investigations to determine the extent of contamination
- In 1989 the first ROD was signed calling for a clay cap with pump and treat system
- After testing in the 90's an Amended ROD was prepared in 2000 calling for a synthetic/clay cap only
- In 2002 the Second Amended ROD was signed calling for monitored natural attenuation with a vegetative cover

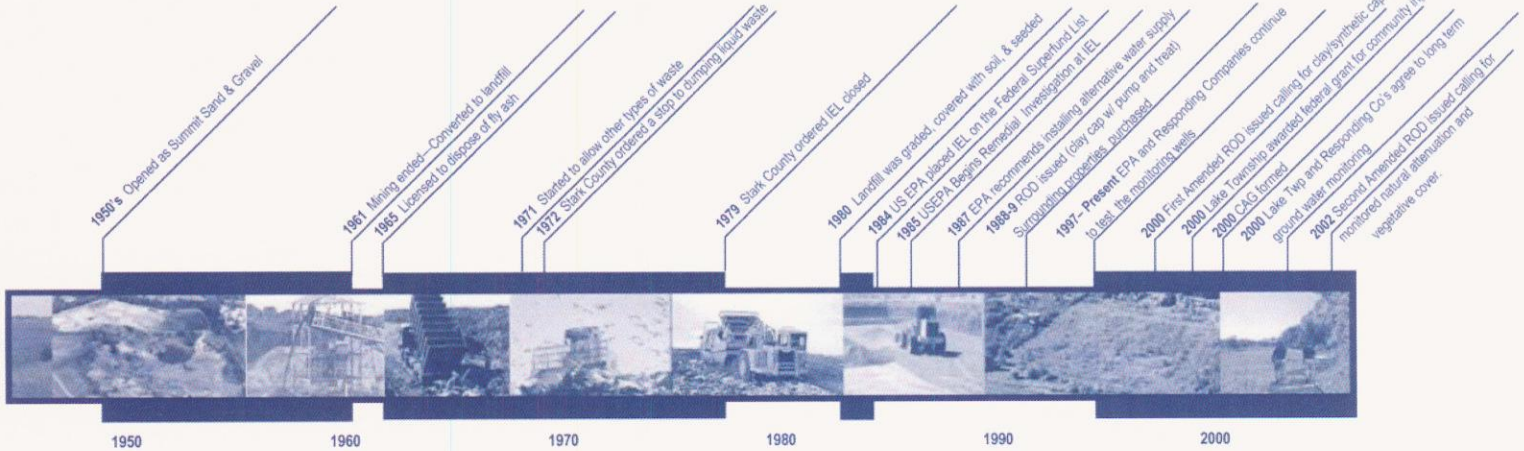
IEL Historical Timeline

After reviewing groundwater testing results, the USEPA prepared an Amended ROD in March 2000, calling for a clay and synthetic cap to be placed over the landfill, and eliminated the pump and treat system since it was not warranted. The Lake Township Trustees asked for a delay in the installation of this cap because they knew it would eliminate any possibility of further testing of the on-site and perimeter monitoring wells, which the Lake Township Trustees then felt and continue to feel is necessary and appropriate.

The Lake Township Community Advisory Group (CAG) was organized in the fall of 2000 to provide informed community input about the ultimate return to community use of the IEL and surrounding properties, and to provide community opinion about the future use of the properties surrounding the landfill site as well as the IEL itself.

In April 2002, the USEPA held a public hearing on an amendment to the 2000 ROD. The amendment called for monitoring natural attenuation, the installation of an enhanced vegetative cover at the IEL, as well as a number of additional measures, including regular ground water testing for thirty years, the installation of new wells and testing of gases and shallow soils. This second amended ROD was signed in October 2002.

Adapted from the USEPA and Lake Township Community Advisory Group
For more information see:
www.epa.gov/superfund/action/law/npl_hrs.htm
www.epa.gov/region5/superfund/rods/rod_index.html
for the 1989 ROD Go to "Industrial Excess Landfill-ROD.PDF" --USEPA Region 5 web site



Historic Contaminants

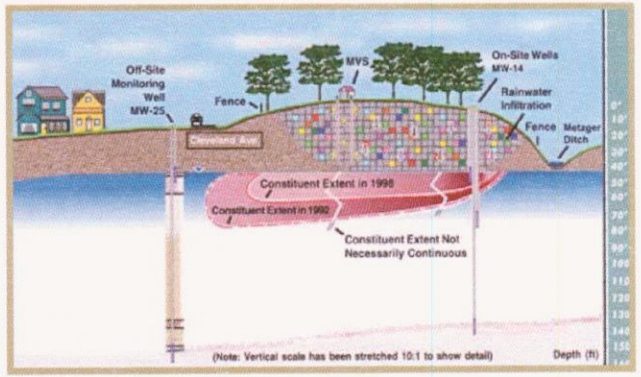
- Groundwater beneath portions of the landfill continues to be primarily contaminated with a limited number of volatile organic compounds
- The number of contaminants & associated concentrations have generally decreased over time
- Methane concentrations along the perimeter of the landfill have decreased over time

Historic Contaminants

Groundwater, beneath the landfill, continues to be primarily contaminated with a limited number of volatile organic compounds (VOCs). Data from 2000-2001 groundwater monitoring events suggests that, with the exception of benzene in the shallow groundwater in the middle of the landfill, the level of contamination is decreasing, both in terms of number of contaminants detected and in concentration. There is no evidence that groundwater contamination outside of the landfill boundary exists. Methane concentrations along the perimeter of the landfill continue to decline to the point where the existing methane venting system (MVS) is only operated periodically and must be supplemented with propane to create a burn-off flare.

Nearly all the residents downgradient of the site are now connected to municipal water, thereby minimizing potential receptors of contaminated groundwater if it moves offsite. Although there have been sporadic exceedances of metals outside of the landfill boundaries, tests of drinking water wells in 1998 revealed that such metal contaminants were significantly lower (i.e., one or two orders of magnitude less) than federal drinking water standards. Furthermore, these metals are likely not attributed to the landfill, but are likely from potential off-site sources such as septic systems.

Generalized cross section of landfill showing how the contamination plume is shrinking over time.



http://www.ielcleanup.com/

Comparing Contaminants extent in 1992 with those detected in 2002

Constituent		Highest Concentration Detected before 2000	Well Location of Highest Concentration	Year Highest Concentration Detected	Range of Conc. Detected in 2000-April 2002		July 2001 Highest Conc.	Well Location of Highest Concentration	
		(ug/L)			Low	High	(mg./L)	Apr-02	Jul-02
1	Acenaphthene	79	MW-17S	Aug-92					
2	Acetone	260	MW-09I	Dec-91					
3	Aldrin	0.82	MW-01I	Mar-97					
4	Benzene	8,300	MW-14S	Sep-98	1.2	25,000	16,000	MW-14s	MW-14-s
5	Benzo(a)pyrene	0.6	MW-13S	Dec-91					
6	Benzo(b)fluoranthene	0.6	MW-13S	Dec-91					
7	Benzo(k)fluoranthene	0.8	MW-13S	Dec-91					
8	alpha-BHC	0.06	MW-07S	Mar-97					
9	beta-BHC	0.07	MW-07S	May-92					
10	delta-BHC	0.32	MW-13I	May-97					
11	gamma-BHC (Lindane)	1.04	MW-03I	May-97					
12	Bromodichloromethane	8	MW-28D	May-92					
13	Bromoform	16	MW-28D	May-92					
14	Butyl benzyl phthalate	4	MW-08S	Dec-92					
15	Caprolactam**						95	N/A	MW-07s
16	Carbazole	1	MW-07S	May-92					
17	Carbon disulfide	22	MW-27I	Aug-92					
18	Chlorobenzene	31	MW-07S	Jul-88	4.7	6.2	29	N/A	MW-07s
19	alpha-Chlordane	0.024	MW-17S	Mar-93					
20	gamma-Chlordane	0.013	MW-17S	Aug-92					
21	Chlorodibromomethane	13	MW-28D	May-92					
22	Chloroethane	23	MW-21S	Sep-98	3.1	73	66	MW-21s	MW-21s
23	bis(2-Chloroethyl)ether	1	MW-17S	Aug-92					
24	Chloroform	3	MW-28D	May-92					
25	Chloromethane	20	MW-28D	Dec-92					
26	4-Chloro-3-methylphenol	46	MW-17S	Aug-92					
27	2-Chlorophenol	47	MW-17S	Aug-92					
28	Di-n-butyl phthalate	24	MW-10I	Nov-92					
29	1,4-Dichlorobenzene	59	MW-17S	Aug-92	2.1	9.1	6	N/A	MW-07s
30	1,1-Dichloroethane	150	MW-15S	Dec-91	2	54	25	MW-15s	MW-15s
31	1,1-Dichloroethene	5	MW-15S	Dec-91					
32	1,2-Dichloroethane	100	MW-15S	Dec-91	6	14	11	MW-15s	MW-15s
33	1,2-Dichloroethene (total)	960	MW-15S	Dec-91	2	34	10	MW-15s	MW-21s
34	4,4'-DDD	0.031	MW-14I	Aug-92					
35	4,4'-DDE	0.017	MW-10S	May-92					
36	4,4'-DDT	0.03	MW-01I	Mar-97					
37	Dieldrin	0.95	MW-03I	May-97					
38	Diethylphthalate	10	MW-14S	Dec-91					
39	2,4-Dimethylphenol	3	MW-07S	Jul-88					
40	2,4-Dinitrotoluene	10	MW-17S	Aug-92					
41	Di-n-octyl phthalate	70	MW-20D	May-92					
42	Endosulfan I	0.012	MW-14S	May-92					
43	Endosulfan II	0.19	MW-03S	Mar-97					
44	Endosulfan sulfate	0.081	MW-02D	Dec-91					
45	Endrin	1.1	MW-01I	Mar-97					
46	Endrin aldehyde	0.16	MW-18I	Mar-97					
47	Endrin ketone	0.02	MW-15S	Dec-91					
48	Ethylbenzene	1,900	MW-15S	Dec-91	2.6	29	6	MW-15s	MW-13I
49	bis(2-Ethylhexyl)phthalate	800	MW-10I	Mar-93					
50	Heptachlor	1.2	MW-01I	Mar-97					
51	Heptachlor epoxide	0.02	MW-01D	Sep-92					
52	Hexachloroethane	2	MW-15S	Aug-92					
53	2-Hexanone	2	MW-17S	Dec-92					
54	Isopropylbenzene			Aug-00	2.7	8.7	3.9	MW-17S	MW-17S
55	Methoxychlor	0.053	MW-23I	May-92					
56	Methyl Acetate			Aug-00	3.1	3.1		N/A	N/A
57	Methyl ethyl ketone	670	MW-15S	Dec-91			4.9	N/A	MW-7S
58	Methylene chloride	360	MW-15S	Dec-91					
59	2-Methylnaphthalene	3	MW-07S	Jul-88					
60	4-Methyl-2-pentanone	7	MW-13S	Aug-92					
61	2-Methylphenol	4	MW-15S	Aug-92					
62	4-Methylphenol	15	MW-07S	Jul-88					
63	Naphthalene	10	MW-07S	Jul-88					
64	n-Nitrosodi-n-propylamine	85	MW-17S	Aug-92					
65	n-Nitrosodiphenylamine	42	MW-07S	May-92			11	N/A	MW-07S
66	4-Nitrophenol	63	MW-17S	Aug-92					

Sharp and Associates, Groundwater Monitoring Report for the July, 2002 Sampling Event, dated October, 2002

Public Safety & Monitoring

- The Responding Companies and the USEPA continue to collect, evaluate, and report groundwater and health risk information on the site
- Current test results found no offsite levels exceeding USEPA safe drinking water standards
- There are 54 monitoring wells in and around the site to monitor groundwater

Clean-up Method

The properties surrounding the IEL now consist of vacant land. There was a restaurant and a gas station/tire store formerly located along Cleveland Ave. However, all underground storage tanks (USTs), buildings, and septic systems associated with these two buildings have been removed. The Ohio State Fire Marshal Bureau of Underground Storage Tank Regulations (BUSTR) issued a No Further Action (NFA) status to these sites indicating that any detected contaminants in the soil in the area of the USTs were below applicable clean up standards.

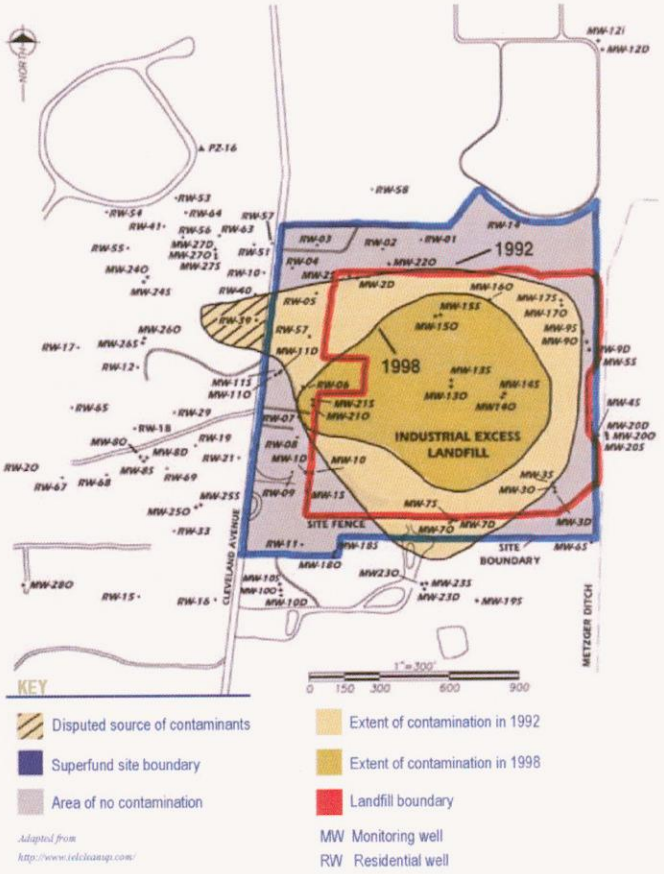
The Responding Companies and USEPA have:

- Secured the site (installed a fence around a vegetative soil cover) to minimize the potential for anyone to come into contact with landfill contents.The fence will be upgraded under the Amended ROD. Lake Township has petitioned the USEPA to move the fence line on the east end of the IEL to allow for construction of the walking trail.
- Installed a public water line for residents who were originally using groundwater wells in the vicinity of the IEL site.
- Installed a methane venting system to collect and destroy methane and other volatile compounds.
- Hired experienced and qualified environmental professionals to collect, evaluate and report on groundwater and health risk information from the site.
- Continued to test the groundwater and found that there are no contaminents offsite at levels exceeding USEPA's safe drinking water standards.
- Have agreed to work with Lake Township officials and their environmental consultant to provide long term groundwater monitoring of the site for up to 30 years.

Because community health is protected under current conditions, the natural attenuation remedy, coupled with groundwater monitoring, will ensure that human health and the environment continue to be protected. The USEPA, by finalizing the Second Amended ROD, believes that a monitored natural attenuation remedy is the best course of action for addressing the contaminants at the IEL site. However, as stated in the Amended ROD, the benzene dissolved in the shallow groundwater beneath the middle of the landfill will be further investigated and, if warranted, remediated by alternative techniques.

Monitoring wells within the IEL

IEL Site and Surrounding Properties with Historical Trends in Extent of Groundwater Contamination



Clean-Up—Natural Attenuation

- USEPA has recently recommended monitored natural attenuation with a vegetative cover as the preferred clean-up method for IEL
- Natural Attenuation is a natural process that breaks down or reduces the concentration of contaminants.
- Natural Attenuation involves several processes including:

  1. destroying or converting to something less toxic
  2. reducing the concentration to a point it will not cause a risk
  3. binds the constituents to the soil preventing migration

Clean-up Method

Natural attenuation is the name given to a cleanup technique that relies on physical, chemical and/or biological processes that will slow the migration of constituents or destroy contaminents in soil or groundwater.

Natural attenuation processes happen to some degree in all contamination sites but do not always work fast enough to be selected as the only remedy for cleaning up a site. Natural attenuation can work in three ways:

- It can destroy the constituents or convert them into something less toxic (via biological or chemical processes);
- It can reduce the concentrations of constituents to a point where they no longer pose a risk (through destructive processes or dilution); or
- It can bind the constituents to the soil and prevent them from migrating.

The USEPA and Natural Attenuation

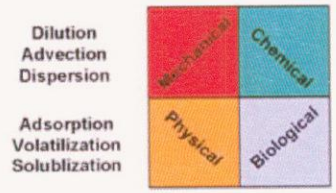
USEPA considers monitored natural attenuation to be a cleanup option that may be appropriate for some sites. USEPA does not view the selection of natural attenuation as a "no action" or "walk-away" approach. It considers natural attenuation to be an effective means of cleaning up a site where:

- All measures necessary to protect human health and the environment have already been taken;
- Natural attenuation will clean up the site in a reasonable time frame compared to other options; and,
- The progress of the cleanup is monitored to ensure that the conditions at the site continue to be protective of human health and the environment.

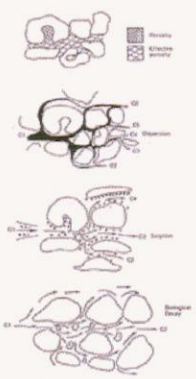
Natural Attenuation Processes

Research from many sources around the world has identified processes that destroy constituents in the environment. Some of these processes are biological in nature--microbes that are naturally-occurring in the ground will use the chemicals as a source of energy or food. The eventual end products of these biological processes are non-toxic (such as carbon dioxide and water) or are manageable by other means (methane can be burned).

Natural Attenuation is the naturally occurring reduction in contaminant concentrations by:

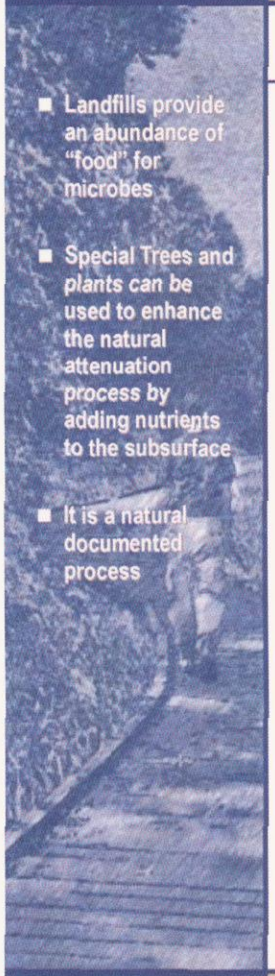


Conceptual Natural Attenuation Processes



Two slides used by permission: Duane Winegardner, Cardinal Engineering, Inc. 6520 N. Western, 206, Oklahoma City, OK 73116

Clean-Up—Natural Attenuation



- Landfills provide an abundance of "food" for microbes
- Special Trees and plants can be used to enhance the natural attenuation process by adding nutrients to the subsurface
- It is a natural documented process

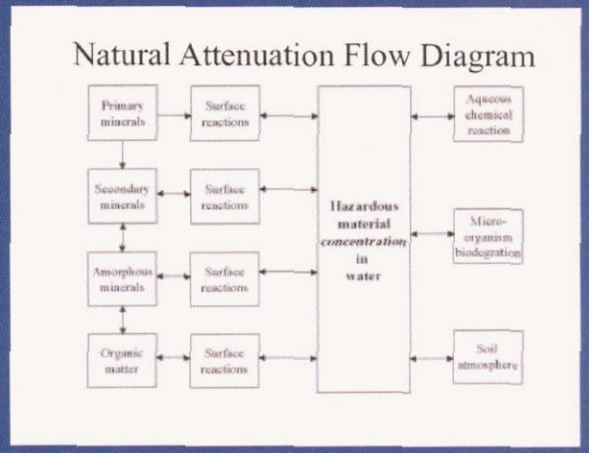
How does it work?

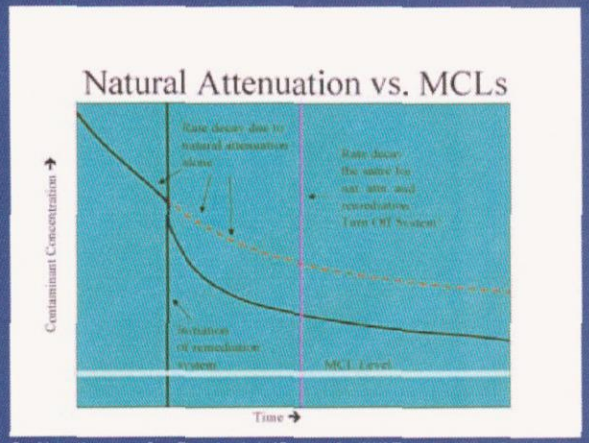
Landfills, with their abundance of "food" (either actual food waste or other organic chemicals), eventually develop enormous populations of microbes that consume the contaminants. The natural attenuation processes operating in landfills are some of the same processes that we depend upon to destroy constituents in our home septic systems and large waste water treatment plants.

Three types of microbial processes that can be found at many landfills include:

- *Methanogenesis:*
  Every landfill has microbes that (in the absence of oxygen) will convert garbage and other organic contaminants into methane and water.
- *Aerobic Biodegradation:*
  These microbes rely on oxygen. Sewage treatment plants (among others) use microbes in the presence of oxygen to destroy sewage and other organic constituents--converting them to carbon dioxide and water.
- *Co-Metabolism:*
  Some chlorinated organic contaminants are destroyed by the byproducts of microbes as they consume other organic contaminants. This is called co-metabolism. Chlorinated organic contaminants may also be destroyed by direct microbial action.

In addition to these processes occurring naturally (where conditions permit), they are also used in landfills, sewage treatment plants, breweries and pharmaceutical manufacturing plants.





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Additional Resources

Additional Resources

Information gathered for this report was researched from many sources. The list below provides additional selected resources beyond what was presented in this program.

Bioremediation Resources	http://www.nal.usda.gov/bic/Biorem/biorem.htm
Buckeye Trail	http://www.buckeyetrail.org/
Clean Ohio Fund	http://www.state.oh.us/cleanohiofund
EPA Region 5	http://www.epa.gov/region5/sites/iel/
Lake Township Chamber of Commerce	http://www.lakechamber.com/
Lake Township Community Advisory Group	http://www.ltcag.com/index.php
Natural and Accelerated Bioremediation Research	http://www.lbl.gov/NABIR/
Responding Companies	http://www.ielcleanup.com/index.htm
Scenic Railroad Trail—Metroparks serving Summit County	http://www.neo.lrun.com/MetroParks/
Stark County Park System	http://www.starkparks.com/
USEPA	http://www.epa.gov/
USEPA Superfund Sites	http://www.epa.gov/superfund/sites/
Quail Hollow State Park	http://www.quailhollow.org/

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No representations are provided as to these sites or the accuracy of the information or data obtained therefrom.

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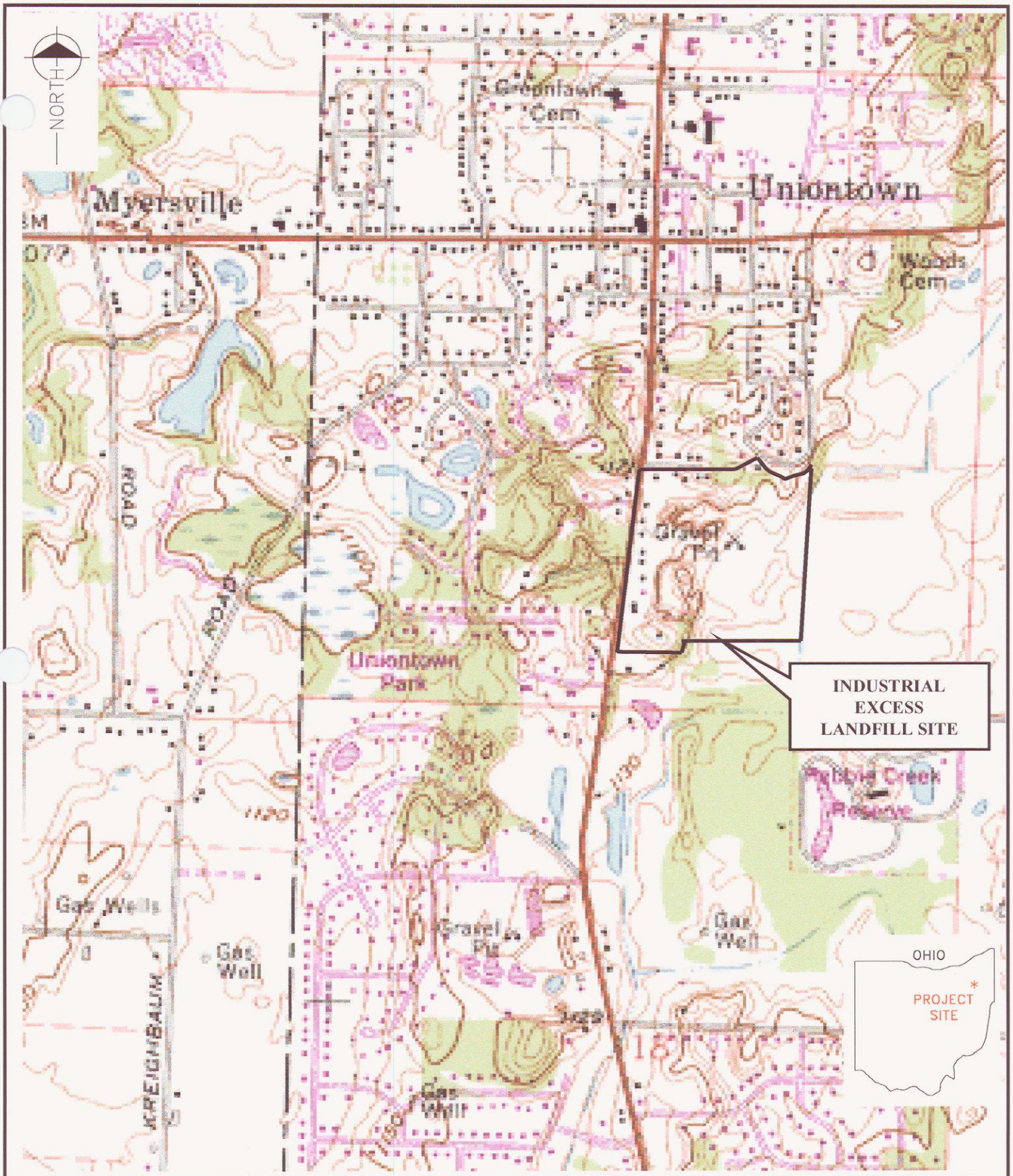


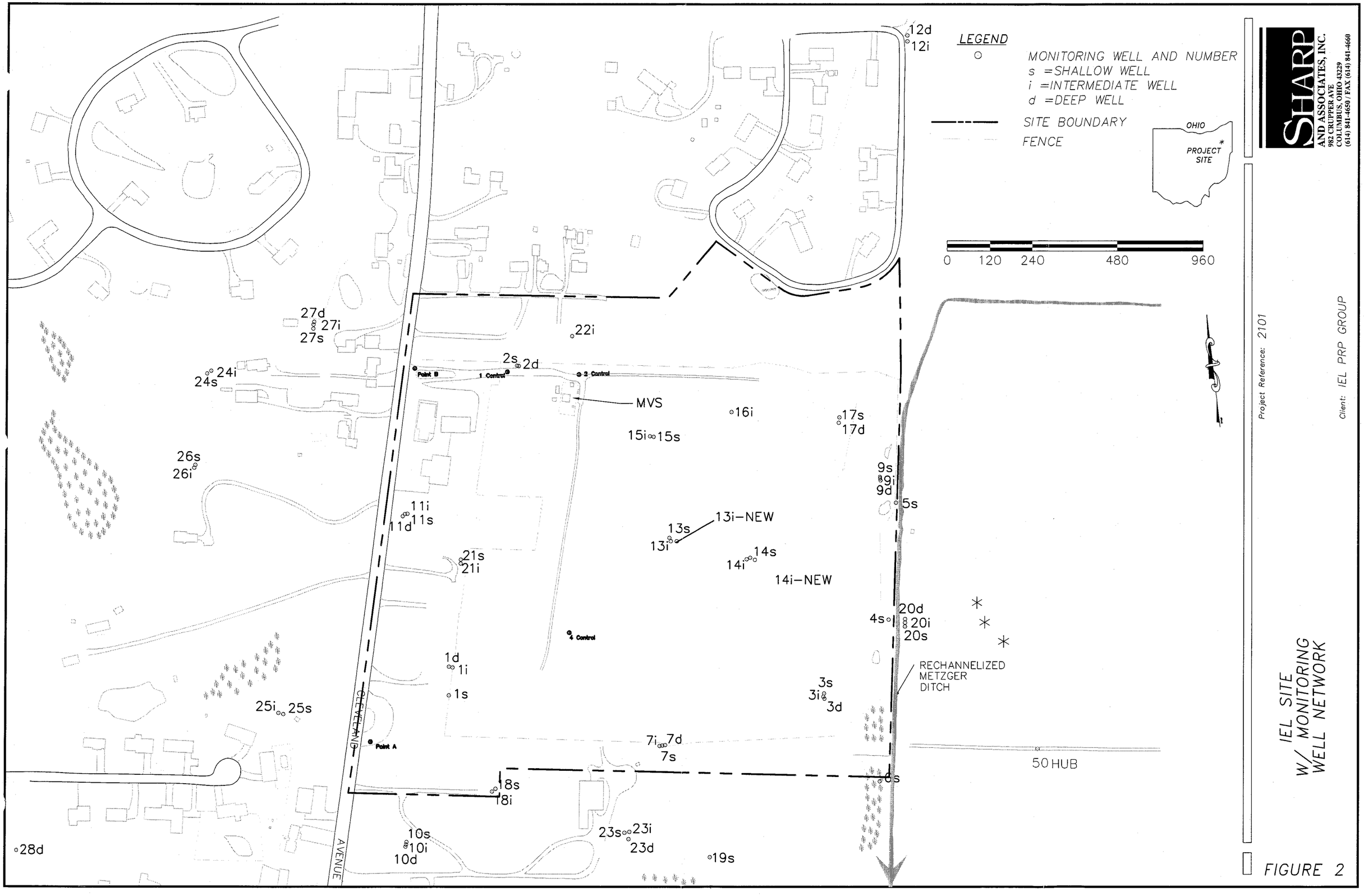
SHARP AND ASSOCIATES, INC.
982 CRUPPER AVE
COLUMBUS, OHIO 43229
(614) 841-4650 / FAX (614) 841-4660

SITE LOCATION MAP

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.1	N.T.S.

FIGURE 1


LEGEND
MONITORING WELL AND NUMBER
s =SHALLOW WELL
i =INTERMEDIATE WELL
d =DEEP WELL
SITE BOUNDARY
FENCE
OHIO
PROJECT SITE
0 120 240 480 960
12d
12i
27d
27i
27s
22i
2s
2d
24i
24s
Point B
1 Control
2 Control
MVS
16i
17s
17d
15i
15s
26s
26i
9s
9i
9d
5s
11i
11s
11d
13i-NEW
13s
13i
14s
14i
14i-NEW
21s
21i
20d
4s
20i
20s
4 Control
RECHANNELIZED METZGER DITCH
1d
1i
1s
3s
3i
3d
25i
25s
CLEVELAND
Point A
7i
7d
7s
50 HUB
6s
18s
18i
10s
10i
10d
23s
23i
23d
19s
28d
AVENUE
SHARP AND ASSOCIATES, INC.
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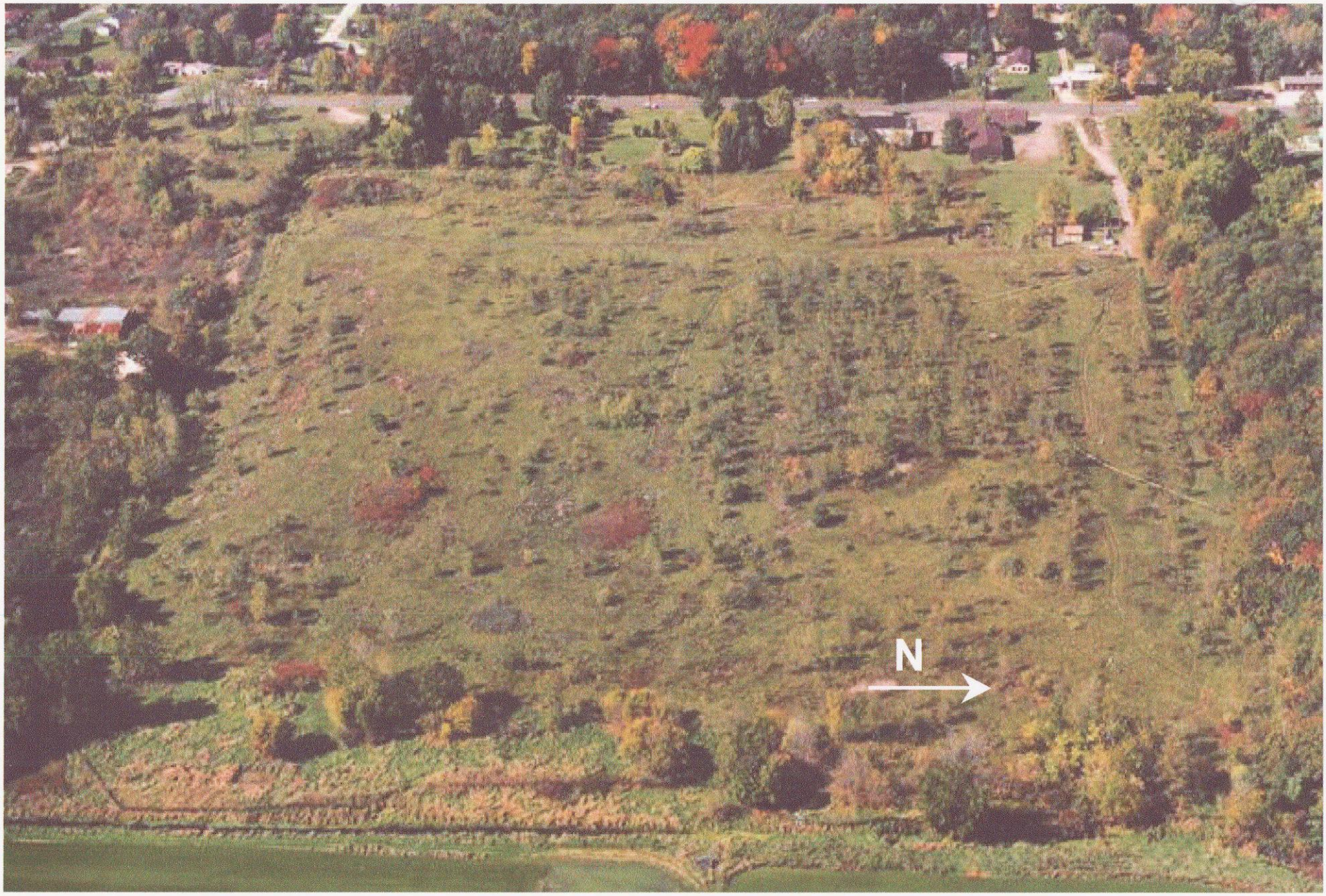
COLUMBUS, OHIO 43229
(614) 841-4650 / FAX (614) 841-4660
Project Reference: 2101
Client: IEL PRP GROUP
IEL SITE W/ MONITORING WELL NETWORK
FIGURE 2
R:\2101\8-03 ks\iel site.dwg 2/20/2004 10:09:07 AM, jbale, 1:240, CTB:2101-DL-01



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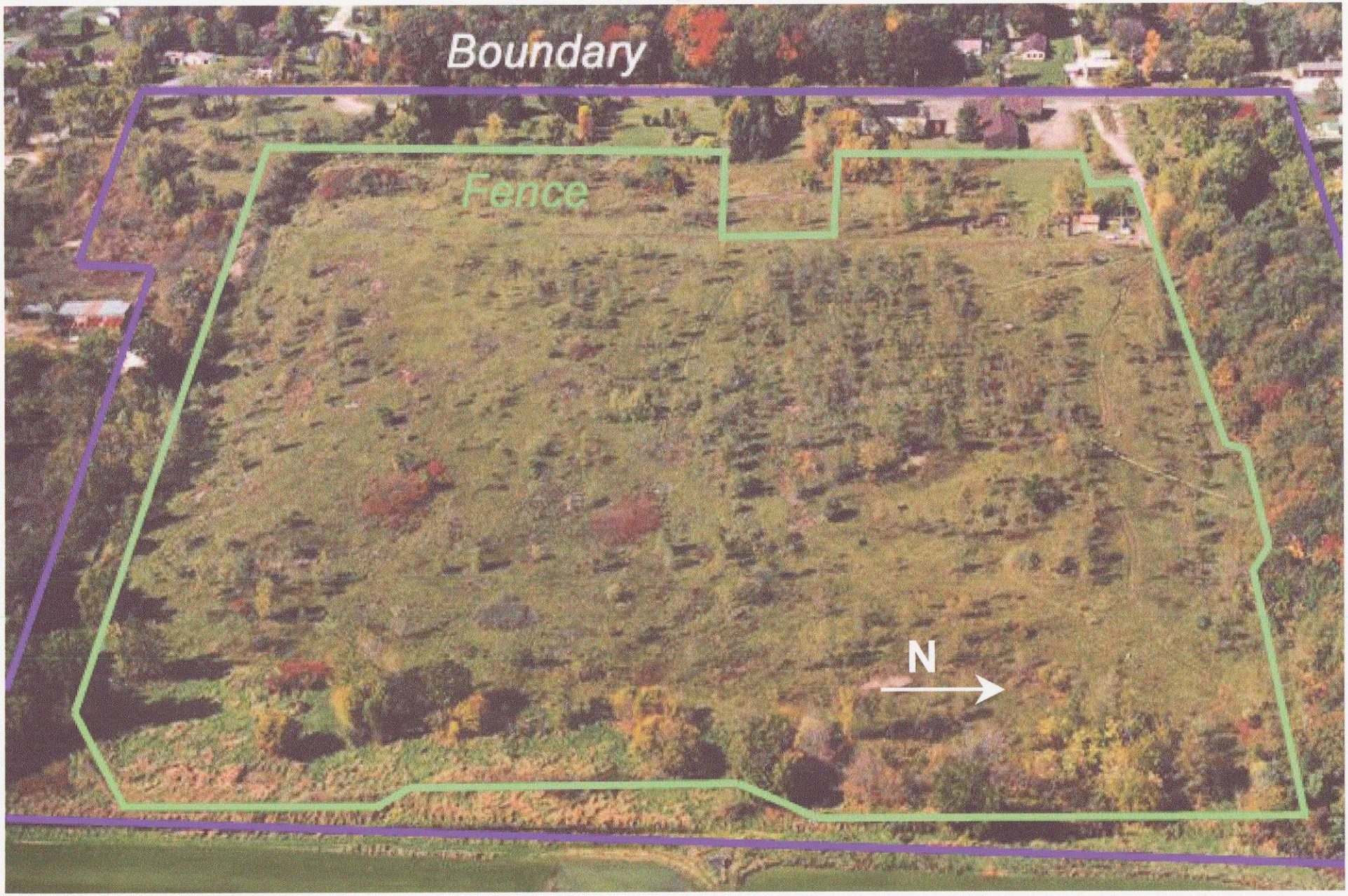
1997 PHOTOGRAPH OF THE IEL SITE

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.3	N.T.S.

FIGURE
3



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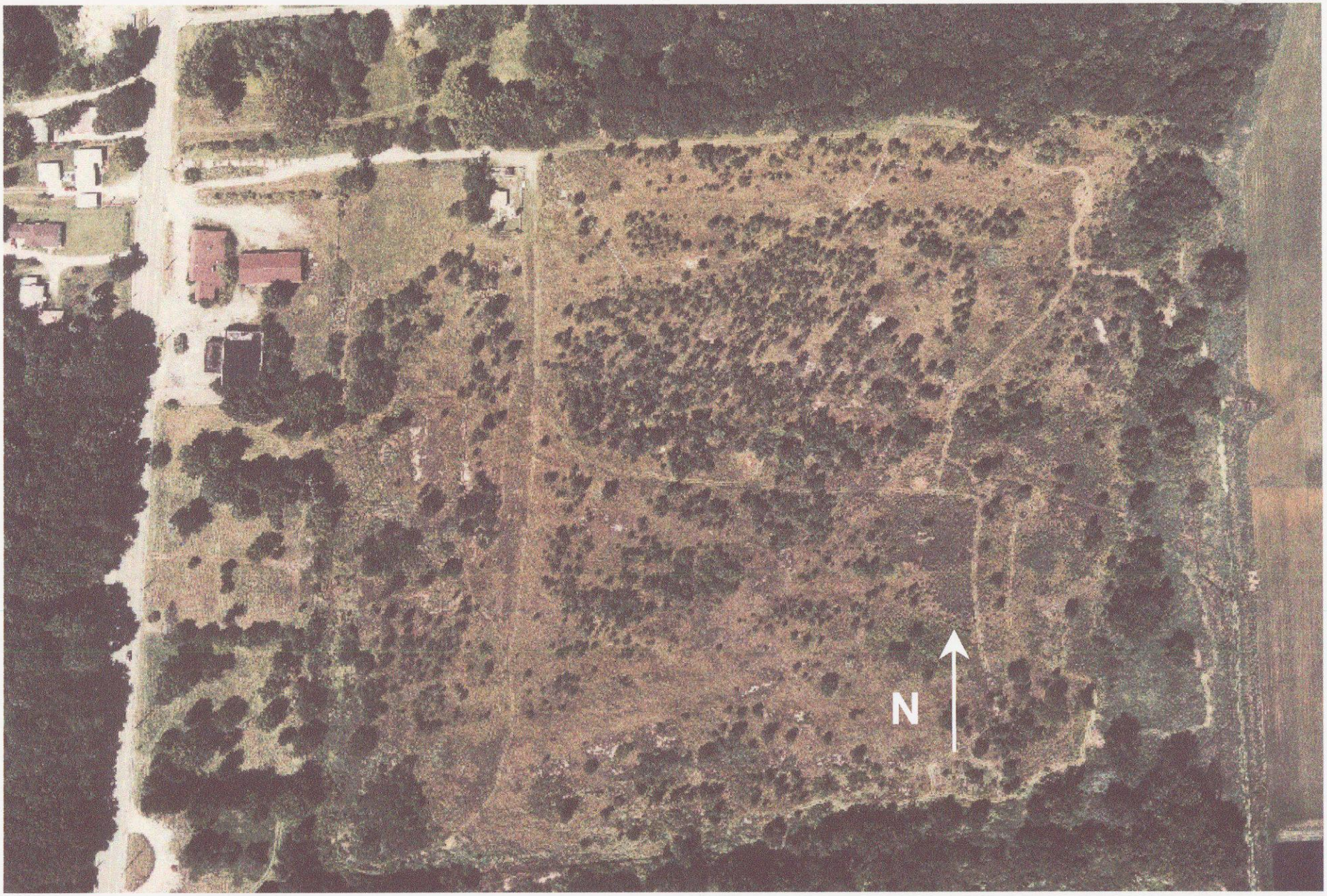
1997 PHOTOGRAPH WITH SITE FENCE AND SITE BOUNDARY NOTED

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.4	N.T.S.

FIGURE
4



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AUGUST 2000 PHOTOGRAPH OF THE IEL SITE

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.5	N.T.S.

FIGURE
5

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AUGUST 2000 PHOTOGRAPH WITH SITE FENCE AND SITE BOUNDARY NOTED

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.6	N.T.S.

FIGURE
6

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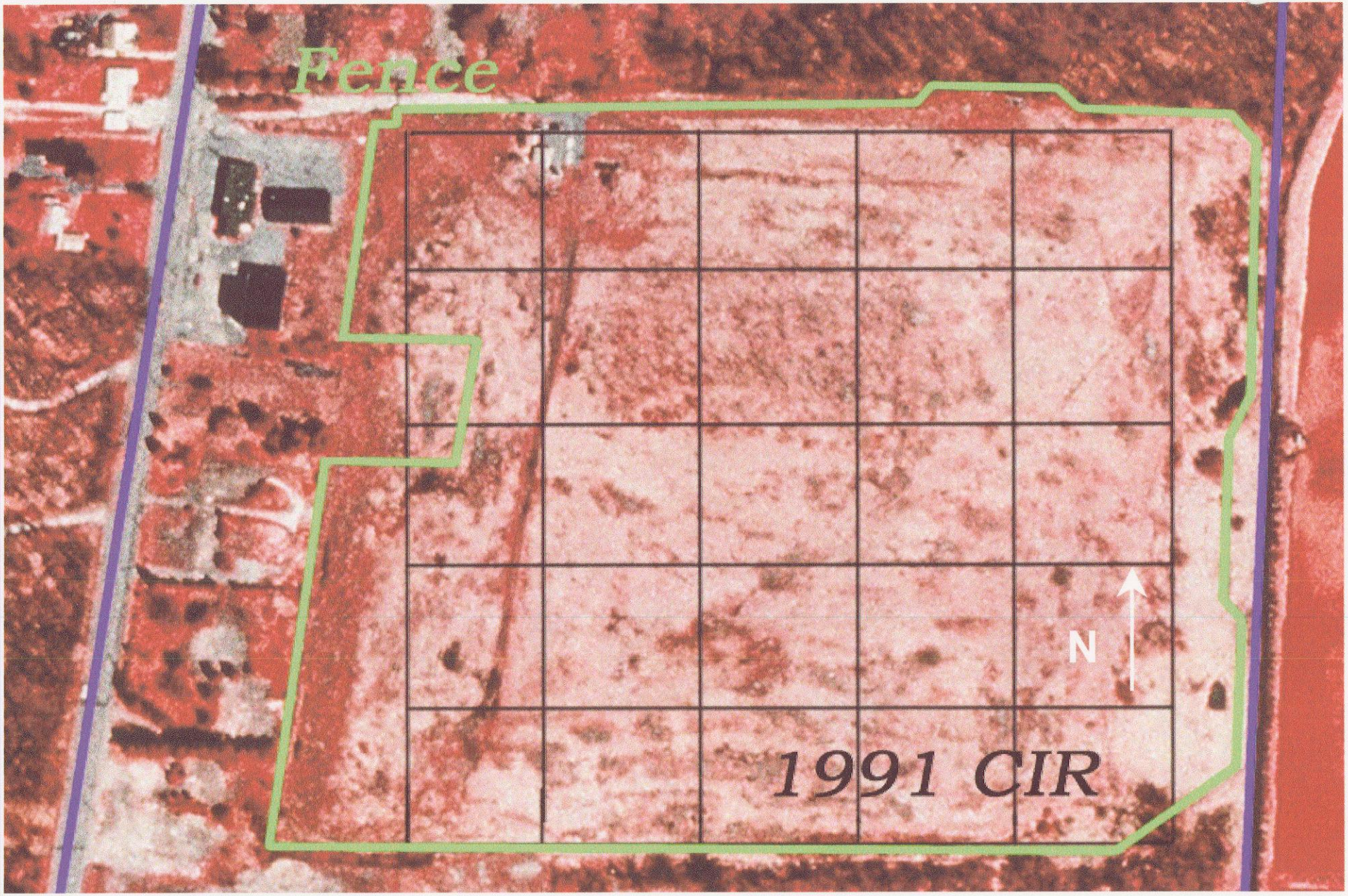
1991 COLOR INFRARED PHOTO OF IEL SITE

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.7	N.T.S.

FIGURE
7



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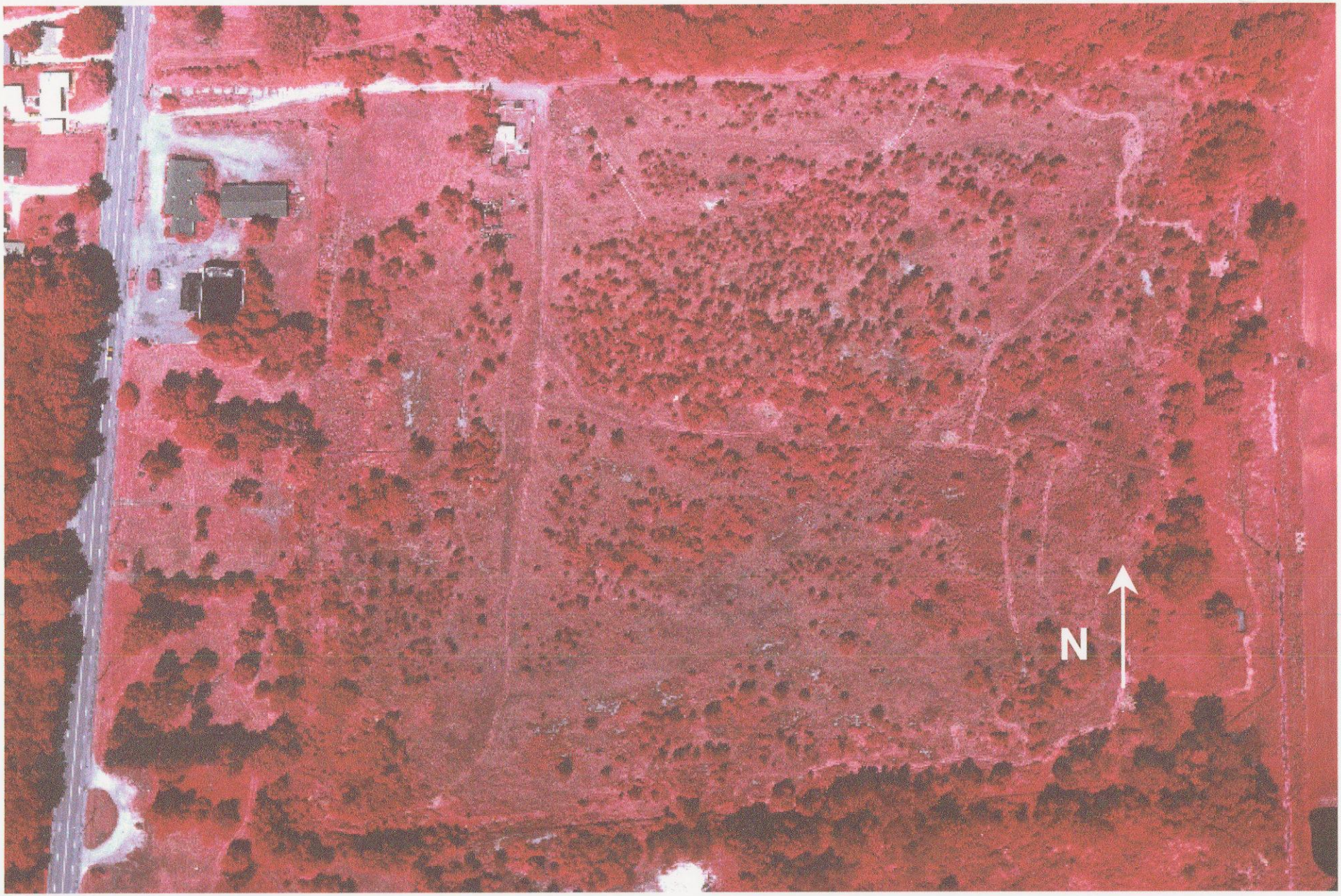
1991 COLOR INFRARED PHOTO WITH SITE FENCE AND SITE BOUNDARY NOTED

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.8	N.T.S.

FIGURE
8



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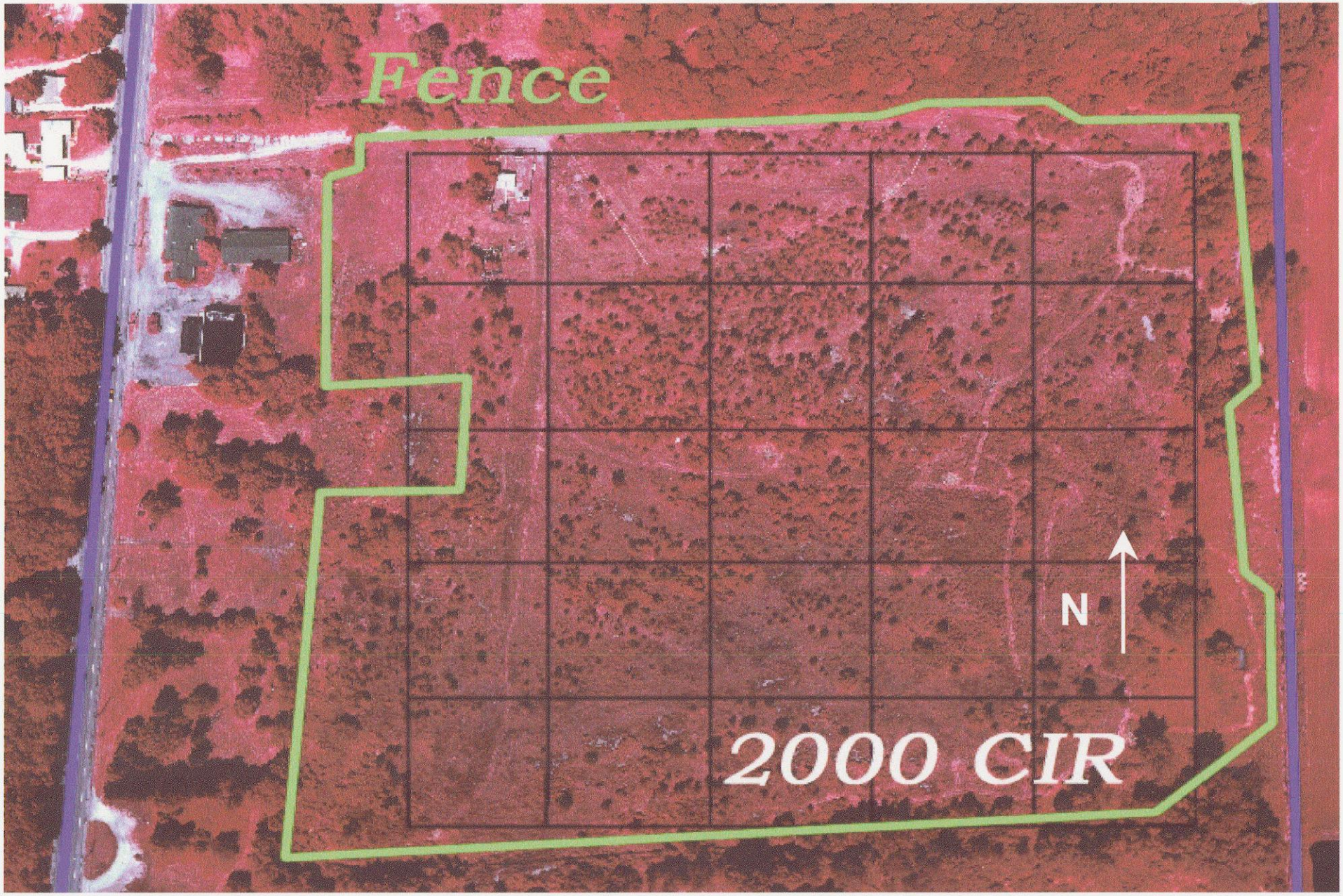
AUGUST 2000 COLOR INFRARED PHOTOGRAPH OF THE IEL SITE

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.9	N.T.S.

FIGURE
9



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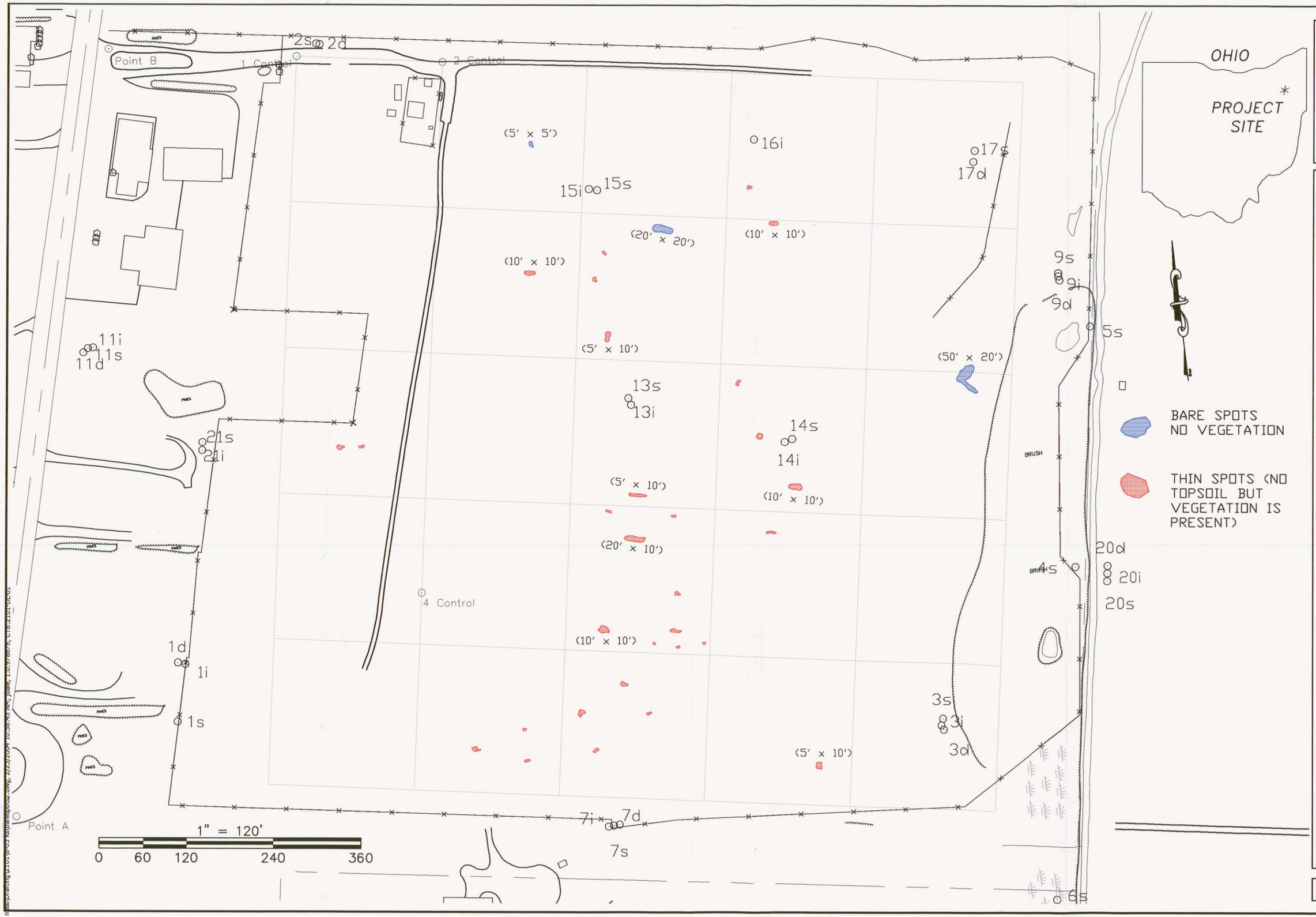
AUGUST 2000 COLOR INFRARED PHOTO WITH SITE FENCE AND SITE BOUNDARY

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.10	N.T.S.

FIGURE
10


Point B
1 Control
2 Control
4 Control
Point A
2s 2d
11i 11s 11d
21s 21i
1d 1i 1s
(5' x 5')
15i 15s
16i
17s 17d
(20' x 20')
(10' x 10')
(10' x 10')
(5' x 10')
13s 13i
14s 14i
(5' x 10')
(10' x 10')
(20' x 10')
(10' x 10')
(5' x 10')
(50' x 20')
9s 9i 9d
5s
BRUSH
4s
20d 20i 20s
3s 3i 3d
7i 7d 7s
6s
1" = 120'
0 60 120 240 360
OHIO
PROJECT SITE
BARE SPOTS NO VEGETATION
THIN SPOTS (NO TOPSOIL BUT VEGETATION IS PRESENT)
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COLUMBUS, OHIO 43229
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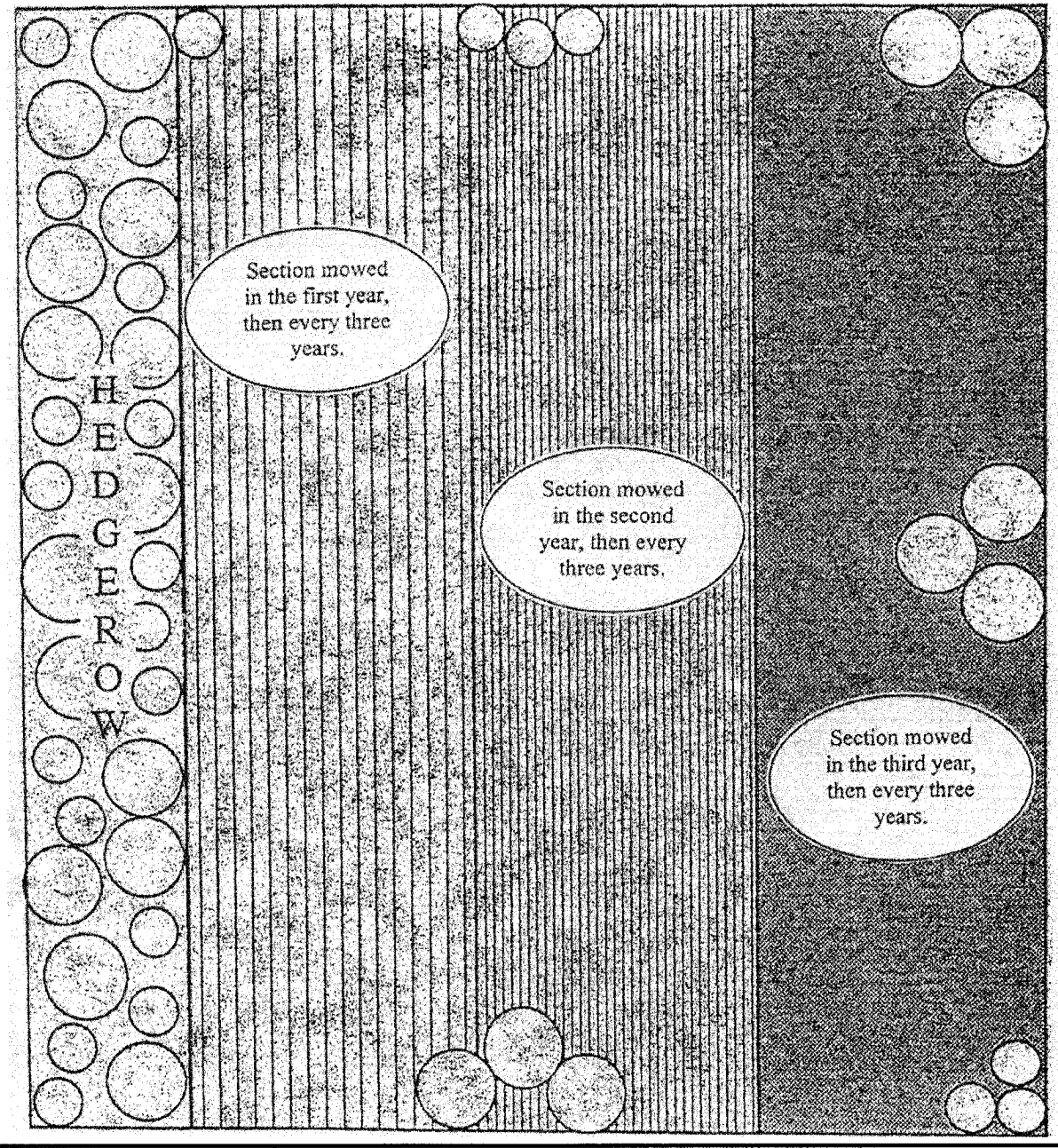
Project Reference: 2101
IEL UNIONTOWN, OHIO
Client: IEL PRP GROUP
IEL SITE CONDITIONS JULY 31, 2003

FIGURE 11



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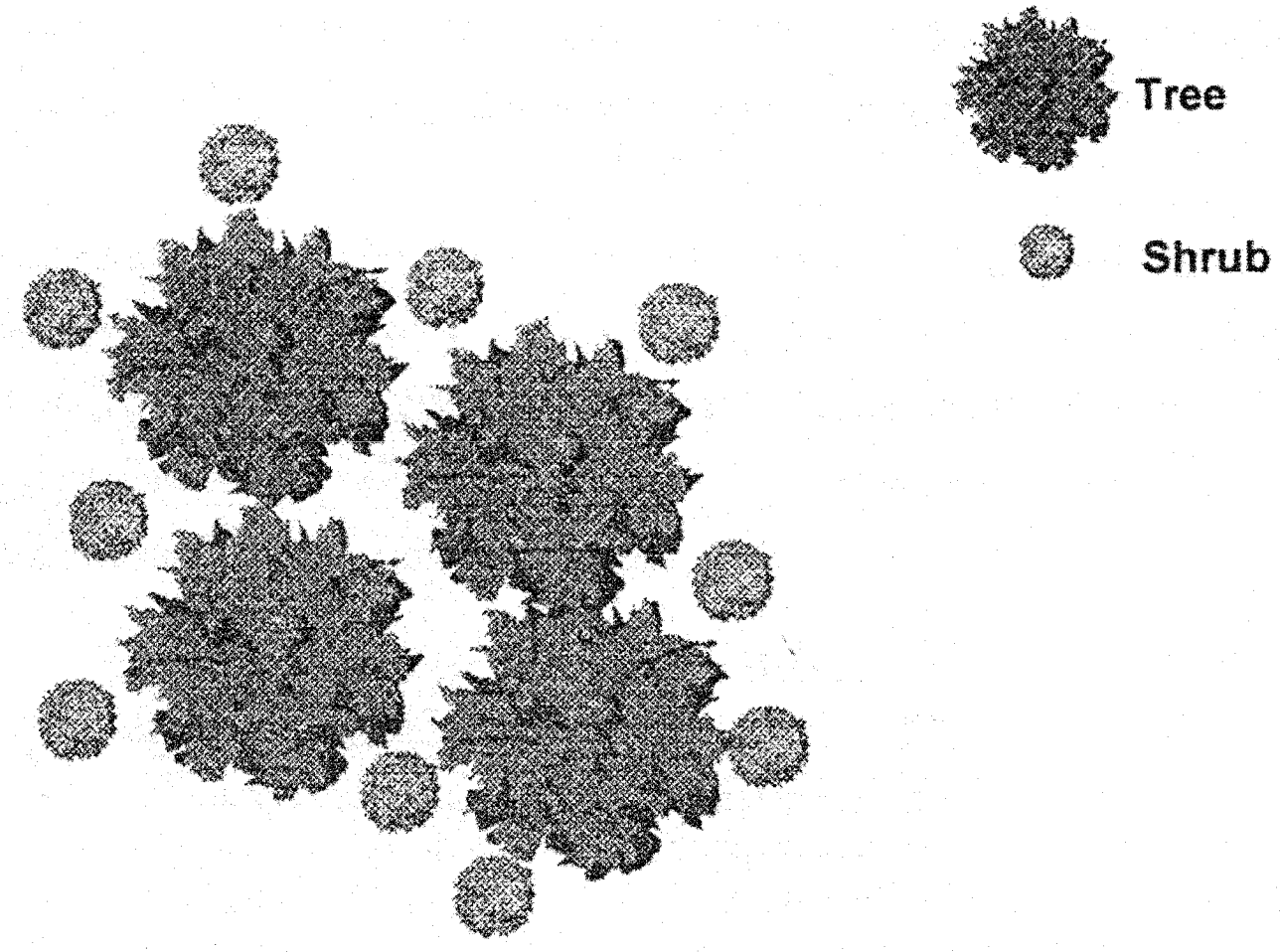
CONCEPTUAL ROTATION MOWING PROGRAM (FROM WHC REPORT)

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.12	N.T.S.

FIGURE
12



Trees should be planted 12 feet apart

Shrubs should be planted 3 feet apart

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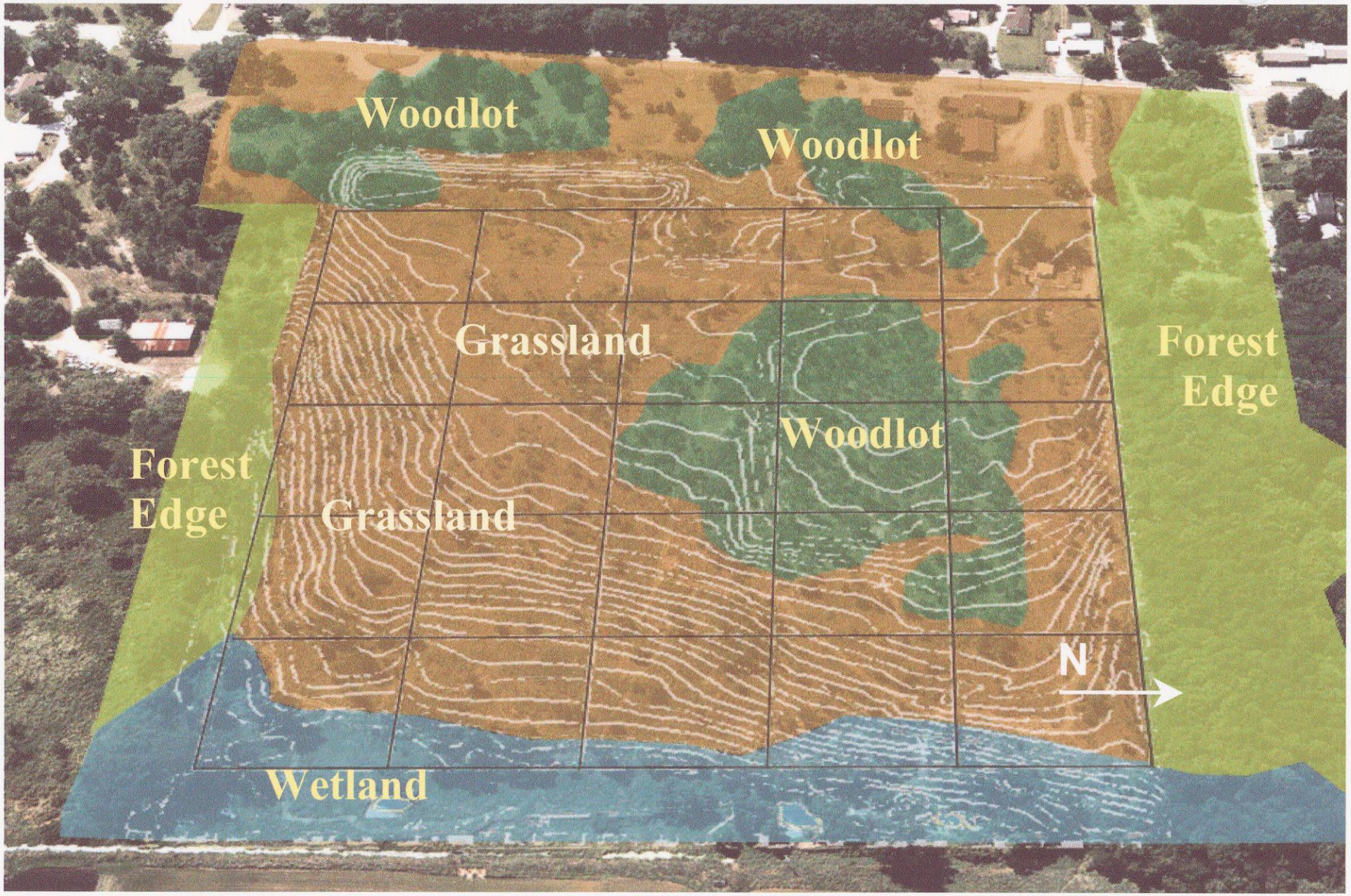
CONCEPTUAL FORESTED ISLAND (FROM WHC REPORT)

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.13	N.T.S.

FIGURE
13



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CURRENT (AUGUST 2000) ECOLOGICAL REGIMES (FIGURE 1 FROM PETITION)

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.14	N.T.S.

FIGURE
14

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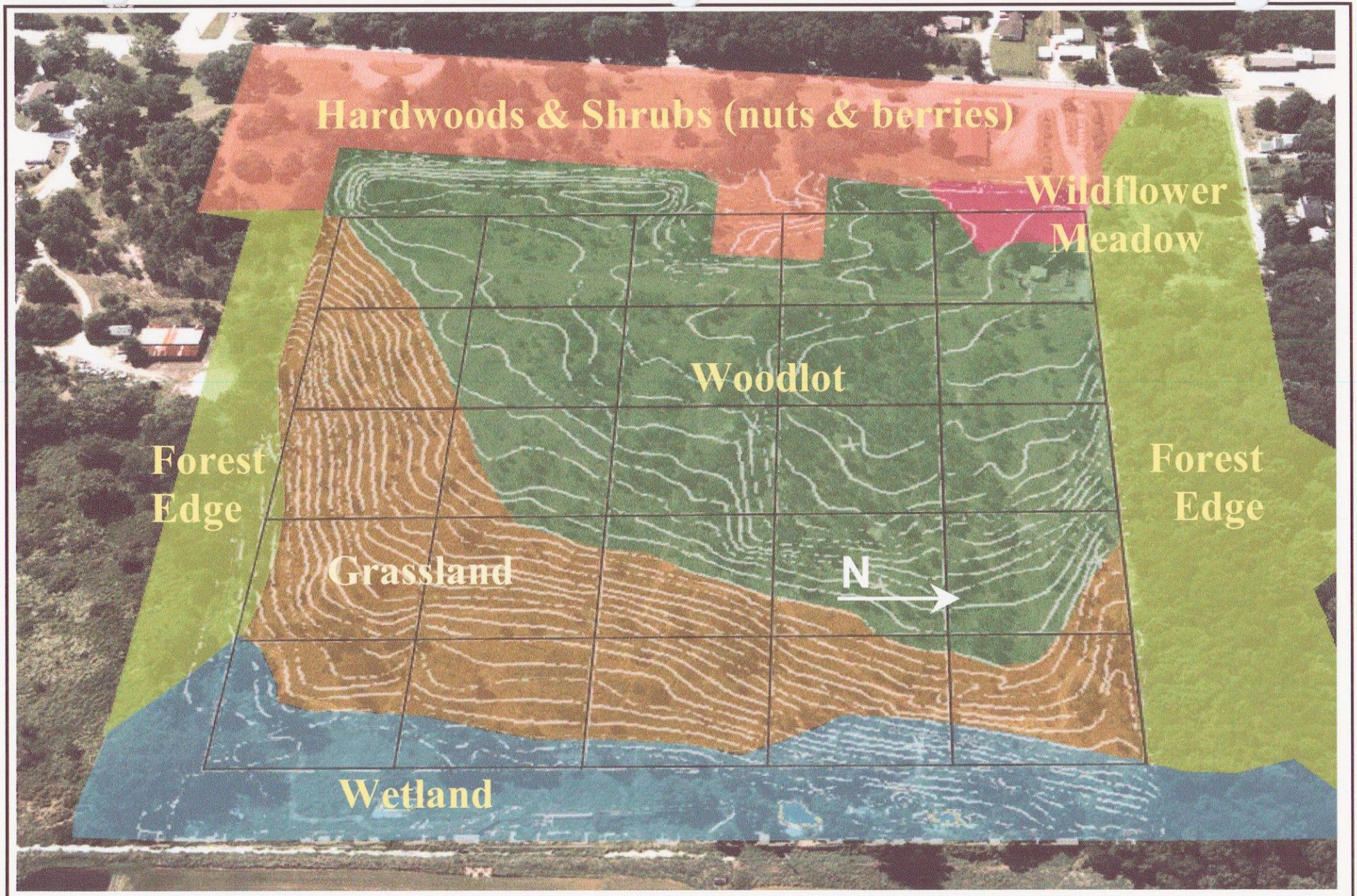
PROPOSED TREE PLANTING AREA (FIGURE 2 FROM PETITION)

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.15	N.T.S.

FIGURE
15



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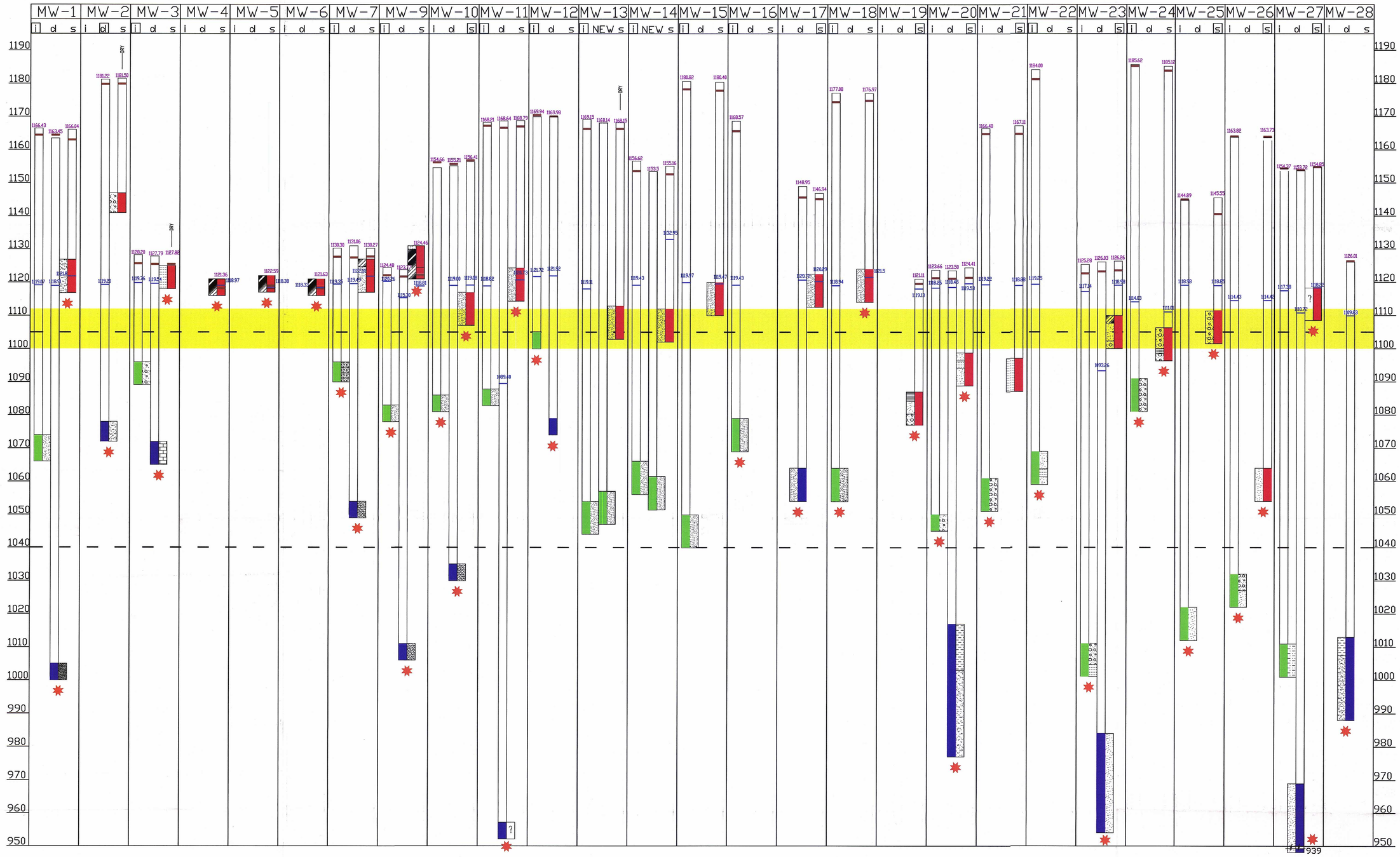
FUTURE ECOLOGICAL REGIMES (FIGURE 3 FROM PETITION)

INDUSTRIAL EXCESS LANDFILL
UNIONTOWN, OHIO

PROJECT NUMBER	DATE	FILE NAME	SCALE
2101	08/15/03	2101/FIG.16	N.T.S.

FIGURE 16



LEGEND

- SHALLOW (s) WELLS - SCREENED INTERVAL
- INTERMEDIATE (i) WELLS - SCREENED INTERVAL
- DEEP (d) WELLS - SCREENED INTERVAL
- NO GROUNDWATER CONTAMINANTS DETECTED FOR +10 YEARS
- 1,100-1,112' ZONE MAPPED BY THE USGS.
- INTERPRETED AS REPRESENTING UPPERMOST CONTINUOUS GW UNIT
- XXX.XX AUG. 2000 GROUNDWATER ELEVATION
- XXX.XX TOP OF CASINGS ELEVATION (SEPT. 26, 2000)
- GROUND ELEVATION (AUG. 2000)

REFERENCE: DUMOUCHELLE, DENISE H. AND BAIR SCOTT E, 1994 GROUND-WATER LEVELS AND DIRECTIONS OF FLOW NEAR INDUSTRIAL EXCESS LANDFILL, UNIONTOWN, OHIO, MARCH 1994, USGS WATER-RESOURCES INVESTIGATION REPORT 94-4136, 17p.

LITHOLOGIES ADJACENT TO MW SCREENS:

- LIMESTONE
- PEAT
- SAND
- SANDSTONE
- SILT
- PEBBLES, COBBLES, GRAVEL
- SANDSTONE/ SILTSTONE
- SHALE
- SANDY GRAVEL; SAND & GRAVEL
- CLAYEY SAND
- CLAY

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IEL MONITORING WELLS WELL DESIGNATION & COMPLETION DEPTH

FILE NAME: 2101-ISD-WELLSREV03	DATE: 8/8/03	FIGURE A2
PROJECT #: 2101	SCALE: N.T.S.	

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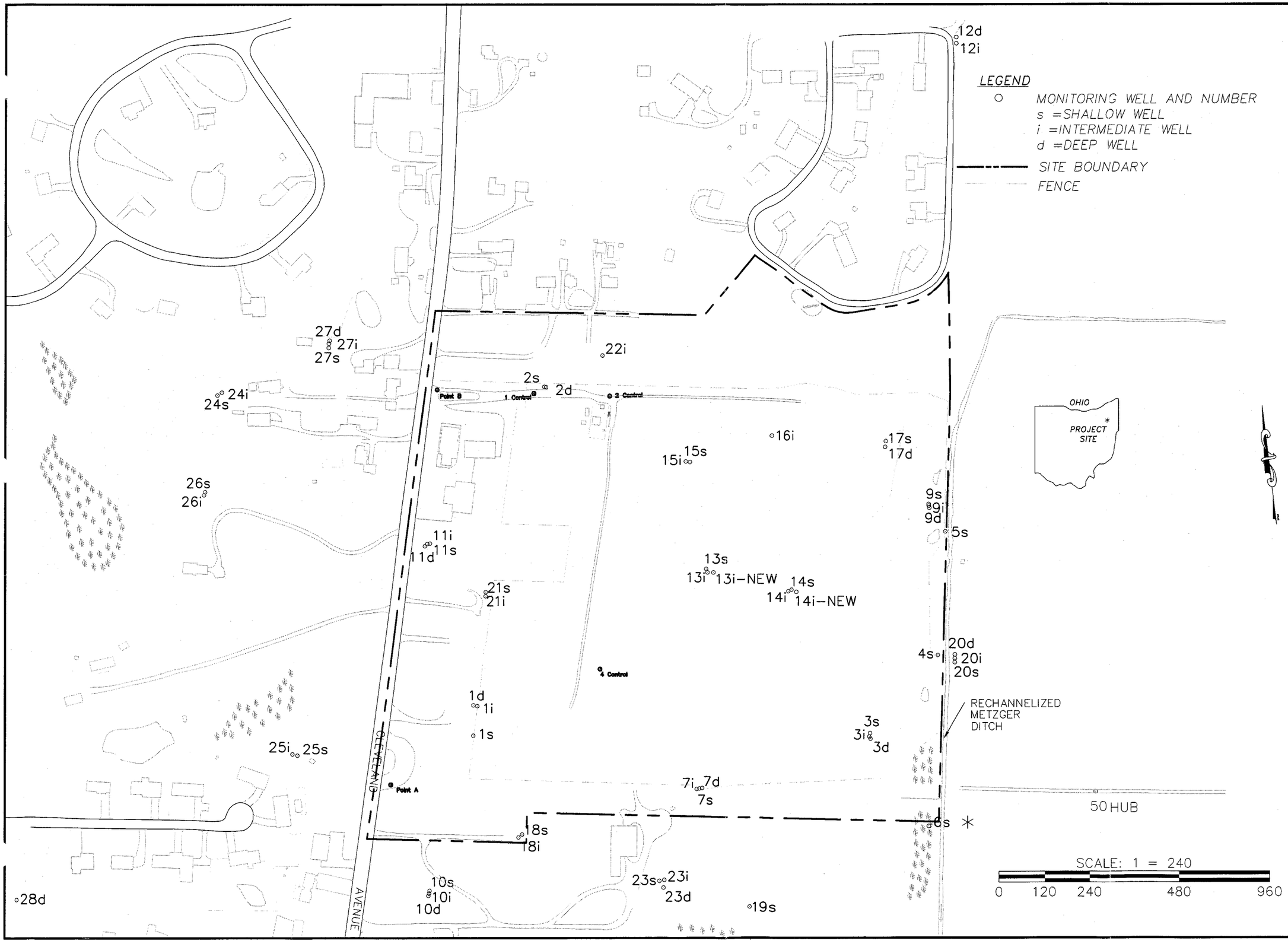

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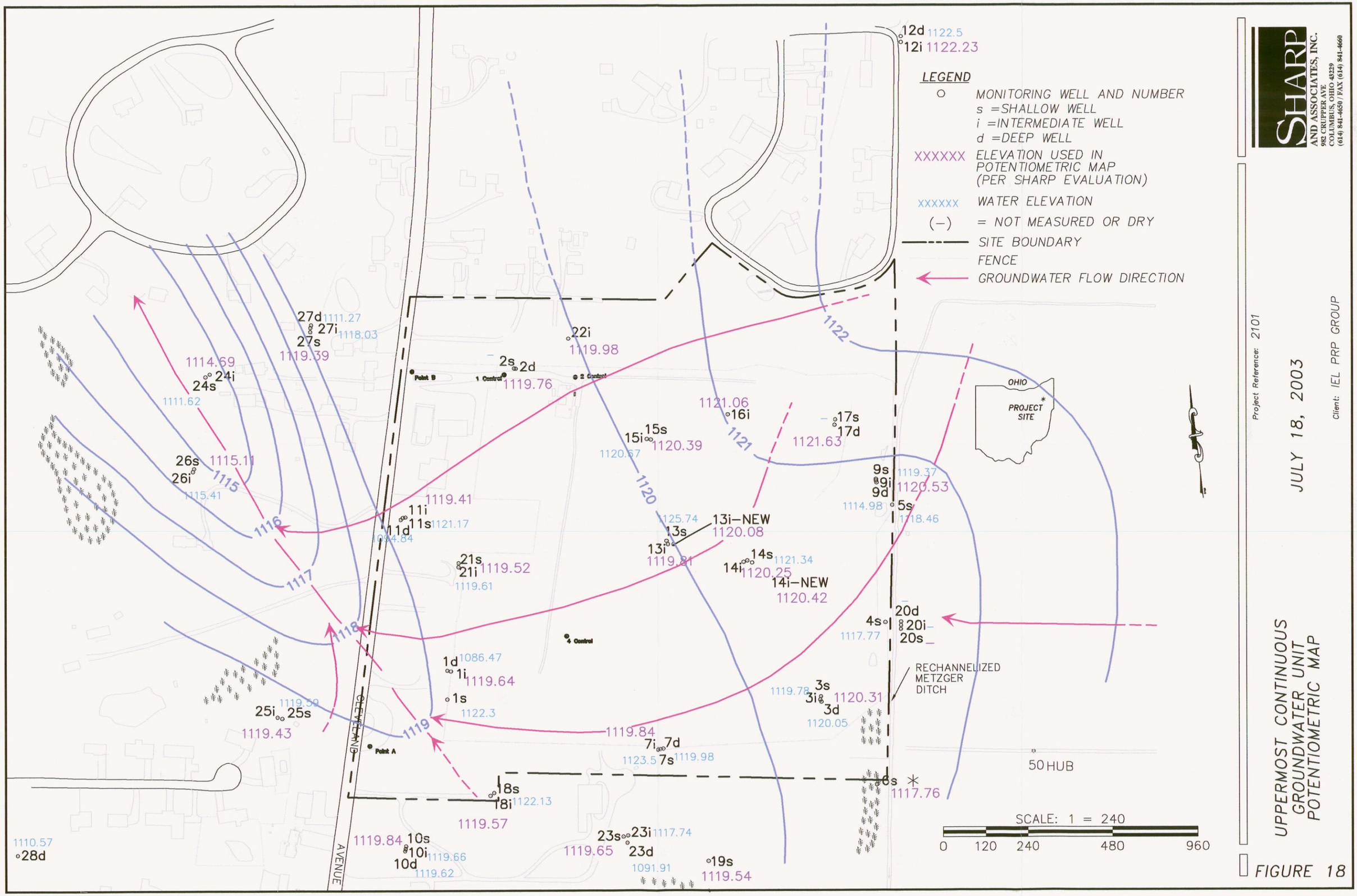
Project Reference: 2101

Client: IEL PRP GROUP

IEL SITE MAP W/CURRENT
MONITORING WELL NETWORK

FIGURE 17

R:\2101\8-03 ks\2101-ks-01.dwg, 2/20/2004 9:38:34 AM, jbale, 1:240, CTB:2101-DL-01



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Project Reference: 2101

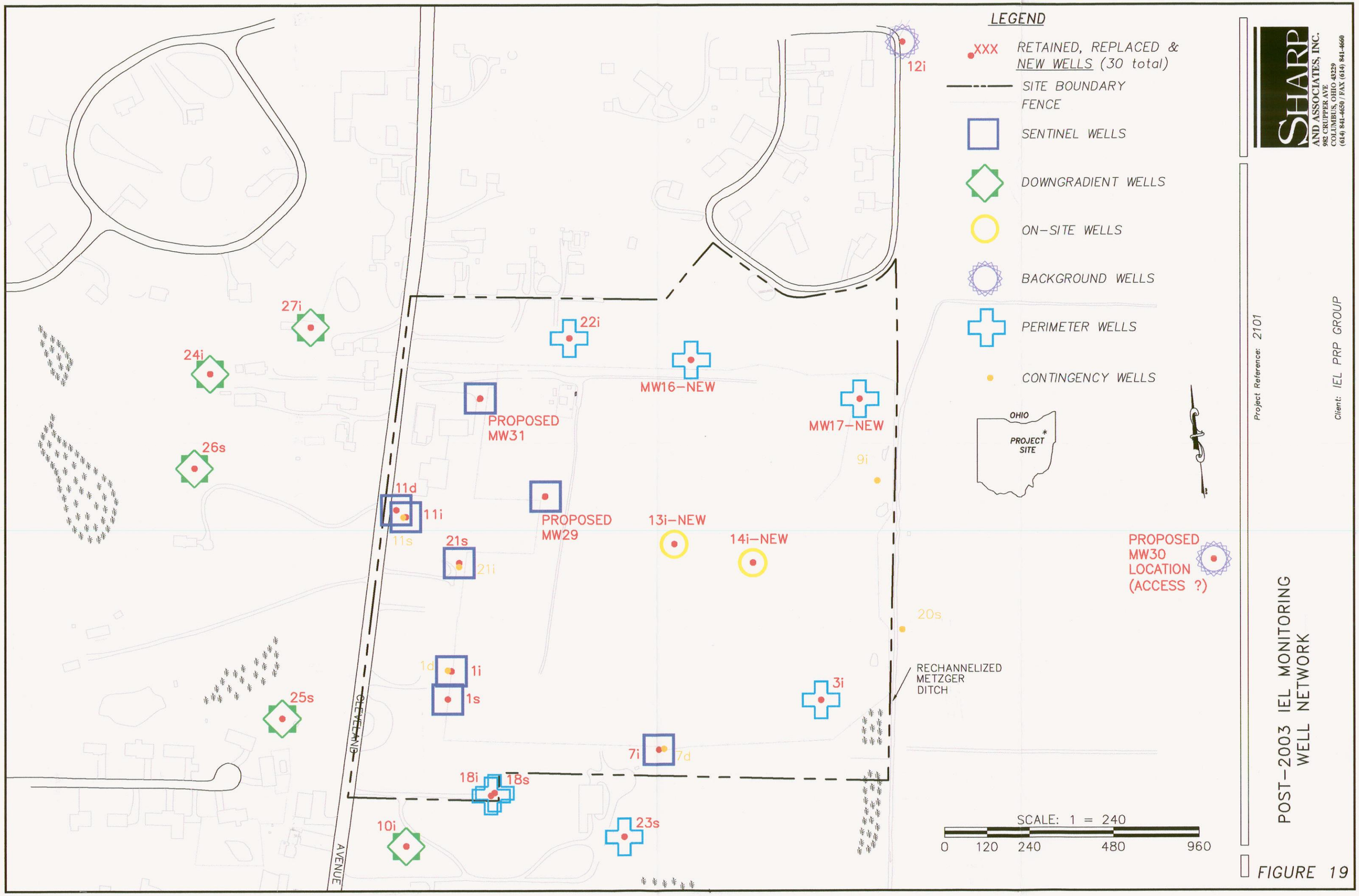
JULY 18, 2003

Client: IEL PRP GROUP

UPPERMOST CONTINUOUS GROUNDWATER UNIT POTENTIOMETRIC MAP

FIGURE 18

ness\Drafting\2101\8-03 ks\2101-KS-02.dwg, 2/23/2004 10:54:40 AM, jbale, 1:233.396, CTB:2101-DL-01



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COLUMBUS, OHIO 43229
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Project Reference: 2101

Client: IEL PRP GROUP

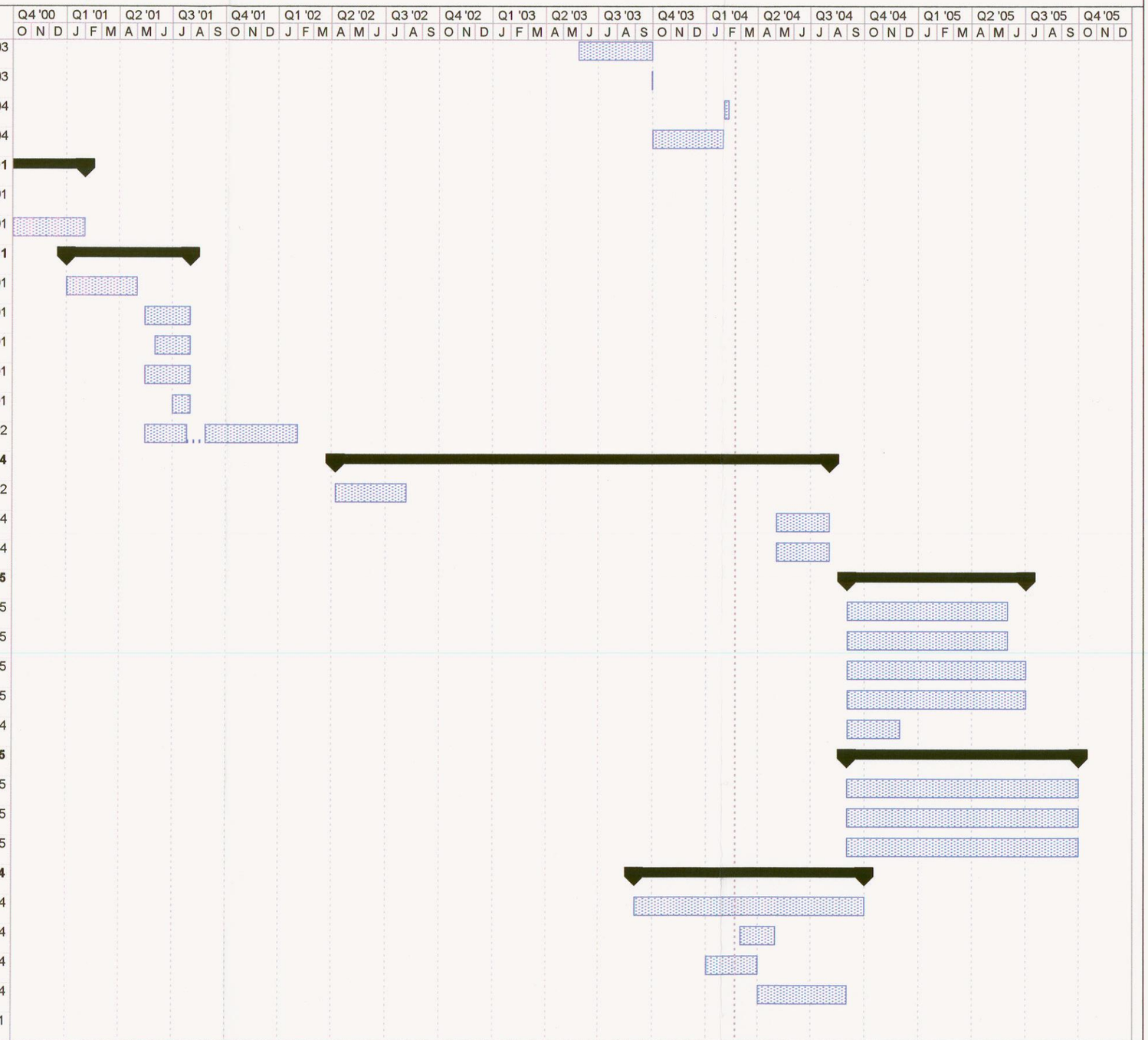
POST-2003 IEL MONITORING WELL NETWORK

FIGURE 19

\\Colbusiness\Drafting\2101\8-03 ks\2101-ks-04rev1.dwg, 2/23/2004 10:56:46 AM, jbale, 1:240.216, CTB:2101-DL-01

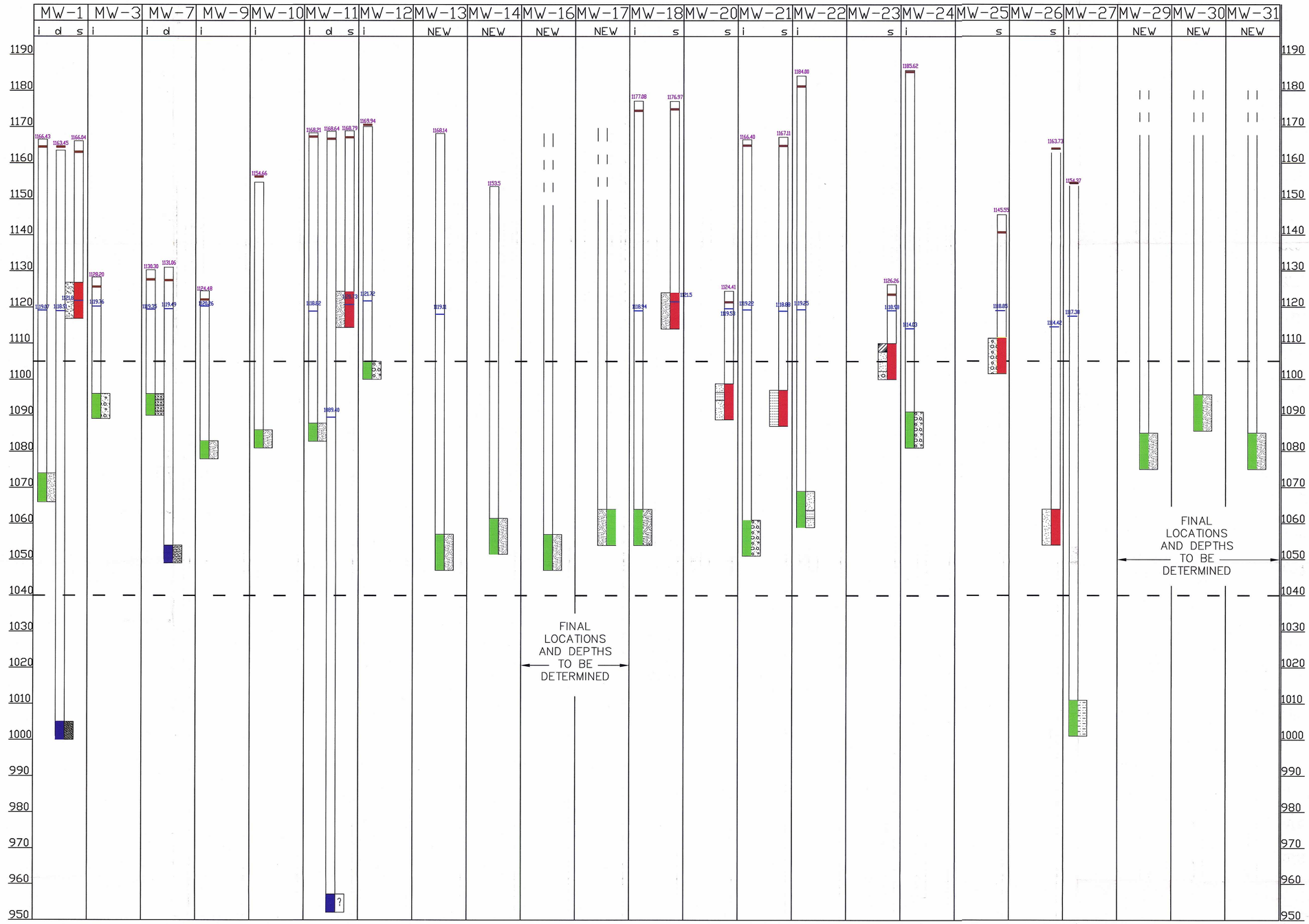
Figure 20. IEL Remedial Implementation Schedule

ID	ID	Task Name	Duration	Start	Finish
1	1	Detailed Design Submittals through Approval	90 days	Wed 5/28/03	Tue 9/30/03
2	2	Notice to Proceed	1 day	Tue 9/30/03	Tue 9/30/03
3	3	Mobilization/Demobilization	6 days	Mon 2/2/04	Mon 2/9/04
4	4	Revise Work Plans, through approval	88 days	Wed 10/1/03	Fri 1/30/04
5	**5**	**Pre-Remedy**	**2633 days**	**Tue 1/1/91**	**Thu 2/1/01**
6	6	Provide for alternate water supply	261 days	Tue 1/1/91	Tue 12/31/91
7	7	Characterize/Remove/Dispose Investig'n-Derived Was	89 days	Mon 10/2/00	Thu 2/1/01
8	**8**	**Demolish Buildings along Cleveland Avenue**	**153 days**	**Mon 1/1/01**	**Tue 7/31/01**
9	9	Prepare plans through approval process	87 days	Mon 1/1/01	Tue 5/1/01
10	10	Properly abandon 8 USTs	57 days	Tue 5/15/01	Tue 7/31/01
11	11	Properly abandon 2 monitoring wells and 2 septic	44 days	Fri 6/1/01	Tue 7/31/01
12	12	Demolish 3 buildings and dispose of waste	57 days	Tue 5/15/01	Tue 7/31/01
13	13	Regrade and revegetate	23 days	Sun 7/1/01	Tue 7/31/01
14	14	Remove debris from site and dispose	168 days	Tue 5/15/01	Fri 2/1/02
15	**15**	**Re-work Monitoring Well Network**	**608 days**	**Mon 4/8/02**	**Mon 8/2/04**
16	16	Install new/replacement wells on-site, double case	86 days	Mon 4/8/02	Mon 8/5/02
17	17	Install new wells	67 days	Mon 5/3/04	Mon 8/2/04
18	18	Properly abandon monitoring/observation wells	67 days	Mon 5/3/04	Mon 8/2/04
19	**19**	**Enhance Vegetative Cover**	**217 days**	**Thu 9/2/04**	**Fri 7/1/05**
20	20	Plant trees (incl. Yr 1/2 replacements)	194 days	Thu 9/2/04	Tue 5/31/05
21	21	Plant Shrubs for edge environments	194 days	Thu 9/2/04	Tue 5/31/05
22	22	Establish grassland area through mowing	217 days	Thu 9/2/04	Fri 7/1/05
23	23	Remove invasive non-native species	217 days	Thu 9/2/04	Fri 7/1/05
24	24	Add soil / admendments to bare areas	64 days	Thu 9/2/04	Tue 11/30/04
25	**25**	**Wildlife Management Improvements**	**283 days**	**Wed 9/1/04**	**Fri 9/30/05**
26	26	Consulting/coordinating/implementing nest boxes, rap	283 days	Wed 9/1/04	Fri 9/30/05
27	27	Edge environments/brush piles, ect.	283 days	Wed 9/1/04	Fri 9/30/05
28	28	Wildflower meadows/hummingbird gardens	283 days	Wed 9/1/04	Fri 9/30/05
29	**29**	**Additional Studies**	**286 days**	**Mon 9/1/03**	**Thu 9/30/04**
30	30	WHC Studies and CAG Integration	286 days	Mon 9/1/03	Thu 9/30/04
31	31	Restore fencing and signage	45 days	Mon 3/1/04	Fri 4/30/04
32	32	Methane study	65 days	Thu 1/1/04	Wed 3/31/04
33	33	Future Use Risk Assessment	111 days	Thu 4/1/04	Tue 8/31/04
34	34	CERCLA 5-year review(s) (begin 9/2006 and 9/2011)	1326 days	Fri 9/1/06	Fri 9/30/11



Project: IEL Schedule Outline
Date: Fri 2/20/04

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline



LEGEND

- SHALLOW (s) WELLS - SCREENED INTERVAL
- INTERMEDIATE (i) WELLS - SCREENED INTERVAL
- DEEP (d) WELLS - SCREENED INTERVAL

XXX.XX AUG. 2000 GROUNDWATER ELEVATION

XXX.XX TOP OF CASINGS ELEVATION (SEPT. 26, 2000)

GROUND ELEVATION

LITHOLOGIES ADJACENT TO MW SCREENS:

- SAND
- SILT
- SANDSTONE
- SANDY GRAVEL; SAND & GRAVEL
- CLAYEY SAND
- CARLISLE MUCK

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INDUSTRIAL EXCESS LANDFILL
REVISED MONITORING
WELL NETWORK

FILE NAME: 2101-FIG A-3.dwg	DATE: 9/19/03	FIGURE
PROJECT #: 2101	SCALE: N.T.S.	A3

R:\2101\8-03 fig\2101-FIG A-3.dwg, 2/20/2004 11:56:09 AM, jbate, 1:1, CTB:61051