Environmental Protection Agency

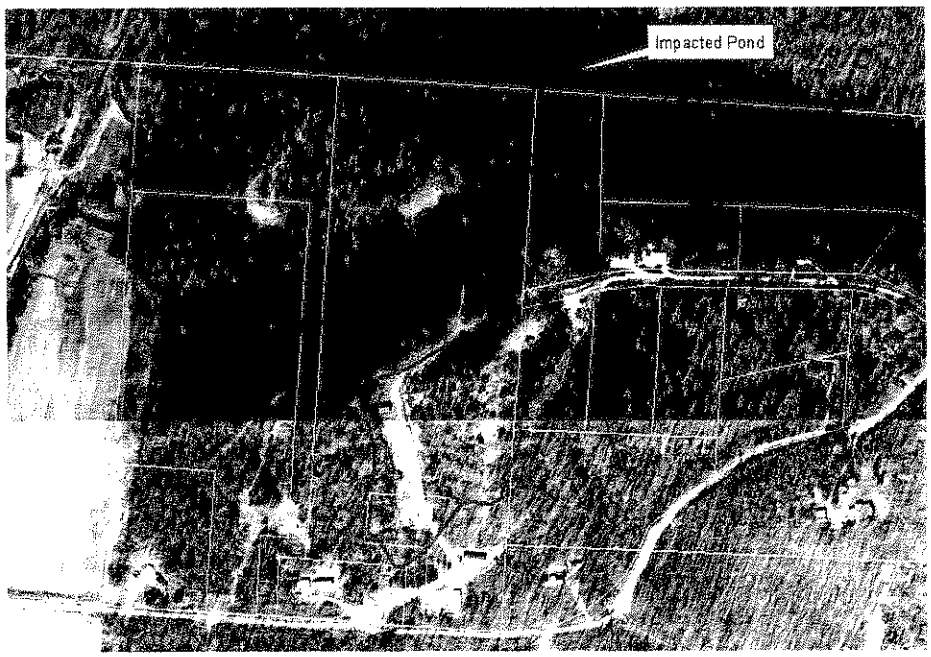
Division of Emergency and Remedial Response

DECISION DOCUMENT

FOR THE REMEDIATION OF THE

GREEN I LANDFILL

GREEN TOWNSHIP, HOCKING COUNTY, OHIO



Ted Strickland, Governor
Lee Fisher, Lt. Governor
Chris Korleski, Director

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: [signature] Date: 11-22-10

DECLARATION

SITE NAME AND LOCATION

Green I Landfill
Green Township, Hocking County, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Green I Landfill in Green Township, Hocking County, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency, statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of industrial, hazardous and other wastes at the Site, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health or safety and are causing or contributing to air or water pollution or soil contamination. Green I Landfill accepted municipal, industrial, and other wastes from 1970 to 1974. Ohio EPA's investigation of the Green I Landfill has determined that hazardous substances were disposed of in the landfill. These hazardous substances have been identified in the leachate (*i.e.*, water that has come into contact with buried landfill wastes) emanating from the Site.

DESCRIPTION OF THE SELECTED REMEDY

Ohio EPA's selected remedy for the Green I Landfill includes:

- Construction of a multi-layer landfill cap[1] that will include an impermeable flexible membrane liner, a clay layer, a drainage layer, a protective layer and a vegetative cover;

- Collection and storage (or treatment) of leachate discharging from the nine seeps at the perimeter of the landfill to prevent direct contact and discharge to surface water;

- A one-time removal and treatment of contaminated surface water from the adjacent property pond;

- Excavation of pond sediments on an adjacent property (contaminated by activities at the Site), for disposal under the landfill cap, and reasonable restoration of this area; and

[1] A multi-layer cap will be constructed based upon a design submitted during the Remedial Design phase of the project. This design will be approved by Ohio EPA and may include modifications in the event that Ohio EPA staff determine that the multi-layer cap as described cannot be constructed on specific areas of the Site.

- Development of a long-term operation and maintenance plan that will include periodic sampling of ground water and inspection of the installed landfill cap.

Ohio EPA finds that these measures will protect public health and the environment by reducing risk to acceptable levels once the remedial action objectives have been achieved.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input, and is cost-effective. The remedy uses permanent solutions and treatment technologies to the maximum extent practicable to reduce toxicity, mobility, and volume of hazardous substances at the Site. The effectiveness of the remedy will be reviewed regularly.

Chris Korleski, Director

11/19/10
Date

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for the Green I Landfill
Green Township, Hocking County, Ohio

1.0 SUMMARY OF SITE CONDITIONS

1.1 Site History

The Green I Landfill is located on Hunters Woods Road in Green Township, Hocking County, Ohio (see Figure 1) approximately one and three-quarters miles north of the City of Logan. From 1970 to 1974, the Green I Landfill was owned and operated by Lee and Evelyn Notestine. Richard Donahey assisted with operations. Later, Mr. Notestine and Mr. Donahey became business partners. In 1978, Mr. Notestine sold his interest to Mr. Donahey, who is now deceased. In 1979, the plat for the Hunters Woods Subdivision was filed in the Hocking County Recorder's Office. From 1975 to 1990, the landfill property was owned by Mr. Donahey, but the mortgage was held by Citizen's Bank of Hocking County. Approximately six of the 10.6 acres of the landfill were auctioned to private individuals in the fall of 1989, which led to the further development of the area.

The majority of the landfill, along with additional acreage, was sold to Leslie Johnson on May 4, 1990, at a sheriff's auction. In 1991, Mr. Johnson subdivided the property into three sections and sold approximately 22 acres, which included most of the Green I Landfill, to Mr. Bill Hamby. Goodyear purchased all of the property on which the landfill is situated during the Remedial Investigation.

The Green I Landfill was the only local disposal facility near Logan, Ohio, in the early 1970s and accepted household, municipal, industrial, and other wastes. Goodyear's local production facility disposed of approximately 4,600 drums of liquid industrial wastes (The Goodyear Tire & Rubber Company, Wolfe, D.L., 1983). These drummed wastes included polyols (an alcohol compound), isocyanates, alcohols, oils, waxes, paints, solvents, and paint booth cleanings. In addition, Goodyear also disposed of various solid wastes at the Green I Landfill. The General Electric Company (GE) also disposed of solid wastes at the Green I Landfill. These wastes included broken glass, floor sweepings, glass batch and flue dust residues as well as furnace refractories (General Electric, Michael Lamanna, 1990).

The Green I Landfill design was approved by the Ohio Department of Health in 1970. At the time the Green I Landfill operated, it was regulated by the Hocking County Health Department. Records obtained from the Hocking County Health Department and subsequent inspections performed by Ohio EPA indicate that the landfill was never properly closed pursuant to the rules in effect in 1974. In 1983, U.S. EPA installed four ground water monitoring wells at Green I Landfill and identified ground water contamination attributable to the landfill. Following this U.S. EPA investigation, Ohio EPA conducted a Preliminary Assessment and Green I Landfill was prioritized for additional investigation.

In 1990, additional soil and ground water samples were collected by Ohio EPA, which confirmed the presence of various contaminants of concern. In November 1990, while

attempting to reclaim an oil well, approximately ten (10) buried drums were exposed during excavation activities at the Site. A black tar-like substance began to surface and sampling indicated that the material contained a variety of chemicals including polychlorinated biphenyls (PCBs). An emergency action was initiated involving U.S. EPA and Ohio EPA. During this emergency response action, approximately 100 drums and 370 tons of soil were removed from the Site and disposed of at a licensed facility authorized to accept such waste. PCB contamination of soils remained following the removal action and a U.S. EPA contractor treated the PCB contaminated soils in place.

In 1991, Ohio EPA conducted a geophysical study of the Green I Landfill to determine the approximate limits of waste placement. A secondary objective of the geophysical study was to attempt to identify areas within the landfill waste where large amounts of metals were detectable in order to determine if additional mass drum disposal had occurred. In 1994, a U.S. EPA contractor (PRC Environmental Management) evaluated the Site for inclusion on the National Priorities List (NPL) due to the threat posed to human health and the environment. The U.S. EPA contractor affirmed the presence of contamination, but determined that the Green I Landfill did not meet the requirements for inclusion on the NPL.

In an effort to monitor the safety of the ground water used by local residents near Green I Landfill, Ohio EPA conducted periodic private water well sampling from 1985 through 2003. All of the private water wells sampled were drawing water from the regional Big Injun/Blackhand Sandstone aquifer. Samples collected from private water wells have never detected landfill contaminants. Public water is available in the area of Green I Landfill; however, no service has been established on Hunters Woods Road. All residents in the area of the landfill utilize the regional aquifer for their potable water.

Based on their use of the Green I Landfill for disposal of hazardous substances, Goodyear and General Electric Corporation ("GE") were identified as responsible parties at the Green I Landfill. Goodyear signed the Ohio EPA Director's Final Findings and Orders to conduct a Remedial Investigation and Feasibility Study in 2002. Several interim actions were initiated for the protection of public health, safety and the environment. These interim actions included the installation of fencing at the Green I Landfill surrounding nine springs of contaminated water ("seeps") and additional sampling and study of two private water wells on and adjacent to the Site. The completion of these activities resulted in the abandonment of one of the private water wells because of poor construction. The remaining private water well was determined to have been constructed in a manner that provides for a safe source of potable water. This was confirmed through sampling.

The RI Report was approved in December 2005. Through the course of the RI, Ohio EPA's understanding of the Green I Landfill has been greatly increased. The boundary of the landfill has been defined, the seeps and ground water have been sampled, and the various ways that people, animals, birds, plants and other species can be affected by the landfill have been studied. The FS Report was approved in December 2007 and outlines various options for addressing the threats to public health, safety and the environment identified during the RI. Based on the potential remedies presented in the Feasibility Study, Ohio EPA described the Agency's preferred alternatives in the Preferred Plan that was published for

public comment on February 9, 2010. A public meeting was held on March 4, 2010, to present the findings of the Remedial Investigation and Feasibility Study and to receive comment on the Preferred Plan. The public comment period ended on April 19, 2010.

1.2 Summary of the Remedial Investigation

The RI was conducted by Goodyear and included a number of tasks to identify the nature and extent of Site-related chemical contaminants. The investigation was conducted with oversight by Ohio EPA, and is documented in the Remedial Investigation Report that was approved in December 2005. The tasks included sampling soil, ground water, surface water, and sediment. The data obtained from the investigation were used to conduct a baseline risk assessment (*i.e.*, an evaluation of the risks to humans and the environment posed by a site) and to determine the need to evaluate remedial alternatives. This Decision Document contains only a brief summary of the findings of the RI and FS. Please refer to the RI and FS Reports for additional information on contaminant concentrations. These reports are available for review in Ohio EPA's Southeast District Office and the Logan-Hocking Library, both of which are located in Logan, Ohio.

Included with this Decision Document are figures (Figures 3 through 9) taken from the RI Report showing the sample locations where testing determined contaminants exceeded project action levels. During the RI, the following activities were conducted:

- A total of 36 test pits were installed around the Green I Landfill to determine the extent of wastes at the Site.
- To determine the concentration of metals in soils that have not been impacted by Site activities (i.e., background concentrations), soil samples were collected from 15 soil sample locations outside the limits of the landfill (BSB-1 through BSB-15). Two composite soil samples were prepared from each of the 15 soil sample locations: one representative of a surface soil sample (0 to 4 feet below ground surface, "bgs") and another representative of a subsurface soil sample (4 to 4.5 feet bgs).
- Soil samples were collected from soil borings (SB-1, SB-2, and SB-3) and monitoring well borings (MW-2I, MW-4I, MW-5, MW-6, MW-6I, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13) located outside the landfill limits. These samples were analyzed for volatile organic compounds (VOCs) (Method 8260B), semi-volatile compounds (SVOCs) (Method 8270C), and Target Analyte List (TAL) Metals (Methods 6010B and 7471A).
- The shallow and intermediate aquifers were evaluated for hydrogeologic properties using high-resolution borehole imaging and gamma logging. Monitoring wells MW-2I, MW-4I, MW-6I, and MW-6 were evaluated using this equipment.
- Ground water samples were collected from the 11 newly installed monitoring wells (MW-2I, MW-4, MW-6, MW-6I, and MW-7 through MW-13) and the four existing monitoring wells (MW-1 through MW-4). Ground water was analyzed for VOCs (Method 8260B), SVOCs (Method 8270C), and total and dissolved TAL Metals (Method 6010B and 7470A). Ground water from monitoring well MW-8 was also analyzed for polychlorinated biphenyls (PCBs) (Method 8082).

- Surface soil and surface water samples were collected from a total of nine leachate seep locations (Seeps 1 through 8 and 5A). Four to five surface soil samples and one surface water sample were collected from each seep location. All samples were analyzed for VOCs (Method 8260B), SVOCs (Method 8270C), and TAL Metals (Method 6010B and 7470A). Select surface soil samples from Seeps 4, 5, 5A and 8 were analyzed for PCBs (Method 8082).
- To determine the concentration of metals in sediments that have not been impacted by Site activities (i.e., background concentrations), 16 sediment samples from four locations (SD-1 through SD-4) were collected. One composite surface (0 to 0.5 feet bgs) sediment sample was collected from each of the 16 sample locations. The sediment samples were analyzed for TAL metals (Method 6010/7470), except beryllium and silver.
- Sediment samples were collected from four locations (SED-1 through SED-4) from 0 to 0.25 feet bgs along the ditch that runs through the Site. The samples were analyzed for VOCs, SVOCs, and metals.
- Three surface water samples (locations 1 through 3) and seven sediment samples (from locations 1 through 4) were collected from a small pond located down slope of Seeps 5 and 5A on property owned by Harold and Donna Phillips ("off-Site pond"). Ohio EPA gained access and samples were collected from the off-Site pond by the Ohio EPA (Goodyear and their subcontractors could not obtain access to the property). Pond samples were analyzed for VOCs, SVOCs, TAL metals, and PCBs.

The nature and extent of contamination at the Green I Landfill in each environmental medium and the contaminants of concern attributable to the Site are described below in the following sections.

1.2.1 Soil Contamination

Background Soil Evaluation

To determine the concentration of metals in soils that have not been impacted by Site activities (i.e., background concentrations), soil samples were collected from 15 soil sample locations outside the limits of the landfill (BSB-1 through BSB-15). The sample locations were approved by Ohio EPA and the samples were collected from areas at a sufficient distance from the Green I Landfill. Sampling locations were limited to areas where Goodyear had access agreements.

Two composite soil samples were prepared from each of the 15 soil sample locations: one representative of a surface soil sample (0 to 4 feet bgs) and another representative of a subsurface soil sample (greater than 4 feet bgs). The composite surface soil samples were analyzed for TAL metals, except beryllium and silver, which had not been detected in the preliminary assessments of the Site. The composite subsurface soil samples were analyzed for arsenic, iron, lead, and manganese. Soil background values were calculated according to Ohio EPA background calculation methodology (Ohio EPA, June 2004).

Landfill Perimeter Soil Evaluation

Soil samples were collected from soil borings (SB-1, SB-2, and SB-3) and monitoring well borings (MW-2I, MW-4I, MW-5, MW-6, MW-6I, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13) located outside the landfill limits. These samples were analyzed for VOCs, SVOCs, and TAL Metals. Results of these data are summarized in the RI Report (Table 3 and Figure 4).

Soil sampling results indicate that the soils outside the landfill limits are not impacted with VOCs or SVOCs above project action levels[2]. The results of the soil sampling activities indicate that the soil outside the landfill limits contains concentrations of metals. Three metals (arsenic, iron, and manganese) have been detected at concentrations exceeding Preliminary Remediation Goals (PRGs) and above Site-specific background concentrations. Arsenic exceeds PRGs (0.39 ppm) and/or background concentrations (11.025 ppm) in soil from SB-3 (4 to 6 feet), and MW-4I (4 to 6 feet), and MW-6I (6 to 8 feet). Concentrations ranged from 10.8 parts per million (ppm) to 18.1 ppm. Iron was detected exceeding PRGs (23,000 ppm – residential) and above background concentrations (30,850 ppm) in samples collected from borings MW-2I (0-2), and MW-2I 92-4). Concentrations of iron exceeding action levels and above background concentrations range from 37,900 ppm to 59,500 ppm. Manganese was detected in one soil sample from boring MW-2I (2-4) at a concentration of 4,840 ppm, which exceeds PRGs (1,800 ppm – residential) and background soil concentrations (1,327 ppm). Metals (iron, manganese, selenium, vanadium, and zinc) were also determined to exceed project action levels for ecological receptors at several locations outside of the landfill limits.

1.2.2 Ground Water Contamination

During the investigation, three ground water aquifers were investigated. On-Site monitoring wells were installed into the shallow and intermediate aquifers. Off-Site, Ohio EPA has sampled the deep, Blackhand Sandstone aquifer, which supplies drinking (potable) water to local residents. Sample results from the intermediate aquifer indicate that Site related contaminants have not impacted this zone. Shallow aquifer sampling did, however, reveal impacts from site-related contaminants. It should be noted that the vertical separation between the shallow and deep aquifers is greater than 250 feet with layers of relatively impermeable bedrock in between, which restricts the potential for downward migration of contaminants.

Ground water samples were collected from the 11 newly installed monitoring wells (MW-2I, MW-4, MW-6, MW-6I, and MW-7 through MW-13) and the four existing monitoring wells (MW-1 through MW-4). Ground water was analyzed for VOCs, SVOCs, and total and dissolved TAL Metals. Ground water from monitoring well MW-8 was also analyzed for PCBs. Data from these samples are summarized in the RI Report (Table 4 and Figure 5). In June 2004, monitoring wells MW-2, MW-5, and MW-8 were resampled for arsenic and lead (total and dissolved).

[2] A "project action level" is a concentration for a chemical of concern that has been determined by regulation or through a risk assessment to be protective of human health or ecological receptors. This concentration value could be based on a preliminary remediation goal ("PRG"); a drinking water maximum contaminant level ("MCL"); or a background concentration ("background").

Ground water sampling data indicates that ground water collected from the monitoring wells is not impacted with SVOCs or PCBs above project action levels. VOCs were detected in three wells (MW-1, MW-6, MW-12) at concentrations exceeding project action levels (MCLs and/or PRGs). Monitoring well, MW-1, located within the landfill limits contained concentrations of benzene (170 parts per billion (ppb)) and chloroform (26 J[3] ppb) which exceeded project action levels of 5 ppb and 0.17 ppb, respectively. Ethylbenzene (32 J ppb) was detected in MW-1 at concentrations below the MCL (700 ppb) but above the PRG (2.9 ppb). Vinyl chloride (1.4 ppb) was detected in monitoring well MW-6 in excess of PRGs (0.02 ppb) but not above the MCL (2.0 ppb). MW-6 is located outside the landfill on the east side about 200 feet north of Seeps 1 and 2. Benzene (0.47 J ppb) and vinyl chloride (1.8 ppb) were detected in excess of PRGs in monitoring well MW-12 but not above MCLs. MW-12 is located outside of the landfill on the south side, east of Seep 7. Concentrations of metals were detected in all wells, except MW-11, in excess of project action levels. Metals detected in ground water above MCLs and/or PRGs include: aluminum, antimony, beryllium, cadmium, cobalt, iron, manganese, nickel, and thallium. Table 1 (pages 14-15) shows the project action levels for these metals.

1.2.3 Surface Water Contamination

At the off-Site pond, surface water samples were collected prior to sediment sample collection at each location. Samples were analyzed for VOCs, SVOCs, TAL metals (total and dissolved), and PCBs. Results of sampling are provided in the RI Report (Table 8 and Figure 9). Results of these analyses indicate that the surface water is not impacted by VOCs, SVOCs or metals (except for manganese, which exceeds ecological criteria) above project action levels. PCBs were encountered at all three sample locations at estimated concentrations above the project action levels. Concentrations of PCBs in surface water from the pond ranged from 0.65 J ppb to 0.88 J ppb. Additional surface water samples were collected from the leachate seeps as described in section 1.2.5.

1.2.4 Sediment Contamination

Ditch Sediments

Sediment samples were collected from four locations (SED-1 through SED-4) from 0 to 0.25 feet bgs along the ditch that runs through the Site. The samples were analyzed for VOCs, SVOCs, and metals. Results of sampling are provided in the RI Report (Table 7 and Figure 8). These analyses indicate that the sediment is not impacted by VOCs or SVOCs.

Arsenic and lead were detected in the sediment samples above project action levels and background concentrations. Arsenic was detected in all four samples above PRGs and background concentrations. Lead was detected in sample SED-3 at a concentration of 838 mg/kg, which exceeds PRGs and background concentrations. Metals (arsenic, iron, lead, manganese, selenium, vanadium, and zinc) were also determined to exceed ecological criteria in several ditch sediment samples.

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[3] A sample result marked with a "J" indicates an estimated value. This value is estimated because the contaminant was detected in the testing, but at a concentration lower than the chemist/analyst can assure the accuracy of the value ("below the method detection limit").

Off-Site Pond

A small pond is located down slope of Seeps 5 and 5A on an adjacent property. The pond is approximately 60 feet by 80 feet and four feet deep. Seven sediment samples (from locations 1 through 4) were collected from the off-Site pond by Ohio EPA personnel. Pond sediment samples were analyzed for VOCs, SVOCs, TAL metals, and PCBs. Results of sampling are provided in the RI Report (Table 9 and Figure 10).

Results of these analyses indicate that the sediment is not impacted by VOCs or SVOCs. PCBs were reported in four of the seven samples submitted for analysis. PCBs were encountered at one sample location (Pond Sediment #4 – 0 to 0.5 feet) at a concentration (0.520 ppm) above the project action level of 0.220 ppm. Arsenic was detected in each sample above the project action level. Concentrations of arsenic ranged from 23.5 ppm to 68.6 ppm. Iron was detected at each sample location above the project action level. Concentrations of iron ranged from 25,000 ppm to 60,800 ppm. In addition, arsenic, acetone, benzoic acid, carbazole, and PCB arochlors 1242 and 1248 were present at concentrations in the sediments exceeding ecological criteria.

1.2.5 Leachate Contamination

Surface soil and surface water samples were collected from a total of nine leachate seep locations (Seeps 1 through 8 and 5A). Four to five surface soil samples and one surface water sample were collected from each seep location. All samples were analyzed for VOCs, SVOCs and TAL Metals. Select surface soil samples from Seeps 4, 5, 5A and 8 were analyzed for PCBs. Surface water samples were analyzed for total and dissolved metals. Surface water samples from Seeps 5 and 5A were also analyzed for PCBs. Results of surface soil and surface water sampling are provided in the RI Report (Table 5 and Figure 6 for surface soil, Table 6 and Figure 7 for surface water).

Leachate Seep Surface Soil Background Samples

To determine the concentration of metals in sediments that have not been impacted by Site activities (i.e., background concentrations), 16 sediments samples were collected from four locations (SD-1 through SD-4). One composite surface (0 to .05 feet bgs) sediment sample was prepared from each of the 16 sample locations. The composite sediment samples were analyzed for TAL metals by Method 6010/7470, except beryllium and silver.

Sediment background values were calculated according to Ohio EPA Background Calculation Methodology (Ohio EPA, June 2004). The background sediment soil sample results are summarized in Table 11 of the RI Report. The calculated sediment background levels are summarized in Table 13 of the RI Report.

RI Samples

Results of the surface soil sampling at the leachate seeps indicate that the soils are not impacted with VOCs and SVOCs, except for bis(2-ethyhexyl)phthalate at location Seep 4, which exceeded ecological criteria. However, PCBs were detected above action levels (0.220 ppm) in one sample from Seep 4 sample location S5 at 0.340 ppm. Arsenic was detected above the PRGs and background concentrations in all seep soil samples collected

with the exception of Seep 5A sample location S2. The concentration of arsenic in samples ranged from 15.7 J to 1,400 J ppm. Iron was detected in all seep locations; however, several samples from Seeps 1, 3, 5A, and 7 did not contain concentrations of iron above action levels and above background concentrations. Samples collected from Seeps 5, 6, and 8 contained concentrations of manganese above project action levels and background concentrations. The concentration of manganese ranged from 1,800 J to 8,730 ppm. Thallium was detected in two samples (Seep 6 and 8) in concentrations exceeding project action levels and background concentrations. Metals (arsenic, barium, cadmium, iron, lead, manganese, selenium, thallium, vanadium, and zinc) were also determined to exceed ecological criteria at several locations in seep soils/sediments.

Leachate Seep Surface Water Samples

Surface water samples were collected from nine leachate seep locations (Seeps 1 through 8 and 5A). Results of the surface water sampling indicate that PCBs were not detected in the samples collected from Seep 5 and 5A. However, water samples from the seeps are impacted with VOCs, SVOCs, and metals. Specifically, Seeps 1, 2, 3, and 8 contained concentrations of benzene above PRGs. Seep 1 contained concentrations of vinyl chloride (1.7 ppb) exceeding PRGs. Ethylbenzene, trichloroethene, and vinyl chloride were also detected above project action levels at Seep 8. The SVOC 1,4-Dichlorobenzene was also detected above action levels at Seep 8.

Several metals (arsenic, iron, lead, and manganese) were detected above MCLs and/or PRGs in the samples collected from all seep locations. Arsenic was detected above action levels in all surface water samples collected (filtered and nonfiltered) at concentrations ranging from 0.0065 B (dissolved) to 1.4 (total) ppm. Iron was detected above action levels in all samples except those collected from Seeps 2, 5A, 6, and 7. Dissolved iron was detected above project action levels from samples collected at Seeps 1 and 8. Concentrations of lead were detected above MCLs and/or PRGs in all surface water samples, except the sample collected from Seep 1. Manganese was detected above PRGs at a concentration of 3.2 J ppm in one sample collected from Seep 5. Metals (arsenic, copper, iron, lead, manganese, and zinc) were also determined to exceed ecological criteria in several seep water samples.

1.3 Additional Information, Approved by the Ohio EPA, Subsequent to the Remedial Investigation

The Goodyear Tire & Rubber Company conducted an additional study of the thickness of the existing clay cap at the Green I Landfill. This study revealed that approximately half of the landfill has a cap thickness of greater than two feet. This report can be reviewed in the Ohio EPA Southeast District Office.

1.4 Interim or Removal Actions Taken to Date

Fencing

Two interim actions were initiated to protect public health, safety and the environment during the RI. The first interim action was to install fencing around each leachate seep area to restrict access to these areas. These fences were installed in the summer of 2003. During field activities, two additional seeps were located at the Site, for a total of nine seep locations (Seeps 1 through 8 and Seep 5A). Fencing was installed around all nine seep locations (Figure 2). The fencing at the Site was a minimum of six feet high with a minimum three-strand barbed wire at the top of the fence. Where appropriate, set backs of 25 feet from the edge of the seep were installed, unless there were physical constraints. A five-foot gate was also installed at each fence location to allow for inspection of the seep areas. These fences will remain in place until construction of the remedy.

Targeted Residential Well Sampling

In an effort to verify the safety of the regional aquifer for use by local residents, a second interim action was conducted. This second interim action involved sampling ground water from two private water wells (Horn and Hamby residences) to determine if these wells had been impacted by historical Site operations. The locations of these wells are shown on Figure 2. Water from the wells was analyzed for VOCs, SVOCs, and TAL metals (filtered and non-filtered).

On June 10, 2003, the private water wells located on the Hamby (now Goodyear) and Horn properties were sampled in accordance with the Ohio EPA approved Source Control Interim Action (SCIA) Work Plan. Water samples were analyzed for VOCs, SVOCs, and TAL Metals.

The results of the June 2003 sampling indicated that VOCs, SVOCs, and thallium were detected in samples collected from the Horn well. After evaluating the data from the Horn well, it was determined that the well should be resampled to validate results. On August 18, 2003, ground water samples were collected directly from the Horn water wellhead and submitted to the laboratory for VOC, SVOC, and total and dissolved metal analysis.

The August 2003 laboratory results for the Horn well indicated that thallium was not a COC, as it was not encountered above the method detection limit of 0.010 ppm. VOC data was unavailable due to an electrical outage at the laboratory. However, total lead (0.067 ppm) was detected in the samples collected from the Horn well above the MCL (0.015 ppm), and concentrations of dissolved lead were found to be below method detection limits. The water samples collected from the Horn well on August 18, 2003, were turbid and contained small amounts of sediment. The concentrations of total lead were most likely caused by the small amount of sediment in the ground water samples; however, it was determined that the Horn well would be sampled again to confirm these results.

The Horn well was sampled again directly from the water well for VOC analysis on October 8, 2003. However, due to anomalies in the metals data collected from the October sampling event, the well was sampled again for total and dissolved metals on November 26,

2003. At this time, samples were collected at the wellhead and from a tap located outside the Horn residence. An additional sample was collected from the Horn well at the request of Ohio EPA on August 11, 2004, and the sample was analyzed for total and dissolved thallium. Purging was conducted from the tap, and sampling was conducted from the wellhead. Following evaluation of all of the data from the Horn well sampling, the ground water was found to contain no contaminants from the Green I Landfill. The Horn well remains in service and provides water to two homes owned by Mr. Horn adjacent to the landfill on Hunters Ridge Road.

Results of laboratory analysis for the Hamby well indicated that the well was not impacted by VOCs, SVOCs, or metals (total or dissolved). Concentrations of acetone, bis (2-ethylhexyl) phthalate, and di-n-butyl phthalate were detected in the ground water samples collected from the Hamby water supply well; however, acetone, bis (2-ethylhexyl) phthalate, and di-n-butyl phthalate are considered laboratory contaminants, as acetone was also detected in the trip blank, and bis (2-ethylhexyl) phthalate, and di-n-butyl phthalate are common laboratory contaminants. Concentrations of COCs detected in the Hamby well were below drinking water standards (MCLs). The Hamby well was decommissioned on October 9, 2003, after Mr. Hamby decided that he would not use it as a water supply well.

1.5 Summary of Site Risks and Need for Remedial Action

A baseline risk assessment was conducted to evaluate current and potential future risks to human health and ecological receptors as the result of exposure to contaminants present at the Site. The results demonstrated that the existing contaminants in environmental media pose, or potentially pose, unacceptable risks and/or hazards to human and ecological receptors sufficient to trigger the need for remedial actions.

The conceptual Site model defines the physical and chemical setting of the Green I Landfill. This conceptual Site model (CSM) combines historical Site information with the data collected during the remedial investigation field activities. Based on the history of the Site and the results of Site investigations, the primary source of contamination is the landfill materials buried at the Site. Primary release mechanisms may include direct release, leaching, erosion, and precipitation and associated runoff. Secondary sources of contamination are impacted soil, leachate seeps, and ground water migration.

The media directly impacted by the landfill wastes buried at the Site are soil and ground water. Surface runoff is considered a transport medium because precipitation from storm events may have generated episodic overland flow and carried contaminants of potential concern (COPCs) away from the waste areas. Ground water is a transport medium of concern for COPCs where discharge to seeps may occur. Surface water medium (i.e., the small pond) is also impacted by the landfill wastes buried at the Site through surface runoff. Dust is considered a potential transport medium, because COPCs in soil may become entrained in fugitive dust.

Transport Pathways

Release mechanisms and transport pathways were evaluated during the RI on a media-by-media basis. Listed below are potential cross-media transfer mechanisms of COPCs:

- COPCs in subsurface soil leaching into ground water underlying the Site.
- COPCs in surface soil migrating to leachate seeps and ditch sediment along the landfill through surface runoff.
- COPCs in ground water transport to leachate seeps and ditch along the landfill through ground water recharge.
- COPCs in surface soil and ground water transport to the atmosphere via volatilization or fugitive dust emission.
- COPCs in pond sediment and surface water impacted through surface runoff.

Contaminant Migration

The RI results show that VOCs and metals were detected in shallow ground water, and SVOCs and PCBs were not detected in any of the ground water samples. The source of VOCs and metals may migrate to shallow ground water through potential direct release to soil from wastes disposed at the Green I Landfill and further leaching to shallow ground water. The source of metals could also be part of the natural background. Both VOCs and metals could transport to a surface water body through seep or ground water/surface water interphase. In addition, the VOCs could migrate to air through volatilization.

The ground water and seep water analytical results show that benzene, ethylbenzene, vinyl chloride, arsenic, iron, lead and manganese were detected exceeding either MCLs or PRGs indicating that these chemicals are mobile and could be transported through seep water to a surface water body. Only chloroform, aluminum, antimony, beryllium, cadmium, cobalt, nickel, and thallium were detected in ground water exceeding MCLs or PRGs. Trichloroethene and 1,4-dichlorobenzene were only detected in seep water, which indicate the potential of transport of these chemicals from wastes in the vadose zone to surface water.

PCBs were detected in seep sediment samples, pond surface water and pond sediment samples. However, PCBs were not detected in any of the soil from borings, ground water, and seep water samples.

1.5.1 Risks to Human Health

A human health risk assessment for the Green I Landfill was prepared to evaluate potential adverse impacts to human health posed by COPCs in soil, ditch sediment, ground water, pond sediment, and pond surface water outside of the landfill perimeter (limits of waste) based on data collected during the RI. When Site-specific data are not available, standard defaults were used.

Potential adverse impacts to human health are posed by COPCs within the landfill perimeter based on previous investigation results. The risk assessment process combines information on opportunities for exposure to Site-related COPCs with information on their toxic characteristics to generate a quantitative estimate of risk.

Discussion of Risks to an Adult Living on the Site with No Remedial Action
The risk assessment results show that the total cancer risk and total hazard index resulting from exposure to COPCs in soil and ground water for a current/future adult resident were calculated to be 2.7×10^{-5}. The chemical of concern for this receptor is arsenic detected in soil and the pathway of concern is soil incidental ingestion. The total hazard index is below the target hazard level of 1.

Discussion of Risks to a Child Living on the Site with No Remedial Action
The total cancer risk and total hazard index resulting from exposure to COPCs in soil and ground water for a current/future child resident were calculated to be 5.3×10^{-5} and 5.1, respectively. Both the total cancer risk and the total hazard index exceeded the target cancer level of 1×10^{-5}, and the target hazard level of 1. The chemicals of concern for this receptor are arsenic and manganese detected in soil and the pathway of concern is soil incidental ingestion.

Lead was evaluated separately. The residential Region 9 Preliminary Remediation Goal (PRG) of 400 ppm, based on a child residential scenario, was used to determine the potential risk of lead. The comparison results show that only one sample (ditch sediment sample location SED-3, lead concentration of 838 ppm) exceeds the PRG of 400 ppm. The lead concentrations detected in surface and subsurface soils are all below 400 ppm.

Based on the risk assessment results, the COPCs detected in soil may pose an unacceptable risk and hazard to human health under the current and future residential scenarios. COPC concentrations exceeding the Site-specific background levels are located in limited areas on the former Hamby (now Goodyear) and Hoag (Hunters Woods Subdivision Lot 3) properties. COPCs in the ground water and pond sediment and surface water do not pose unacceptable risk to human health under the current and future residential or commercial scenarios.

1.5.2 Risks to Ecological Receptors

An Ecological Risk Assessment (ERA) was conducted as part of the RI of the Green I Landfill Site. The ERA was conducted in order to assess potential impacts of chemicals of concern on ecological receptors (non-human, non-domesticated species) at the Site.

Specifically, a Level I scoping ERA determined that based on the history of disposal activities at the Green I Landfill Site and surrounding land use, the Green I Landfill Site has the potential to pose a risk to ecological receptors. Thus, a Level II ERA was conducted. The Level II ERA for the Green I Landfill includes a comparison of Site-specific data to screening benchmark values and the identification of relevant and complete exposure pathways between each source medium of concern and ecologically significant receptors for the potential ecological contaminants of concern.

For the chemicals that exceed the screening values and where a completed exposure pathway exists, a baseline ecological risk assessment was conducted (i.e., Level III ERA).

The approach for the Level III ERA consisted of the calculation of Hazard Quotients (HQs) using Site-specific exposure factors, chemical-specific and species-specific toxicity values and representative endpoint species. Upon completion of the ERA for the Green I Landfill Site, the following compounds in various media were determined to pose a potential risk to ecological receptors:

- Surface Soils: arsenic, barium, cadmium, iron, lead, manganese, selenium, thallium, vanadium, zinc, and bis(2-ethylhexyl)phthalate.
- Off-Site Surface Water: manganese, PCB-1260.
- Off-Site Sediments: arsenic, acetone, benzoic acid, carbazole, PCB-1242, PCB-1248.

2.0 REMEDIAL ACTION OBJECTIVES

The FS was conducted by PARSONS on behalf of Goodyear to define and analyze appropriate remedial alternatives. The study was conducted with Ohio EPA oversight and was approved in December 2007. The RI and FS are the basis for the selection of the Ohio EPA's selected remedial alternative.

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), codified at 40 CFR Part 300 (1990), as amended, which was promulgated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 et. seq., as amended, and U.S. EPA guidance. The RAOs are goals that a remedy should achieve in order to ensure the protection of human health and the environment. The goals are designed specifically to mitigate the potential adverse effects of Site contaminants to people and ecological resources (receptors) present in the environmental media.

Preliminary Remediation Goals (PRGs) for the protection of human health were established using the acceptable excess lifetime cancer risk and non-cancer hazard goals identified in the DERR Technical Decision Compendium (TDC) document "Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for DERR Remedial Response and Federal Facility Oversight", dated April 26, 2004. These goals are given as 1E-5 (*i.e.*, 1 in 100,000) excess lifetime cancer risk and a hazard index of 1, and were established using the default exposure parameters provided by U.S. EPA or Site-specific information. This TDC document can be found at the Ohio EPA's webpage:

http://www.epa.ohio.gov/portals/30/rules/riskgoal.pdf

The carcinogenic risk level refers to the increased likelihood that someone exposed to chemicals from the Site would develop cancer during his or her lifetime as compared with a person not exposed to the Site's contaminants. For example, a 1 in 100,000 (equal to 1/100,000 or 1E-5) risk level means that if 100,000 people were chronically exposed to a carcinogen at the specified concentration, then there is a probability of one additional case of cancer in this population. Note that the risks refer only to the incremental risks created by exposure to the chemicals at the Site. They do not include the risks of cancer from other non-Site related factors to which people could be exposed in their lifetime (*e.g.*, smoking,

poor diet). Non-carcinogenic hazards are generally expressed in terms of a hazard quotient (HQ) or hazard index (HI), which combines the concentration of chemical exposures with the toxicity of the chemicals (quotient refers to the effects of an individual chemical whereas index refers to the combined effects of all chemicals). A hazard index of 1 represents the exposure at which no harmful effects are expected.

The RAOs developed for the Site are detailed below in Table 1.

TABLE 1 – REMEDIAL ACTION OBJECTIVES

PATHWAY	APPLICABLE COMPOUNDS	TARGET LEVEL[10]	BASIS
Soils – Human Receptors (H1)			
Protect human health by eliminating exposure (i.e. direct contact, ingestion, inhalation) to soils with concentrations of chemicals of concern in excess of regulatory or risk based standards. This includes direct contact with the buried waste materials and leachate emanating from the Site.	Arsenic Lead Manganese	11.025 400 1,326.75	Background Region 9 PRG[1] Background
Leachate – Human Receptors (H2)			
Protect human health by eliminating exposure (i.e. direct contact, ingestion, inhalation) to leachate with concentrations of chemicals of concern in excess of regulatory or risk based standards.	Benzene Ethylbenzene Vinyl chloride Arsenic Manganese	5 700 2 0.010 0.015	MCL MCL MCL MCL (ppm) MCL (ppm)
Shallow Ground water – Human Receptors (H3)			
Protect human health by eliminating exposure (i.e. ingestion) to shallow ground water with concentrations of chemicals of concern in excess of regulatory or risk based standards.	Benzene 1,4-DCB[12] Chloroform Ethylbenzene TCE[13] Vinyl chloride Arsenic Beryllium Cadmium Lead Thallium	5 75 0.17 700 5 2 0.010 0.004 0.005 0.015 0.002	MCL MCL Region 9 PRG MCL MCL MCL MCL (ppm) MCL (ppm) MCL (ppm) MCL (ppm) MCL (ppm)

TABLE 1 – REMEDIAL ACTION OBJECTIVES (CONTINUED)			
Soils – Ecological Receptors (E1)			
Prevent direct contact with contaminated surface soils and consumption of contaminated food	Arsenic Barium Cadmium Iron Lead Manganese Selenium Thallium Vanadium Zinc BEHP[11]	11.025 100 0.21 30,850 25 1,326.75 0.4 1.1 26.85 71.2 0.05	Background HQ=1 (Robin)[2] Background Background HQ=1 (Robin) Background HQ=1 Background Background Background HQ=1 (Robin)
Surface Water – Ecological Receptors (E2)			
Prevent direct contact with contaminated off-Site surface water	Manganese PCB-1260	120	Region 6[3] Ohio EPA SW[4]
Sediments – Ecological Receptors (E3)			
Prevent direct contact with contaminated off-Site sediments	Arsenic Acetone Benzoic Acid Carbazole PCB-1242 PCB-1248	19 0.0099 ND[5] ND 0.0598 0.0598	Sediment[6] Region 5[7] Lab MDL[8] Lab MDL Consensus[9] Consensus

1. USEPA Region 9 Preliminary Remediation Goal
2. HQ=1 for the most sensitive terrestrial receptor
3. USEPA Region 6 Freshwater Screening Benchmark
4. Ohio EPA Surface Water Criterion
5. ND = Non-detect
6. Ohio Sediment Reference Value
7. USEPA Region 5 Ecological Screening Level
8. Laboratory Method Detection Limit
9. Consensus-based Threshold Effects Concentration
10. Units of Measure: Surface Soils – ppm; Surface Water or Ground water - ppb; Sediments – ppm.
11. BEHP = bis(2-ethylhexyl)phthalate
12. 1,4-Dichlorobenzene
13. Trichloroethene

The Remedial Action Objectives (RAOs) listed above for the Green I Landfill have been developed to address the pathways of exposure to contaminants of potential concern (COPCs) that were identified in the conceptual Site model and evaluated in the human health and ecological risk assessments. Based on the results of the RI and FS, removing the wastes from the property poses an unacceptable risk to local residents. Although the Site will continue to be a closed landfill into the foreseeable future, the Site is surrounded by residential properties and therefore, the RAOs have been designed to be protective of this use designation.

3.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of 18 remedial alternatives were considered in the FS. A brief description of the major features of each of the remedial alternatives follows. More detailed information about these alternatives can be found in the FS. For comparison a "No Action" alternative is included in each of the sets of remedial alternatives. This No Action alternative is the basis for comparison of the other options.

3.1 Landfill Capping Alternatives

3.1.1 General Description of Alternatives

Alternative 1 No Action.
Alternative 2 Soil Cover (1 foot) with Underlying Geotextile Fabric.
Alternative 3 Soil Cover (2 feet).
Alternative 4 Dual Layer Low Permeability Cap.
Alternative 5 Single Layer Low Permeability Cap.
Alternative 6 Single Layer Low Permeability Cap over Existing Soil Alternative Contingent Remedy for Alternatives 2 and 3.

Please note that Alternative 6 is included as a contingent remedy for Alternatives 2 and 3, and is included for informational purposes.

A brief description of the individual alternatives is presented in the subsequent sections. All of the landfill cap alternatives listed above except Alternative 1, No Action, contain the following components.

Landfill stability along slopes will be addressed as necessary. The method of addressing slope instability will be determined as part of a pre-design investigation and evaluation. It is anticipated that landfill waste will not be re-graded and relocated for slope stability improvement. Limited relocation of a small amount of landfill waste located on adjacent properties will be performed as necessary to consolidate all of the landfill waste within the limits of the property owned by Goodyear. Surface drainage will be controlled to divert as much runoff as possible away from the landfill. In addition, surface drainage on the landfill will be controlled to minimize erosion potential. Roads and conveyances will be designed to access the landfill, but not reduce the effectiveness of the alternative.

Institutional controls (i.e., land use restrictions) documented in an environmental covenant in accordance with Ohio's enactment of the *Uniform Environmental Covenants Act (UECA),* Ohio Revised Code Section 5301.80 *et seq.* (effective December 30, 2004), will be recorded for the property. The restrictions will prohibit the use of ground water for potable and/or agricultural purposes. The restrictions will also prohibit building or placing any permanently occupied structures on the landfill proper.

Trench drains will be installed at the existing leachate seeps to control the seeps. Leachate collection and treatment options are considered in Section 3.4. The trench drains will be monitored during post closure inspections to determine if the seeps persist after placement of

the landfill soil cover to determine the need for implementation of one of the leachate treatment alternatives 2 through 5.

The soil cover will be planted with a vegetative mix (*e.g.*, prairie mix) suitable for the Site. Gates will be installed at the access roads and fences extended approximately 20 feet on each side to limit access to the property. Warning signs will be installed around the landfill as deemed appropriate during the remedial design. Fencing around the entire landfill is not necessary to protect human health or the environment. The gates will comply with the requirement of OAC 3745-27-11(H)(7) to block the access road and prevent unauthorized vehicle entry to the Site.

One (1) additional intermediate zone monitoring well will be added to the existing monitoring well network on the southeast side of the landfill to comply with the condition stated in the approval letter for the RI Report. This monitoring well network will be monitored in accordance with an approved ground water monitoring plan to be developed as part of the landfill operation and maintenance (O&M) plan.

Coordination between the off-Site pond remedy located north of the landfill and the landfill remedy will be required. One of the pond remedies includes placement of sediment from the pond beneath the landfill cover. The leachate seeps discharging to the pond north of the landfill will need to be cut off before the remedy for the pond is implemented. Also, any runoff from construction operations on the landfill will need to be diverted away from the pond or otherwise ensure that the water is not contaminated. The leachate trench drains will be installed at these seeps prior to cleanup of the seep drainage channels and the pond. Temporary measures to collect seep water generated during construction will be incorporated as part of the construction package.

3.1.2. Alternative 2 – Soil Cover (1 Foot) with Underlying Geotextile Fabric

With this alternative, a soil cover coupled with a geotextile fabric would be employed at the Site to encompass the impacted unconsolidated material. This design provides adequate soil cover for growth of a vegetative cover while the geotextile fabric prevents worms and other prey species from reaching the contaminated soil at the landfill. With this alternative, the Site would not require mowing. The establishment of trees and shrubs would also be desirable. Plans to plant trees (evergreens) at about the time of the five-year review are included in the O&M cost. The transport of approximately 19,600 cubic yards of clean cover soil to the Site would also be required. Approximately 130 rolls of geotextile fabric would also have to be transported to the Site.

3.1.3. Alternative 3 – Soil Cover (2 Feet)

With this alternative, a two-foot thick soil cover would be employed at the Site to encompass the impacted unconsolidated material. No geotextile would be utilized with this alternative. The two-foot cover is considered adequate on a risk basis to provide protection against direct contact with the contaminated soil at the landfill from worms and other prey species. With this alternative, the Site would not require mowing. The establishment of trees and shrubs would also be desirable. Plans to plant trees (evergreens) at about the time of the five-year

review are included in the O&M cost. The transport of approximately 39,200 cubic yards of clean cover soil to the Site would be required.

3.1.4. Alternative 4 – Dual Layer Low Permeability Cap:

With this alternative, a dual layer low permeability cap would be employed at the Site to encompass the impacted unconsolidated material. The cap would include a gas collection layer placed over the entire impacted unconsolidated area. This could be constructed of sand or could be a geocomposite layer. A low permeability 18-inch thick recompacted clay layer (1×10^{-6} cm/sec) or a geosynthetic clay layer would then overlay the gas collection layer. A second low permeability layer (40 mil high-density polyethylene (HDPE)) liner would be installed overlying the clay layer. A drainage layer consisting of at least 12 inches of soil or sand or an equivalent geosynthetic drainage layer (with associated geosynthetic fabric) would overlay the HDPE liner. A protection layer, at least 18 inches thick, would then cover the drainage layer followed by six inches of topsoil. Note: If a geosynthetic drainage layer is utilized, then the total thickness of cover soil required will be a minimum of 30 inches.

This Alternative would require the transport of the following materials to the Site:

- approximately 19,600 cubic yards of clean sand or 528,000 square feet geocomposite for a gas collection layer,
- approximately 29,400 cubic yards of clean clay (1×10^{-6} permeability) for a low permeability layer,
- approximately 29,400 cubic yards of clean soil for a protective cover soil layer,
- approximately 9,800 cubic yards of clean soil for a topsoil layer,
- approximately 130 rolls of geosynthetic material for a second low permeability layer, and
- approximately 130 rolls of geosynthetic drainage material (with associated geosynthetic fabric) for a drainage layer.

3.1.5. Alternative 5 – Single Layer Low Permeability Cap

With this alternative, a single layer low permeability cap would be employed at the Site to encompass the impacted unconsolidated material. The cap would include a gas collection layer (sand or geocomposite) placed over the entire impacted unconsolidated area. A low permeability layer (40-mil HDPE liner) would be installed overlying the gas collection layer. A drainage layer consisting of at least 12 inches of soil, an equivalent geosynthetic drainage layer (with associated geosynthetic fabric), or some other equivalent drainage layer design would overlay the HDPE liner. A protection cover soil layer, at least 18 inches thick, would then cover the drainage layer followed by six (6) inches of topsoil.

This Alternative would require the transport of the following materials to the Site:

- approximately 19,600 cubic yards of clean sand or 528,000 square feet geocomposite for a gas collection layer,
- approximately 29,400 cubic yards of clean soil for a protective cover soil layer,
- approximately 9,800 cubic yards of clean soil for a topsoil layer,
- approximately 130 rolls of geosynthetic material for a low permeability layer, and
- approximately 130 rolls of geosynthetic drainage material (with associated geosynthetic fabric) for a drainage layer.

3.1.6 Alternative 6 – Single Layer Low Permeability Cap Over Existing Soil (Contingent Remedy for Alternatives 2 and 3)

Alternative 6, a single layer low permeability cap that would be employed at the Site to encompass the impacted unconsolidated material as a contingent remedial alternative if Alternative 2 or 3 were unsuccessfully implemented and the volume of leachate produced as determined at the 5-year review was such that treatment through the on-Site wetlands was not feasible. The topsoil from the existing cap would be removed for reuse and the following cap would be installed (same as in Alternative 5). The cap would include a gas collection layer (sand or geocomposite) placed over the entire impacted unconsolidated area. A low permeability layer (40-mil high-density polyethylene (HDPE) liner) would be installed overlying the gas collection layer. A drainage layer consisting of at least 12 inches of soil, and equivalent geosynthetic drainage layer (with associated geosynthetic fabric), or some other equivalent drainage layer design would overlay the HDPE liner. A protection cover soil layer, at least 18 inches thick, would then cover the drainage layer followed by 6 inches of topsoil.

This Alternative would require the transport of the following materials to the Site:

- approximately 19,600 cubic yards of clean sand or 528,000 square feet geocomposite for a gas collection layer,
- approximately 29,400 cubic yards of clean soil for a protective cover soil layer, (if Alternative 3 was implemented, some of the protective cover soil may be used from soil removed from the existing cap depending on construction economics),
- approximately 9,800 cubic yards of clean soil for a topsoil layer (use existing soil to be removed and replaced),
- approximately 130 rolls of geosynthetic material for a low permeability layer, and
- approximately 130 rolls of geosynthetic drainage material (with associated geosynthetic fabric) for a drainage layer.

3.2 Off-Site Pond Surface Water

3.2.1 General Description of Alternatives

Alternative 1 No Action.
Alternative 2 Pre-filtering, Carbon Adsorption, and Discharge to Surface.
Alternative 3 Pre-filtering, Carbon Adsorption, and Transport and Disposal at Local WWTP.
Alternative 4 Transport and Disposal at Treatment and Disposal Facility.

Alternatives 2 and 3 use the following similar components for the pre-filtering and carbon adsorption parts of the remedies:

The pre-filtering and carbon adsorption and treatment would be located on-Site and would be able to remediate the COCs in water at the current concentrations as well as the anticipated volume of water. At a minimum, two carbon vessels would be linked in series. Periodic testing would be conducted of the influent, in between the carbon vessels, and prior to discharge to the surface to ensure compliance with applicable standards. Testing would be conducted on the carbon media and filters to determine how to dispose of them properly.

The RI found only PCBs, at levels just above the drinking water standards. The pre-filtering, carbon adsorption treatment system would remove PCBs and the system would be designed to meet state water quality standards for the surface water discharge.

The estimated volume of water to be treated is 250,000 gallons. Sizing of the pre-filters and the carbon filters would depend on the length of time to be taken to treat this water. This would be determined as part of the design.

3.2.2 Alternative 2 – Pre-Filtering, Carbon Adsorption, and Discharge to Surface

With this alternative, water contained within the confines of the off-Site pond would be evacuated and treated on-Site using carbon to adsorb COCs prior to discharge to the surface. The water would be pretreated using inline filters to remove suspended materials prior to entering the carbon treatment system. The suspended material filtration would prolong the active use of the carbon media and allow for sediment free discharge of water to the surface.

3.2.3 Alternative 3 – Pre-Filtering, Carbon Adsorption, and Transport and Disposal at Local WWTP

With this alternative, water contained within the confines of the off-Site pond would be evacuated and treated on-Site using carbon to adsorb COCs prior to transport and disposal at the local WWTP in Logan. The water would be pretreated using inline filters to remove suspended materials prior to entering the carbon treatment system. The suspended material filtration would prolong the active use of the carbon media and allow for sediment free water to be collected, transported, and discharged at the local WWTP. In order to transport the water, access to the pond for the transport vehicles would need to be created and maintained.

3.2.4 Alternative 4 – Transport and Disposal at Treatment and Disposal Facility

With this alternative, water contained within the confines of the off-Site pond would be evacuated and transported to an off-Site treatment and disposal facility (other than the local WWTP) for treatment and disposal without requiring pre-treatment.

3.3 Off-Site Pond Sediments

3.3.1 General Description of Alternatives

- Alternative 1 No Action.
- Alternative 2 Treat Sediment *In Situ* and Leave In Place.
- Alternative 3 Dewater Sediment *In Situ* and Place Under Green I Landfill Cap.
- Alternative 4 Treat Sediment *In Situ,* Remove, Transport and Dispose at Sanitary Landfill.
- Alternative 5 Leave Sediment In Place, Dewater, Cover, and Eliminate Pond.

3.3.2 Alternative 2 – Treat Sediment In-Situ and Leave in Place

After the seeps are eliminated and the water in the pond is evacuated, the remaining sediment would be treated (solidified) in place using Portland cement and/or other fixing agents. The solidified material would be left in place and the Pond and surrounding area graded to eliminate the Pond and prevent the flow of surface water from the surrounding area to within the former Pond area.

Some pre-design testing would be required to determine the optimum solidification agent and mixing ratio. The optimum reagent to waste mix ratio is typically around 0.25 for contaminated soil. However, this ratio can vary anywhere from 0.1 to 2.0 depending on the contaminants present and the initial moisture content of the waste.

Post-treatment testing would consist of both chemical and physical tests. Required chemical testing often consists of performing the Toxicity Characteristic Leaching Procedure (TCLP) and chemically analyzing the extract. The physical parameters to be tested would be determined during remedial design and would likely include unconfined compressive strength. As there is only an estimated 600 cubic yards of sediment to be treated, only one (1) post-treatment test would be necessary to confirm the sediment is solidified in accordance with the design specifications.

3.3.3 Alternative 3 – Dewater Sediment In-Situ and Place Under Green I Landfill Cap

After evacuation of the water in the pond, the remaining sediment would be dewatered in place using drying agents. The material would then be excavated, transported to the Green I Landfill, and placed under the cap. The Pond area could be graded to remain as a pond or re-graded to eliminate the containment of surface water.

3.3.4 Alternative 4 – Treat Sediment In-Situ, Remove, Transport and Dispose at Sanitary Landfill

With this alternative, after the seeps are eliminated and the water in the pond is evacuated, the remaining sediment would be treated (solidified) in place using Portland cement and/or other fixing agents. The materials would then be excavated and transported to the sanitary landfill for disposal. Alternatively, the sediment could be excavated, transported, and solidified at the sanitary landfill. This Alternative would require lined trucks to ensure that water does not seep out of the sediment onto the roadway during transport. The Pond area could be graded to remain as a pond or re-graded to eliminate the containment of surface water.

3.3.5 Alternative 5 – Leave Sediment In Place, Dewater, Cover, and Eliminate Pond

After the seeps are eliminated and the water in the pond is evacuated, the remaining sediment would be dewatered, left in place, and covered with a suitable soil material. The area would need to be regraded as necessary to provide for surface drainage to be re-routed away from the former pond. Pre-design testing may be required to determine if the sediment can be dried in a reasonable time period without the addition of drying agents to provide sufficient structural strength for placement of a suitable cover soil material.

3.4 Leachate Collection

3.4.1 General Description of Alternatives

Alternative 1 No Action.
Alternative 2 Collect Leachate and Treat On-Site in Constructed Wetlands.
Alternative 3 Collect Leachate and Subsurface Recharge within Landfill.
Alternative 4 Collect Leachate, Transport, and Dispose at Local WWTP.
Alternative 5 Collect Leachate, Transport and Dispose at Treatment and Disposal Facility
Alternative 6 Leachate Collection and Holding Tank System.

3.4.2 Alternative 2 – Collect Leachate and Treat On-Site in Constructed Wetlands

With this alternative, a leachate collection piping system connecting the leachate trench drains would be installed outside of the limits of the cap to transport the leachate to the constructed treatment wetland. The piping would be double walled to protect against leakage and would be either gravity drained or pumped as required (to be determined during design). The design flow for the leachate would be based on an evaluation of the amount of leachate seepage in the leachate trench drains. A pre-design study may be necessary to evaluate this flow.

The constructed treatment wetlands would be designed based on an analysis of the leachate in the trench drains. If any seeps that exist after construction of the cap resemble in constituency the nine leachate seeps sampled as part of the RI, the constructed treatment wetland would need to treat the water for VOCs, SVOCs, and metals in order to reduce the contaminant load to levels that would meet acceptable state water quality standards for surface water discharge. The configuration of the constructed treatment wetland and the selection of components included in the constructed treatment wetland would be determined during the design. The components of the constructed treatment wetland would need to be selected so that the discharge would be able to meet NPDES permit requirements.

3.4.3 Alternative 3 – Collect Leachate and Subsurface Recharge in Landfill

With this alternative, a leachate collection piping system connecting the leachate trench drains would be installed outside of the limits of the cap to transport the leachate to a holding tank from which the recharge system would pump the leachate into the waste below the cap. The piping would be double walled to protect against leakage and would be either gravity drained or pumped as required (to be determined during design). The design flow for the leachate would be based on an evaluation of the amount of leachate seepage in the leachate trench drains. A pre-design study may be necessary to evaluate this flow. The holding tank would be provided with double containment.

3.4.4 Alternative 4 – Collect Leachate, Transport, and Dispose at Local WWTP

With this alternative, a leachate collection piping system connecting the leachate trench drains would be installed outside of the limits of the cap to transport the leachate to the storage tanks. The piping would be double walled to protect against leakage and would be either gravity-fed or pumped as determined in design. The design flow for the leachate

would be based on an evaluation of the amount of leachate seepage in the leachate trench drains. A pre-design study may be necessary to evaluate this flow, which would be used for sizing the piping, tanks and pumps. The holding tank would be provided with double containment.

An agreement would need to be made with the local WWTP and a transport company for transport and disposal of the leachate.

3.4.5 Alternative 5 – Collect Leachate, Transport, and Dispose at Treatment and Disposal Facility

With this alternative, a collection system and the holding tanks would need to be designed and an agreement made with the treatment and disposal facility and a transport company.

3.4.6 Alternative 6 – Leachate Collection and Temporary Holding Tank System

With this alternative, as part of the cap construction, a leachate collection system with a holding tank would be installed to collect and contain the leachate for transport and disposal. If leachate production is significant and is not greatly reduced shortly after cap installation, one of the other leachate handling options may be implemented such as the installation of a constructed treatment wetland. Collection system and holding tank specifications would need to be established during design.

Ohio EPA anticipates that leachate generation rates would decrease significantly in the first five years following implementation of the selected remedy. A review of the leachate generation rates and analytical data will be conducted to determine the quality and quantity of the leachate and whether another leachate alternative should be considered.

4.0 COMPARISON AND EVALUATION OF ALTERNATIVES

4.1 Evaluation Criteria

In selecting a remedy for a contaminated site, Ohio EPA considers the following eight evaluation criteria as outlined in U.S. EPA's NCP promulgated under CERCLA (40 CFR 300.430):

1. Overall protection of human health and the environment - Remedial alternatives shall be evaluated to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site.

2. Compliance with all applicable or relevant and appropriate requirements (ARARs) - Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements of state and federal environmental laws.

3. Long-term effectiveness and permanence - Remedial alternatives shall be evaluated to determine the ability of a remedy to maintain reliable protection of human health

and the environment over time once pollution has been abated and RAOs have been met. This includes assessment of the residual risks remaining from untreated wastes, and the adequacy and reliability of controls such as containment systems and institutional controls (*i.e.*, environmental covenant).

4. Reduction of toxicity, mobility, or volume through treatment - Remedial alternatives shall be evaluated to determine the degree to which recycling or treatment are employed to reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. Short-term effectiveness - Remedial alternatives shall be evaluated to determine the following: (1) short-term risks that might be posed to the community during implementation of an alternative; (2) potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) time until protection is achieved.

6. Implementability - Remedial alternatives shall be evaluated to determine the ease or difficulty of implementation and shall include the following as appropriate: (1) technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions); and (3) availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.

7. Cost - Remedial alternatives shall evaluate costs and shall include the following: (1) capital costs, including both direct and indirect costs; (2) annual operation and maintenance costs (O&M); and (3) net present value of capital and O&M costs. The cost estimates include only the direct costs of implementing an alternative at the site and do not include other costs, such as damage to human health or the environment associated with an alternative. The cost estimates are based on figures provided by the Feasibility Study.

8. Community acceptance - Remedial alternatives shall be evaluated to determine which of their components interested persons in the community support, have reservations about, or oppose. This assessment is not to be completed until comments on the Preferred Plan are considered.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative that has accomplished the goal of protecting human health and the environment and has complied with the law. Any acceptable remedy must comply with both of these criteria.

Evaluation Criteria 3 through 7 are the balancing criteria used to select the best remedial alternative(s) identified in the Preferred Plan. Evaluation Criteria 8, community acceptance, is a modifying criterion that will be evaluated through public comments on the alternatives received during the comment period (see Section 7.0).

4.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives found in Section 3.0 and compares how the alternatives achieve the criteria.

4.2.1 Overall Protection of Human Health and the Environment

Evaluation of the overall protectiveness of the alternatives focused on whether each alternative achieves adequate protection of human health and the environment and identifies how site risks posed through each pathway being addressed are eliminated, reduced or controlled by the alternative. This evaluation also includes consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

Landfill Capping Alternatives

Alternative 4 - Dual Layer Low Permeability Cap is the only alternative presented in the FS that would incorporate the use of compacted clay and a plastic liner, which would provide a solid physical barrier that would prevent contact by humans and other species with contaminated landfill materials. The combination of these two layers would provide the level of protection required for modern solid waste landfills. FS Alternative 4 will effectively address the concerns outlined in RAO H1. This alternative is the only alternative, which would provide two barriers (liner and clay) to prevent infiltration of surface water and precipitation, which will reduce the amount of leachate production.

Alternative 1 – No Action: This alternative would not provide additional protection of human health and the environment and would continue to allow direct contact with leachate and the potential for direct contact with waste materials. This alternative would not prevent or retard the infiltration of surface water or precipitation and thus would not prevent or reduce the generation of leachate.

Alternative 2 – Soil Cover (1 foot) with Underlying Geotextile Fabric: This alternative would provide some additional protection as a physical barrier is placed to prevent soil dwelling species and some burrowing animals from coming into contact with buried waste. This alternative would not prevent or retard the infiltration of surface water or precipitation and thus would not prevent or reduce the generation of leachate. This alternative, as described in the FS, would not require mowing and tree planting would be considered at the first Five Year Review. By not mowing, burrowing animal activity is more difficult to observe and the planting of trees in the cap may permit the unearthing of waste if a tree were to be uprooted.

Alternative 3 - Soil Cover (2 feet): This alternative is similar to the no action alternative in that it would rely on soil to become a barrier to prevent contact with waste materials.

This alternative would not prevent or retard the infiltration of surface water or precipitation and thus would not prevent or reduce the generation of leachate. By not mowing, burrowing animal activity is more difficult to observe and the planting of trees in the cap may permit the unearthing of waste if a tree were to be uprooted.

Alternative 5 - Single layer low permeability cap. This alternative significantly improves the level of protection of human health and the environment when compared with the no action alternative and soil only alternatives by virtue of the addition of a plastic liner. This alternative is not as protective as Alternative 4 since the thickness of the cap is less and the potential for the plastic to leak is increased due to the absence of the clay layer.

Alternative 6 - Single Layer Low Permeability Cap over Existing Soil Alternative as a Contingent Remedial Alternative: This alternative combines alternatives 2 or 3 with alternative 5. For the reasons described in the individual alternatives, this alternative would not be as protective of human health and the environment.

Leachate Collection and Management

Ohio EPA anticipates that leachate generation rates will decrease significantly in the first five years following implementation of the selected remedy and therefore Alternative 6 will be implemented until leachate volume and chemical analysis can be monitored following cap construction. A review of the leachate generation rates and analytical data will be conducted annually during the five years to determine the quality and quantity of the leachate and whether a change to FS Alternative 2 (treatment wetlands), FS Alternative 4 (collection and disposal at WWTP) or FS Alternative 5 (collection and disposal at non-WWTP treatment facility) is appropriate. The final implementation of one of these alternatives is anticipated to eliminate the pathways described by RAO H1 and E1. Interim measures are anticipated to be protective of human health and the environment.

Alternative 6 – Leachate Collection and Holding Tank System: This alternative is a component of what will be required to implement Alternative 4 and Alternative 5, if selected at the five-year review. As presented in the FS, this alternative was presented as a short-term alternative until leachate generation rates stabilize and one of the other alternatives could be implemented as a permanent solution. This alternative, when properly implemented and monitored, is considered protective of human health and the environment and is Ohio EPA's selected alternative for leachate management until a permanent solution is selected at the first five year review.

Alternative 1 – No Action: This alternative would continue to allow leachate to be produced resulting in on-Site and off-site exposures to contaminants of concern.

Alternative 2 – Collect Leachate and Treat On-Site in Constructed Wetlands: This alternative may be viable at some point in the future; however, the implementation of this remedial alternative would require further consideration of the volume and quality of the leachate produced to determine if a seasonally active wetland would be a viable alternative for treating this wastewater. Some contaminants of concern, for example

PCBs, may make this alternative technically impractical. In addition, an NPDES permit may be required before this remedy could be utilized. Until the design and basis for the design are better understood, this alternative is not viable as it may not be protective of human health and the environment.

Alternative 3 – Collect Leachate and Subsurface Recharge within Landfill: Since the Green I Landfill was constructed without a bottom liner and leachate collection system, this alternative is not appropriate. Recirculating leachate has been shown to increase decomposition in municipal solid waste landfills; however, these facilities were constructed in such a manner as to ensure the containment of the leachate. This alternative would not be protective of human health and the environment.

Alternative 4 – Collect Leachate, Transport, and Dispose at Local WWTP: This alternative would provide for both capture and appropriate treatment of the leachate. Given the contaminants of concern, a municipal wastewater treatment plant (WWTP) would likely be able to accept this leachate. Additional testing following cap installation will be required to determine the characteristics of the leachate. The WWTP would also need to agree to accept this material. This alternative could be protective of human health and the environment, depending on the quality of the leachate generated at the Green I Landfill.

Alternative 5 – Collect Leachate, Transport and Dispose at Treatment and Disposal Facility: This alternative would retain all of the benefits of Alternative 4, but would result in disposal of the leachate at a facility permitted to handle chemically contaminated water. This alternative would be protective of human health and the environment.

Off-Site Pond Surface Water

With the exception of Alternative 1 (no action), all of the remaining alternatives presented in the FS for remediation of the off-Site pond's surface water would successfully eliminate the pathway of concern outlined in RAO E2. Ohio EPA's selected alternative as described in FS Alternative 3 is the most cost effective remediation option that includes final treatment of the removed surface water at an off-Site wastewater treatment plant. The complete removal of this impacted surface water would ensure short and long-term protection of ecological receptors.

Off-Site Pond Sediment

With the exception of Alternative 1 (no action), all of the remaining alternatives presented in the FS for remediation of the off-Site pond's sediment would successfully eliminate the pathway of concern described in RAO E3. FS Alternatives 3 and 4 would both ensure that the pathway is completely eliminated by removing the contaminated sediments from their current location. FS Alternatives 2 and 5 would result in the sediments remaining in place and will require future inspections to ensure that the pathway remains incomplete. Ohio EPA's selected alternative as described in FS Alternative 3 will allow for the cost effective complete removal of the contaminated sediments by permanently relocating these contaminated materials to a location underneath the constructed cap. The

complete removal of impacted sediments will ensure short and long-term protection of ecological receptors.

4.2.2 Compliance with ARARs

Landfill Capping Alternatives

Alternative 4 – Dual Layer Low Permeability Cap is the only alternative, which will be fully compliant with the applicable, relevant and appropriate rules and laws for construction of a solid waste landfill cap in Ohio as described in the Ohio Administrative Code Rule 3745-27-08. Alternatives 1, 2, 3, 5 and 6 would not be ARAR compliant.

Leachate Management Alternatives

All of the leachate management options, except Alternative 1 – No Action, would be ARAR compliant once the leachate was transported to an appropriate disposal facility. Alternative 2, Collect Leachate and Treat On-Site in Constructed Wetlands, would be ARAR compliant if an NPDES permit was issued for the discharge.

Off-Site Pond Surface Water

With the exception of Alternative 1 – No Action, the remaining three alternatives would comply with ARARs provided that the appropriate wastewater discharge permits were obtained (Alternatives 2 and 3) or the wastewater was accepted at a treatment and disposal facility (Alternative 4).

Off-Site Pond Sediments

Alternative 1 and Alternative 5 would not be compliant with ARARs. Alternatives 2 and 5 would create an unpermitted disposal area in violation of Ohio law, which would not be ARAR compliant. Alternative 3 would be compliant if an ARAR compliant cap was installed. Alternative 4 would meet ARARs.

4.2.3 Long-Term Effectiveness and Permanence

The landfill capping alternatives were evaluated, in part, on their ability to divert or prevent infiltration of water into the waste in an effort to reduce the generation of leachate. All of the capping options presented would be permanent if properly maintained; however, Alternatives 4, 5 and 6 would incorporate a plastic liner component, which would provide the greatest measure of effectiveness and permanence. Alternative 4 would also incorporate a second layer of protection with the addition of low permeability clay.

Ohio EPA's selected alternatives for the off-Site pond's surface water and sediments will eliminate these impacted media through treatment or removal of the impacted media. Thus, the implementation of these alternatives will permanently resolve these pathways.

4.2.4 Reduction of Toxicity, Mobility or Volume by Treatment

Under Ohio EPA's selected alternatives for landfill capping and the off-Site pond's sediments, no treatment or reduction in volume will occur. However, a reduction in the mobility of the contaminants found in the sediments and the landfill waste will be achieved through the placement of the sediments and landfill wastes under the dual layer low permeability cap.

Through implementation of the selected landfill cap alternative, Ohio EPA anticipates a significant reduction in annual leachate volume by preventing infiltration of surface water and precipitation. In addition, leachate that may be generated will be treated off-Site at either a treatment and disposal facility or a wastewater treatment plant until the first five-year review is conducted, at which point leachate volume and quality can be evaluated. Following the evaluation, leachate volume and quality may allow for on-Site treatment through constructed wetlands.

Ohio EPA's selected alternatives for the off-Site pond's surface water and sediments will result in the treatment of an estimated 250,000 gallons of water. The use of the selected option will subject this water to pre-filtering for the removal of particulates, followed by removal of organic chemicals by adsorption to granular activated carbon. The field treated water will then be taken to a wastewater treatment plant for additional treatment to reduce or remove any biological or other residual contamination.

4.2.5 Short-Term Effectiveness

With the exception of the no action alternative, all of the landfill capping alternatives (including Ohio EPA's selected alternative) for the landfill cap would increase dust production in the short term due to construction activities. Construction activities, which disturb the existing cap, would have the potential to increase infiltration of surface water and increase erosion, which could expose waste materials if not carefully monitored. However, the placement of compacted soil layers would increase the density of the soil, reducing the potential for erosion. The installation of a flexible membrane liner would protect the underlying soils from erosion.

Likewise, all of the alternatives for the off-Site pond would result in the impacts being eliminated immediately upon completion of dewatering and sediment removal activities. Following installation of the leachate collection system and holding tank(s), immediate gains in protectiveness would be realized as the leachate would no longer be releasing from the Site or available for direct contact exposure.

4.2.6 Implementability

All of Ohio EPA's selected alternatives are constructible using readily available construction equipment and methods. As described above, the landfill capping selected alternative will require the use of a plastic liner, which will need to be brought to the Site. Liner installation requires specialized installation techniques and equipment, but such services are easily procured. The selected leachate management system is constructible. The collected leachate will require chemical analysis in order to be taken off-Site for treatment at a POTW or industrial WWTP. No additional permits or waivers are anticipated to be needed for the implementation of any selected alternative. The responsible party(ies) will need to develop and record the environmental covenant for the Site.

4.2.7 Cost

The cost estimates produced for all alternatives during the development of the FS (2007) are described for comparison in Tables 2, 3, and 4 found in Section 4.3. The costs of Ohio EPA's selected alternatives are presented in the following text.

Selected Landfill Capping Alternative

The cost for the pre-design investigation, design, and construction oversight are included with the construction costs. The cost of implementing landfill-capping alternative #4 is $4,036,000. This also includes the cost for installation of the additional monitoring well required in the approval of the RI Report.

The estimate for O&M cost for 30 years based on a 7% interest rate is a present worth of $1,020,000 for both alternatives 4 and 5.

Leachate Collection and Management

The cost for this system is based on a leachate system to collect, convey, and hold 50,000 gallons. The estimated cost for installation of the leachate collection and the leachate storage system is $506,000. Additional operation and maintenance costs may be incurred based on the amount of leachate requiring disposal. Since this cost is highly variable and dependent on the volume and chemical characteristics, these costs have not been included for comparison.

Off-Site Pond Surface Water

The cost for the pre-design investigation, design, and construction oversight are included with the construction costs. The estimated construction costs are $272,000. No O&M costs are included with this Alternative.

Off-Site Pond Sediment

The cost for the pre-design investigation, design, and construction oversight are included with the construction costs. The estimated construction costs are $204,000. No O&M costs are included with this Alternative.

4.2.8 Community Acceptance

The Ohio EPA received comments from interested parties during the public comment period that ended on April 19, 2010, and at the public meeting held at Ohio EPA's Southeast District Office on March 4, 2010. Those comments and Ohio EPA's responses are included in the Responsiveness Summary (Section 7.0).

4.3 Summary of Evaluation Criteria

Table 2: Evaluation of Remedial Alternatives for the Green I Landfill Cap

Evaluation Criteria	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
(1) Overall protection of human health and the environment	☐	☐	☐	■	■
(2) Compliance with ARARs	☐	☐	☐	■	◘
(3) Long term effectiveness and permanence	☐	◘	◘	■	■
(4) Reduction of toxicity, mobility or volume through treatment	☐	☐	☐	■	■
(5) Short term effectiveness	☐	■	■	■	■
(6) Implementability	■	■	■	■	■
(7a) Capital Cost	---	*$2,073,000*	*$2,448,000*	*$4,036,000*	*$3,467,000*
(7b) O&M Cost (30 year)	---	*$666,000*	*$666,000*	*$1,020,000*	*$1,020,000*
(8) Community acceptance	*Community acceptance of the selected alternatives will be evaluated after the public comment period.*				

■ *Fully meets criteria* ◘ *Partially meets criteria* ☐ *Does not meet criteria*

Note: Alternative 6 is a contingent remedy for Remedial Alternatives 2 and 3, and was not specifically included in the comparison of remedial alternatives.

Table 3: Evaluation of Remedial Alternatives for the Off-Site Pond Surface Water

Evaluation Criteria	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*
(1) Overall protection of human health and the environment	☐	■	■	■
(2) Compliance with ARARs	☐	◘	■	■
(3) Long term effectiveness and permanence	☐	■	■	■
(4) Reduction of toxicity, mobility or volume through treatment	☐	◘	◘	◘
(5) Short term effectiveness	☐	■	■	■
(6) Implementability	■	◘	◘	■
(7a) Capital Cost	---	*$194,000*	*$272,000*	*$436,000*
(7b) O&M Cost (30 year)	---	*N/A*	*N/A*	*N/A*
(8) Community acceptance	*Community acceptance of the selected alternatives will be evaluated after the public comment period.*			

■ *Fully meets criteria* ◘ *Partially meets criteria* ☐ *Does not meet criteria*

Table 4: Evaluation of Remedial Alternatives for the Off-Site Pond Sediment

Evaluation Criteria	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*	
(1) Overall protection of human health and the environment	☐	☐	■	■	◘
(2) Compliance with ARARs	☐	☐	■	■	◘
(3) Long term effectiveness and permanence	☐	☐	■	■	◘
(4) Reduction of toxicity, mobility or volume through treatment	☐	☐	◘	◘	◘
(5) Short term effectiveness	☐	◘	■	■	■
(6) Implementability	■	■	■	■	■
(7a) Capital Cost	---	*$267,000*	*$204,000*	*$251,000*	*$263,000*
(7b) O&M Cost (30 year)	---	*N/A*	*N/A*	*N/A*	*N/A*
(8) Community acceptance	*Community acceptance of the selected alternatives will be evaluated after the public comment period.*				

■ *Fully meets criteria* ◘ *Partially meets criteria* ☐ *Does not meet criteria*

5.0 SELECTED REMEDIAL ALTERNATIVE

Ohio EPA's selected remedial alternatives include the construction of a dual layer low permeability landfill cap (Alternative 4) along with leachate collection piping, installed to direct the leachate to a holding tank. The selected alternative for capping uses plastic liners and a clay layer to prevent infiltration of surface water and precipitation. Plastic liners are required as a component of modern landfill capping systems. The use of these technologies at the Green I Landfill is appropriate for the long-term protection of human health and the environment, and meets ARARs. The dual layer cap design combined with the physical setting of this landfill is anticipated to significantly reduce the amount of leachate produced by Green I Landfill.

Ohio EPA's selected remedial alternatives for the off-Site pond's surface water include pre-filtering, carbon adsorption and disposal at a WWTP. The sediments in this pond will be dewatered in place, excavated and transported to Green I Landfill for placement under the landfill cap to be constructed. Ohio EPA believes these alternatives will provide cost effective remediation that is protective of human health and the environment.

As stated above, the timing of these remedial alternatives will play an important role in the successful completion of the remediation project. In order to resolve the contamination issues associated with the off-Site pond, the leachate collection system will need to be installed and functioning properly to prevent additional contamination from migrating to the off-Site pond from seeps 5, 5A, 7 and 8. Once the leachate management system has been successfully installed, the remedial activities of dewatering the pond and sediments can begin. These efforts must be completed with sufficient time to allow for transportation of the excavated sediments for inclusion under the landfill cap. Ohio EPA believes the implementation of these alternatives will reduce or eliminate the potential for exposure to contamination found at, and emanating from, the Green I Landfill.

Green I Landfill is located in a rural area with increasing residential development. The environmental covenant for the property will restrict future development of the property and will be enforceable by Ohio EPA. This rural area is home to a variety of recreational uses including hunting and hiking. Property lines are not always clear to persons who are unfamiliar with the local area. Signage will be posted along the property border as part of this remedial action to deter trespassers from accessing this property. When implemented, the alternatives selected by Ohio EPA will enable the long-term protection of ground water and prevention of direct exposure to contaminants. The estimated total cost of the Ohio EPA selected alternatives is $4,449,000.

Based on information currently available, Ohio EPA believes the selected alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The Ohio EPA expects the selected alternative to satisfy the following requirements: 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies (*e.g.*, innovative) to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

The elements of the Ohio EPA Selected Alternatives are as follows:

5.1 *Dual Layer Low Permeability Cap Installation and O&M:* This component will use a plastic liner to prevent infiltration of surface water from snowmelt, rain, etc., and will be designed to meet appropriate standards for a landfill cap set out in Ohio EPA's rules. In addition, the plastic liner and thickness of soil layers will create a physical barrier to prevent direct contact exposures with waste materials. Due to the existing conditions at the landfill, there may be constraints that cannot be overcome with the available construction techniques. As a result, Ohio EPA will consider these constraints in reviewing and approving the final design for the landfill cap, which may include modifications that include the use of a clay liner without the use of plastic in limited circumstances.

To provide for long-term operation and maintenance (O&M) of the cap, an O&M Plan will be developed for approval by Ohio EPA. The cap will be expected to pass periodic inspections by Ohio EPA.

Performance Standard: The success of this cap will be evaluated by its successful installation and inspections by Ohio EPA, following Ohio EPA's approval of the final design. This includes complying with all quality control measures and quality assurance testing as described in the Ohio EPA approved final design.

Performance Standard: Long-term O&M of the cap will be considered successful if Ohio EPA approves an O&M Plan and the cap passes periodic inspections by Ohio EPA.

5.2 *Environmental Covenant:* A component of the remedy for Green I Landfill is the recording of an environmental covenant. This environmental covenant, to be recorded in the Hocking County Recorder's Office, will place restrictions on the property to prohibit the use of ground water for potable and/or agriculture purposes. In addition, the restrictions will prohibit building or placing any permanently occupied structures on the landfill proper. Implementation of this environmental covenant will address RAO H3.

Performance Standard: The environmental covenant element of the remedy will be considered successful when proof of recording in the Hocking County Recorder's Office is presented to Ohio EPA.

5.3 *Leachate Collection and Management:* The selected alternative for leachate collection at the Green I Landfill involves the installation of a series of drains and piping that will collect and convey the leachate to holding tanks, with subsequent appropriate treatment and/or disposal at a municipal waste water treatment plant or industrial treatment facility. Collected leachate will be sampled and quantified over time in order to monitor the chemical characteristics and volume of the leachate. The leachate collection system will both permanently eliminate the uncontrolled off-Site discharge of leachate and the direct contact of leachate by wildlife and trespassers.

The responsible party(ies) and Ohio EPA will also review the chemical analysis of the leachate to detect changes in concentrations or chemical constituents as a routine operation and maintenance activity. Ohio EPA's expectation is that the leachate will become more concentrated as less infiltration occurs. As stated in Section 4, Ohio EPA will determine the final leachate treatment method for Green I Landfill at or before the Five Year Review, based on the quality and quantity of leachate generated. The implementation of this remedial action will eliminate the pathways described by RAO H2 and E2.

Performance Standard: This element of the remedy will be considered successful when a leachate management system is constructed and maintained to pass periodic inspections by Ohio EPA, documenting that all leachate is being contained and that the volume of leachate shows a statistically significant decreasing trend within the first five years following construction completion.

5.4 *Off-Site Pond Surface Water and Sediment Removal:* The components of the off-Site pond's remediation include the removal and on-Site treatment of pond water followed by transportation of the treated pond water to a wastewater treatment plant for disposal. The sediments left behind will then be dried and excavated. The excavated sediments will be transported to Green I Landfill for placement under the dual layer low permeability cap. The final implementation of these remedial actions will eliminate the pathways described by RAO E2 and E3.

Performance Standard: Ohio EPA will consider the remediation of the off-Site pond surface water successful when this water has been removed and disposed of at a proper treatment facility in accordance with applicable regulations. Ohio EPA will consider the off-Site pond sediment removal successful when the sediments have been removed, placed under the Green I Landfill cap, and the analysis of confirmation samples collected from the excavation show that the remaining soils do not exceed the project action levels provided in Table 1 of this Decision Document.

6.0 DOCUMENTATION OF SIGNIFICANT CHANGES

Based on comments received during the public comment period, Ohio EPA has determined that certain areas of the landfill may have physical impediments (*e.g.,* steep slopes) to the construction of the dual layer cap as selected for the Green I Landfill. In these limited areas, Ohio EPA will evaluate alternatives where the dual layer cap cannot be constructed based on appropriate engineering design standards. Any such modification will be incorporated during the Remedial Design.

7.0 RESPONSIVENESS SUMMARY

Comment #1 (Goodyear)

Minimal exposure risk exists at the site, and any risk that does exist can be eliminated through reasonable and less restrictive remedial measures that would be equally protective of human health and the environment.

Ohio EPA Response:

The Site poses an unacceptable risk to current and future receptors (*e.g.* people, wildlife, etc.) that must be addressed through a remedy that is consistent with the NCP and meets applicable or relevant and appropriate requirements (ARARs). The construction of a dual layer cap meets ARARs; reduces risk to current and future receptors by forming a protective barrier that will provide the best level of protection for public safety, human health and the environment; and is consistent with the NCP.

Comment #2 (Goodyear)

There are constructability issues related to the preferred remedy.

Ohio EPA Response:

Certain areas of the landfill may have physical impediments (*e.g.* steep slopes) to the construction of the dual layer cap as selected for the Green I Landfill. Ohio EPA will evaluate alternatives where the dual layer cap cannot be constructed based on appropriate engineering design standards. Any such modification will be incorporated during the Remedial Design.

The comment expressed concerns regarding the stability of Site soils after removal of the trees that are growing within and near the footprint of waste placement at the Site. Based on Ohio EPA's experience with damaged and downed trees, the greater concern, more so than soil stability after removal, is the potential for trees to be blown over, thereby exposing waste. With regard to extending the toe of the cap to allow for slope stability, Ohio EPA will evaluate this issue during Remedial Design activities. The comment also discussed the concern that regrading at the Site may expose hazardous materials that could cause impact to workers and residents in adjacent residential areas. Ohio EPA acknowledges this concern and will ensure that engineering controls and monitoring requirements are followed to minimize these potential impacts. These requirements will be included in the work plan and health and safety plan for the remedial action.

Comment #3 (Goodyear)

Implementation of the preferred remedy potentially will not eliminate the leachate seeps.

Ohio EPA Response:

The implementation of the selected dual layer cap will greatly reduce the infiltration rate of water into the landfill, which will, in turn, reduce the volume of leachate generated annually by the Green I Landfill. While this selected remedy may not fully eliminate the leachate seeps, the volume and toxicity of the existing leachate seeps will be reduced substantially thereby improving the protection of human health, public safety and the environment. Ohio

EPA's selected remedy, including the installation of a toe drain system to collect leachate, will prevent the migration of leachate, which contains contaminants, into waters of the State of Ohio (*e.g.,* surface water and ground water) and will provide a permanent solution to the leachate seeps. As described in Section 5.3, leachate will be collected in drains, piped to storage tanks and periodically disposed of at an approved disposal facility in accordance with state and federal laws and regulations until the first five-year review where a final alternative will be selected based on the volume and chemical makeup of the leachate.

Comment #4 (Goodyear)

Implementation of the preferred remedy will produce significant negative net environmental impacts.

Ohio EPA Response:

Ohio EPA has evaluated the potential positive and negative environmental impacts of the selected remedy. The selected remedy will ensure that this facility is permanently remediated in compliance with all ARARs and consistent with the NCP. Completing the closure of this facility as described in this Decision Document will reduce the likelihood that chemicals disposed of in the Green I Landfill will be released to the environment in the future.

Comment #5 (Goodyear)

Implementation of the preferred remedy will result in significant disturbances to the local area and residents.

Ohio EPA Response:

Ohio EPA acknowledges that there may be impacts to the local area and its residents due to construction (*e.g.* noise, increased traffic, etc.) of the selected remedy. However, these impacts will be limited in duration and the final result of the construction will ensure the long-term protection of the residents' drinking water from the contaminants found at the Site. Ohio EPA will work with the local residents, township, county, and other officials to identify ways to complete the project with the least impact to the community.

Comment #6 (Lyon, Horn)

Several comments were received regarding the removal of vegetation from on and around the landfill and how that may increase the potential for winds and subsequent dust migration.

Ohio EPA Response:

Ohio EPA will work to employ ways to minimize dust generation during construction activities and replace lost vegetation on the periphery of the landfill post-construction to minimize impacts to the local community. Note, Ohio's air laws and regulations will apply to the construction activities. Accordingly, construction of the remedy will be required to comply with the dust suppression requirements therein as ARARs.

Comment #7 (Goodyear, Lyon, Kaeppner, Addington, Horn, Blair)

Several comments were received regarding; 1) the increase in vehicle traffic on Hunters Woods Road, a one and one-half lane wide township road; 2) the use of Hunters Ridge

Road, a private road, to access the Green I Landfill Site; and 3) heavy truck traffic pulling out onto SR 93 from Hunters Woods Road.

Ohio EPA Response:

Ohio EPA recognizes that the community is concerned with the use of Hunters Woods Road due to the size of the road and Hunters Ridge Road due to its status as a private road and will explore alternatives to the use of Hunters Woods Road and Hunters Ridge Road during the Remedial Design process. In the event that no suitable alternative is available, Ohio EPA will work to identify ways to minimize the truck traffic including identifying a suitable off-Site staging area near Green I Landfill to minimize the number of trucks accessing the Site at any one time. To address the concern of trucks pulling out onto SR 93 from Hunters Woods Road, Ohio EPA will request the county engineer and Ohio Department of Transportation (ODOT) to institute traffic controls at this intersection to ensure safety during periods of heavy truck traffic.

Comment #8 (Horn)

Mr. Larry Horn indicated that the septic tank located behind 34490 Hunters Ridge Road appeared to be located close to the landfill cap and may need to be moved to accommodate the proposed landfill cap. Mr. Horn expressed concern about which party will incur any expense in relocating the tank, should it be necessary.

Ohio EPA Response:

While Ohio EPA has no jurisdiction over private septic tanks, Ohio EPA will work to ensure that any impacts to the noted septic system be addressed during the Remedial Design activities. Ohio EPA encourages Mr. Horn to remain involved to ensure that his concerns are addressed.

Comment #9 (Blair)

Mr. Tim Blair, Green Township Trustee, advised that prior to initiating construction that a road repair agreement will need to be in place for Hunters Woods Road.

Ohio EPA Response:

Although Ohio EPA has no jurisdiction over this type of agreement, Ohio EPA staff will encourage the responsible parties to discuss this issue with Green Township officials.

Comment #10 (Walter)

Ms. Jessica Walter, Sanitarian, Hocking County Health Department, advised that private water wells are to be located 25 feet or more from a road. If the road improvements will alter that distance this could be a concern for wellhead protection.

Ohio EPA Response:

Ohio EPA is aware of the potential wellhead protection issues and will be cognizant of these issues when reviewing and approving the remedial work plans for Green I Landfill.

Specific Comments Received on the Preferred Plan from The Goodyear Tire & Rubber Company:

Comment #11

Section 1.1 (Executive Summary)
The Preferred Plan states:

"The major health and environmental risks of this Site come from direct contact with waste materials in the landfill; direct contact or ingestion of leachate emanating from the landfill or sediments in the drainage ways and the off-Site pond receiving leachate; and direct contact or ingestion of contaminated soils at the Site."

Goodyear's Response

Ohio EPA maintains that direct contact with or ingestion of waste or leachate is driving risks at the Site. Goodyear believes the risks associated with this exposure pathway have already been managed through the original capping of the landfill and subsequent activities completed by Goodyear. As described in Part II. E below, the landfill was closed in 1974 with approval from the Hocking County Health Department. Soil cover established on the Site after the 1974 closure protects against direct contact with waste material (and has for over 35 years) and now supports an extensive vegetative cover.

Additionally, the vast majority of the Site does not pose any threat to human health or the environment and does not require remedial activity. In January 2010, Goodyear conducted a geotechnical investigation of the soil cover at the Site. The results of the investigation were detailed in a Certification Report provided to Ohio EPA and demonstrated that over half the landfill area already has a soil cover that is a minimum of 2 feet thick or greater. Permeability testing of a sample of the clay (component of the soil cover), recorded a hydraulic conductivity of 3.1 E10-7, which meets Ohio EPA standards for permeability and is indicative of a highly impermeable soil. Furthermore, soils above background levels are limited to a few specific areas of the Site, namely the former Hamby (now Goodyear-owned) and Hoag (Hunters Woods Subdivision Lot 3) properties. These areas and any areas of the Site that have less than 2 feet of soil cover could be supplemented with additional soil.

Finally, Goodyear completed an Interim Remediation Action in 2003 involving the installation of fences around areas where leachate periodically emanates from the ground. Goodyear also purchased the Hamby property in 2006 during completion of the RI phase. Both of these activities further reduced or eliminated human activities on the Site and any associated exposure risk referenced in the Preferred Plan.

Ohio EPA Response:

Based on Goodyear's investigation it has been determined that approximately 50% of the landfill contains less than two feet of soil cover. The selected remedy for the Green I Landfill is designed to address the entire Site in a manner that meets ARARs and is consistent with the NCP criteria. Goodyear's comments also suggest that the leachate seeps release only part of the year, which is not consistent with Ohio EPA's field observations. The noted fencing was required as a temporary, interim action and was never intended to be the final, permanent remedy for the leachate seeps that are discharging contaminants.

Ohio EPA notes that (1) the soil that has been placed on the landfill does not eliminate infiltration, and therefore does not reduce or prevent the creation of leachate within the landfill; (2) although the soil is "highly impermeable" it still does not meet requirements for a solid waste (or hazardous waste) cap; and (3) a fence does not stop the entry of leachate into surface water or ground water.

Comment #12

Sections 1.2 (Scope of the Proposed Remedial Action) and 5.1.4 (Alternative 4 – Dual Layer Low Permeability Cap)

The Preferred Plan advocates construction of a multi-layer landfill cap that will include a gas collection layer (12" sand or geocomposite layer), a clay layer (18" clay), impermeable flexible membrane liner (FML)(40 mil), a drainage layer (12" soil or geosynthetic fabric), a protective layer (18" soil), and a vegetative cover (6" topsoil).

Goodyear's Response

The preferred remedy would require removal of all vegetation and trees, placement of additional cover material and topsoil, and re-vegetation of the Site. However, re-capping may not be an effective remedial measure to eliminate the seeps, the primary driver of risk at the Site. Based on a review of available information, it is possible that ground water will continue to discharge at the surface in some areas of the Site due to the underlying sandstone formation, even if the entire Site were re-capped. Consequently, the potential effectiveness of implementing the preferred remedy at the Site to eliminate the seeps is questionable.

Goodyear believes that this preferred remedy option is not necessary and will result in slope stability and FML construction issues due to the steepness of the existing topography; leachate outbreak concerns and soil erosion/silt control issues from excavating large amounts of soil; and a significant Site footprint expansion into the neighboring properties. Alternative 4 will be very disruptive to neighboring landowners and will not result in any additional risk reduction compared to the other alternatives.

The preferred remedy would also present numerous significant and negative environmental impacts. Vegetation removed will include numerous large diameter trees at the northern portion of the Site that provide valuable habitat for wildlife, including the black bear, which is listed as endangered in Ohio. In addition to the permanent destruction of valuable forest

habitat, the trees removed for re-capping will have to be removed from the Site. Cap material and topsoil will have to be hauled to the Site. Both of these activities will generate large volumes of truck traffic, which will require large quantities of fuel, emit exhaust emissions, and create nuisances to neighboring landowners in terms of dust and noise. According to Ohio EPA, dust is considered a transport medium, because Chemicals of Potential Concern (COPCs) in soil may become entrained in fugitive dust. Consequently, the re-capping option will have a large carbon footprint and would not be considered Green Remediation.

To avoid or minimize these impacts, Goodyear advocates a remedy employing enhancement of the existing Site cap in areas where the cover thickness is less than 2 feet. The approach advocated by Goodyear is consistent with Ohio EPA's solid waste regulations. The solid waste regulations specifically allow Ohio EPA to grant a variance from the specified multi-layer landfill cap. Goodyear would also advocate an alternative remedy for the Site consisting of eliminating or reducing the source of leachate seeps using surface water control, strategic grading, cap enhancements, and limited leachate collection or control.

Ohio EPA Response:

This comment suggests that a source of ground water exists that is contributing to the production of leachate; however, this is not supported by the data collected during the Remedial Investigation. The current soil cover perpetuates the creation of leachate and migration of the contaminants that have been identified in the waste within the Green I Landfill. Therefore, installation of a cap is necessary for the Green I Landfill to be in compliance with ARARs.

As indicated in Ohio EPA's response to Comment #2, issues of constructability will be addressed in the Remedial Design phase of the project. Habitat enhancement measures can be incorporated into the Remedial Design. Ohio EPA will encourage the responsible parties to use a seed mixture that will allow for additional, diverse habitat that will enhance the wildlife resources in the area. Engineering controls for dust suppression will be required during the implementation of the remedy to address fugitive dust.

Comment #13

Sections 1.2 (Scope of the Proposed Remedial Action) and 7.3 (Leachate Collection and Management)

The Preferred Plan advocates collection and storage (or treatment) of leachate discharging from the nine seeps at the perimeter of the landfill to prevent direct contact and discharge to surface water, involving the installation of a series of drains and piping that will collect and convey the leachate to holding tanks, subsequent to appropriate treatment and/or disposal.

Goodyear's Response

Goodyear would advocate a remedial alternative eliminating or reducing the source of leachate seeps by determining the sources of water that generate the leachate and employing systems to minimize leachate releases to the Site surface. These systems may

include excavating drains back into the waste and grouting or draining the bedrock. For those seeps fed by local surface water drainage, localized grading and cap enhancements would minimize these flows. Some limited leachate collection or control may also be required in conjunction with these measures.

Ohio EPA Response:

Goodyear advocates for a remedial alternative that will eliminate or reduce the source of water that leads to the generation of the leachate seeps. Ohio EPA agrees with this goal and therefore the Agency has selected a remedy that includes a dual-layer cap that will reduce the infiltration of water that directly contributes to the generation of leachate seeps. Ohio EPA's selected remedy anticipates that the volume of leachate generated annually will be substantially reduced within the first five years following cap construction. Ohio EPA will consider whether additional studies are necessary during the Remedial Design phase to determine if there are other sources of water to the landfill that were not identified during the remedial investigation.

Comment #14

Sections 1.2 (Scope of the Proposed Remedial Action) and 7.4 (Off-Site Pond Surface Water and Sediment Removal)

The Preferred Plan advocates a one-time removal and on-site treatment of contaminated surface water from the adjacent property pond followed by transportation of the treated pond water to a wastewater treatment plant for disposal. Treatment would consist of pre-filtering and carbon adsorption. The pond sediments left behind on the adjacent property would be de-watered in place, dried, excavated, and transported for disposal under the landfill cap.

Goodyear's Response

The RI report indicates that the only contaminants detected above project action levels in the sediment at the off-Site pond are arsenic, iron, and PCBs. As previously described, levels of arsenic and iron above PRGs were also found in background soil samples collected off-Site in areas that were not impacted by Site activities.

Alternative 4 of the Preferred Plan includes remedial actions at the Off-Site Pond that include removal of all of the water and sediment in the pond. Goodyear believes these measures would be unreasonable and excessive and would destroy the existing wetland habitat. With the exception of manganese and PCB 1260, testing of the surface water in the pond did not show any impact above Remedial Action Objective Target Levels. Other technologies exist that would allow for the isolation of the sediment such that it could remain in place. Implementation of Alternate 4 would also involve the development of new access roads, which would have a negative impact on forest habitat. Considering the very low concentrations of contaminants reported in the RI, Goodyear recommends a remediation alternative not involving the removal of surface water and sediment from the Off-Site pond.

Ohio EPA Response:

The testing of the pond sediments confirmed the presence of persistent and toxic chemicals, namely PCBs. Based on the approved FS, which forms the basis for evaluating remedial alternatives, all of the alternatives presented in Goodyear's Feasibility Study except the no action alternative, require the removal of surface water. The no action alternative is not protective and therefore was not selected by Ohio EPA. Ohio EPA's selected alternative will permanently address impacts to the pond sediments and surface water. Ohio EPA will evaluate the necessity for habitat restoration within the pond during the Remedial Design activities.

Comment #15

Section 3.1 (Site History)

The Preferred Plan states:

"Records obtained from the Hocking County Health Department and subsequent inspections performed by Ohio EPA indicate that the landfill was never properly closed pursuant to the rules in effect in 1974."

Goodyear's Response:

The Acting Health Commissioner and Sanitarian for the Hocking County Health Department determined in November 1974 that the Site had been appropriately addressed in accordance with applicable requirements. In a letter to the Board of County Commissioners for Hocking County, dated November 1, 1974, the Health Department stated that by mid-August 1974, the Site had been adequately covered and seeded and was satisfactory.

It is unclear to Goodyear what specific closure requirements would have been applicable to the Site in 1974 and would have superseded the Hocking County Health Department's determination that the landfill had been adequately covered and seeded. Goodyear understands that Ohio's first solid waste rule, HE-24, which became effective on July 1, 1968, under the Ohio Department of Health's jurisdiction, required operational plans for landfills but specified no closure or post-closure requirements, and that landfill closure obligations were first developed and imposed in July 1976. Consequently, in light of the Hocking County Health Department's conclusion that the landfill was appropriately covered and seeded as of November 1974, Goodyear respectfully disagrees with Ohio EPA's conclusion that the landfill was not properly closed in 1974 and requests that the language in the Preferred Plan be revised to reflect the County's determination.

Ohio EPA Response:

The 1968 Solid Waste Regulations indicate that the landfill must be closed consistent with their approved plans. The approved plans for Green I Landfill were submitted in May 1970 and indicate "2 Foot Minimum Cover" shall be placed over the waste. Inspection reports of the operating landfill indicate that the operator was cited for not having two feet of cover over the six inches of daily cover (a total of 30 inches). Therefore, based on Goodyear's

January 2010 geotechnical investigation, the Green I Landfill was not properly closed according to the plans noted. Ohio EPA will maintain the original language.

Comment #16

Section 3.4 (Summary of Site Risks)

The Preferred Plan states that the media directly impacted by the landfill wastes buried at the Site are soil and ground water, that surface runoff and ground water (where discharges to seeps occur) are transport mediums, and that dust is considered a potential transport medium.

Goodyear's Response

Impacts to soil are limited to specific areas of the Site as described above in Part I.

Ground water sampling data obtained from the shallow aquifer indicate that ground water has been impacted with some VOCs and metals. As Ohio EPA noted in Section 3.2.2 of its Preferred Plan, vertical separation between the shallow and deep aquifers is greater than 250 feet with layers of impermeable bedrock in between, minimizing the potential for the downward migration of contaminants.

Ohio EPA conducted periodic private water well sampling from 1985 through 2003. All of the private wells sampled drew water from the deeper aquifer. Samples collected from private water wells have never detected landfill contaminants. All residents in the area of the landfill currently utilize this aquifer for their potable water.

Implementation of a remedial alternative involving construction and the potential disturbance of relatively stable landfill wastes and immediately surrounding soils may produce additional exposure risks. Specifically, the engineering requirements of a dual layer cap and the footprint required for that remedial option may require significant land disturbance and the relocation of waste materials that may, in spite of every precaution, facilitate mobilization of potential contaminants. Goodyear believes that remedial efforts should focus on augmenting the existing cover to eliminate exposure pathways and further stabilize the landfill mass only where such activities are required.

Ohio EPA Response:

The proposed plan incorporates standard capping methods in compliance with Ohio's laws and rules. Engineering and operational standards will be employed during Remedial Design to address any stability issues. Ohio EPA has no reason to suspect that the installation of the dual-layer cap will exacerbate risks posed by the Site. Installation of the cap will reduce infiltration of water and eliminate the potential for direct contact with the waste, thereby protecting both human health and the environment.

Comment #17

Section 3.4.1 (Risks to Human Health)

The Preferred Plan states that with no remedial action, the COPCs for an adult living on the Site is arsenic detected in soil, and for a child living on the Site are arsenic and manganese detected in the soil. The Preferred Plan also states that based on the risk assessment results, the COPCs detected in soil may pose an unacceptable risk and hazard to human health.

Goodyear's Response

Soil sampling activities performed during the RI phase to determine metal concentrations in soils that have not been impacted by Site activities (i.e., background metal concentrations) indicated that soils outside the landfill limits contain concentrations of naturally occurring metals (arsenic, iron and manganese) above preliminary remediation goals (PRGs). The human health risk assessment for the Site identifies arsenic and manganese as the primary chemicals of concern. Consequently, there is no difference in risk presented by soils on the Site as opposed to background soils located off-Site.

Soils having the highest potential to pose risks to human health are related to seeps impacting relatively small areas of the Site. COPCs exceeding site-specific background levels are located in limited areas on the former Hamby (now owned by Goodyear) and Hoag properties. The vast majority of the Site does not pose any exposure risk and does not require remedial action.

Ohio EPA Response:

Ohio EPA is aware that there are concentrations of arsenic and manganese in the background samples; however, there are increased concentrations in Site soils and the cumulative effect of background and anthropogenic (man-made) sources create an unacceptable risk to the identified receptors (*e.g.* people, wildlife, etc.) at the Green I Landfill. An environmental covenant is a required component of the remedial action in order to permanently prohibit the use of the property for residential purposes. As previously described, the Remedial Actions are intended to address all of the threats related to contaminants contained within and emanating from the landfill. As pointed out in the comment, limited portions of the Site contain COPCs exceeding background concentrations and Ohio EPA will ensure that these areas are addressed as part of the construction of the landfill cap.

Comment #18

Section 3.4.2 (Risks to Ecological Receptors)

The Preferred Plan states:

"Upon completion of the ERA for the Green I Landfill Site, the following compounds in various media were determined to pose a potential risk to ecological receptors:

- *Surface Soils: arsenic, barium, cadmium, iron, lead, manganese, selenium, thallium, vanadium, zinc, and bis(2-ethylhexyl)phthalate.*
- *Off-Site Surface Water: manganese, PCB-1260.*
- *Off-Site Sediments: arsenic, acetone, benzoic acid, carbazole, PCB-1242, PCB-1248."*

Goodyear's Response

The ecological risk assessment identified a potential risk to ecological receptors exposed to Site related chemicals. Metals are the primary constituents of ecological concern. One area that potentially poses risks to ecological receptors is the offsite pond. On the Site, areas that potentially pose risk to ecological receptors are restricted to several of the seeps, although the potential risk is not the same for all of those seeps. The potential for risk in the areas of the mature forest is low. The results suggest that placement of a dual-layer cap over the entire Site would not be commensurate with the risk identified in the ecological risk assessment, and Goodyear would advocate a more focused approach that would ensure protection of human health and the environment while minimizing destruction and permanent loss of valuable ecological resources.

Ohio EPA Response:

The selected remedy will permanently address risks currently posed by the Green I Landfill, comply with ARARs and meet NCP criteria. Ohio EPA agrees that destruction and loss of trees and habitat should be minimized to the smallest area required to place the dual layer, ARAR compliant cap.

Comment #19

Sections 6.2.2 (Compliance with ARARs)

The Preferred Plan states, with respect to landfill capping alternatives, that Alternative 4 is the only alternative that would be fully compliant with the applicable, relevant and appropriate rules and laws for construction of a solid waste landfill cap in Ohio as described in OAC 3745-27-08.

Goodyear's Response

Ohio Administrative Code 3745-27-04(D) states that a sanitary landfill that has not received municipal waste after June 1, 1994, is not subject to the composite cap closure requirements embodied in the Preferred Plan and the preferred alternative. The Site ceased receiving waste in 1974 and as was discussed above in Part II.F, had been adequately covered and seeded as determined by the Hocking County Health Department in November 1974. According to available information, no wastes were received after the Site was covered and seeded. Consequently, the Preferred Plan and selected alternative should be revised to reflect the non-applicability of Ohio EPA's composite cap requirements pursuant to OAC 3745-27-04(D).

Goodyear's position is consistent with Ohio EPA's approach to the remedy selected in connection with other sites, including the NASA-Glenn Research Center South 40 Area in Cuyahoga County, Ohio, part of which was retained by the NASA-Glenn Research Center and part of which was transferred to the Cleveland Hopkins International Airport. In its 2003 Decision Documents for those sites, Ohio EPA concluded that the landfills located within the South 40 Area had been closed prior to 1976. For that reason, Ohio EPA determined that 1976 cap requirements for solid waste facilities governed cap construction.

Because the Green I landfill had been appropriately covered and seeded prior to 1976, a similar rational applies and the Site remedy should reflect 1976 capping requirements. However, even if a distinction can be drawn between the closure of the pre-1976 NASA-Glenn Research Center landfills and the 1974 closure of the Site, application of the 1976 cap requirements nonetheless would be consistent with the position Ohio EPA has adopted in the past appropriately imposing 1976 capping requirements on an owner or operator of an improperly closed solid waste facility in lieu of current closure or post-closure requirements. See Ohio EPA – DSIWM Guidance No. 0123, "Standards for Current Construction of a 1976 Cap System" (Mar. 27, 1995) (attached to the NASA-Glenn Research Center Decision Documents).

Based on the foregoing, Goodyear advocates that the selected alternative reflect applicability of Ohio EPA's 1976 cap requirements in lieu of current, composite cap requirements.

Ohio EPA Response:

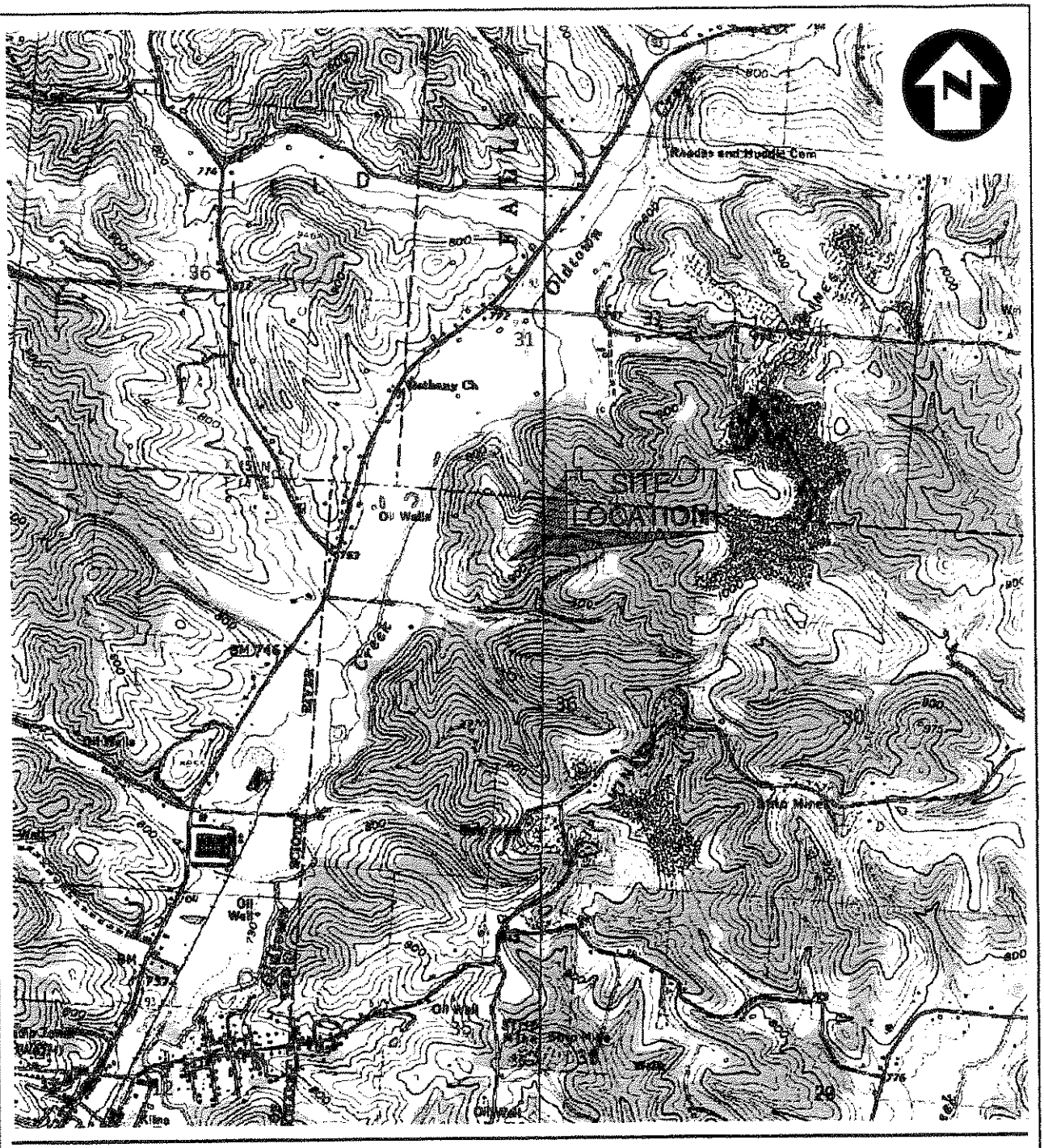
As stated in the response to comment #15, the information contained in the administrative record for this Site, including but not limited to Goodyear's recent geotechnical investigation, clearly demonstrates that the Green I Landfill was not closed in accordance with the 1968 regulations. This fact, combined with Ohio EPA's observations of a continuing discharge of contaminants to waters of the State in violation of Ohio law (*e.g.*, R.C. 6111 and R.C. 3734), and the fact that current capping requirements in Ohio's solid waste laws and regulations provide the best options for long-term protectiveness and permanence, validate Ohio EPA's selected remedy as compliant with ARARs.

8.0 GLOSSARY

Adsorb	The adhesion in an extremely thin layer of molecules (as of gases, solutes, or liquids) to the surfaces of solid bodies or liquids with which they are in contact
Aquifer	An underground geological formation capable of holding and yielding water.
ARARs	Applicable or relevant and appropriate requirements. Those rules which strictly apply to remedial activities at the site, or those rules whose requirements would help achieve the remedial goals for the site.
Baseline Risk Assessment	An evaluation of the risks to humans and the environment posed by a site.
Bioconcentrate	The net result of the uptake, distribution, and elimination of a substance in an organism due to water-borne exposure, whereas bioaccumulation includes all routes of exposure (i.e. air, water, soil, food).
Carcinogen	A chemical that causes cancer.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. A federal law that regulates cleanup of hazardous substances sites under the U.S. EPA Superfund Program.
Contaminants of Concern (COCs)	Chemicals identified at the site which are present in concentrations that may be harmful to human health or the environment.
Decision Document	A statement issued by the Ohio EPA giving the Director's selected remedy for a site and the reasons for its selection.
Ecological Receptor	Animals or plant life exposed or potentially exposed to chemicals released from a site.
Environmental Covenant	A servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in section 5301.82 of the Revised Code.
Exposure Pathway	Route by which a chemical is transported from the site to a human or ecological receptor.
Feasibility Study	A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected.
Final Cleanup Levels	Final cleanup levels are identified in the Decision Document along with the RAOs and performance standards.
Hazardous Substance	A chemical that may cause harm to humans or the environment.

Hazardous Waste	A waste product listed or defined by RCRA which may cause harm to humans or the environment.
Human Receptor	A person or population exposed to chemicals released from a site.
Hydrolyze	decompose by reacting with water
Leachate	Water contaminated by contact with wastes.
LOE Contractor	Level of Effort Contractor. A person or organization retained by the Ohio EPA to assist in the investigation, evaluation or remediation of a site.
Maximum Contaminant Level (MCL)	The highest level of a contaminant that is allowed in a public drinking water supply. The level is established by U.S. EPA and incorporated into OAC 3745-81-11 and 3745-81-12.
NCP	National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended. A framework for remediation of hazardous substance sites specified in CERCLA.
O&M	Operation and Maintenance. Long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.
PAHs	Polycyclic aromatic hydrocarbons. Class of semi-volatile chemicals including multiple six-carbon rings. Often found as residue from coal-based chemical processes.
PCBs	Polychlorinated biphenyls. An oily chemical typically used in electrical equipment.
Performance Standard	Measures by which Ohio EPA can determine if RAOs have been met.
Preferred Plan	The plan that evaluates the preferred remedial alternative chosen by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.
Preliminary Remediation Goal (PRG)	Initial clean-up goals that (1) are protective of human health and the environment and (2) comply with ARARs. They are developed early in the process (scoping) based on readily available information and are modified to reflect the results of the baseline risk assessment (termed site-specific PRGs at this point in time). They are also used during the analysis of remedial alternatives in the remedial investigation/feasibility study (RI/FS).

Project Action Level	A concentration for a contaminant of concern that has been determined by regulation or through a risk assessment to be protective of human health or ecological receptors. This concentration value could be based on a preliminary remediation goal ("PRG"); a drinking water maximum contaminant level ("MCL"); or a background concentration ("background").
RCRA	Resource Conservation and Recovery Act of 1976 codified at 42 U.S.C. 6901 et seq. (1988), as amended. A federal law that regulates the handling of hazardous wastes.
Remedial Action Objectives (RAOs)	Specific goals of the remedy for reducing risks posed by the site.
Remedial Investigation	A study conducted to collect information necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives.
Responsiveness Summary	A summary of all comments received concerning the Preferred Plan and Ohio EPA's response to all issues raised in those comments.
Vadose (or vadose zone)	the layer of soil extending from the ground surface to ground water
Water Quality Criteria	Chemical, physical and biological standards that define whether a body of surface water is unacceptably contaminated. These standards are intended to ensure that a body of water is safe for fishing, swimming and as a drinking water source. These standards can be found in chapter 3745-1 of the Ohio Administrative Code



2000 1000 0 2000

SCALE IN FEET

OHIO
QUADRANGLE LOCATION

THE GOODYEAR TIRE & RUBBER CO.

FIGURE 1

GREEN I LANDFILL
HOCKING CO., OHIO

SITE LOCATION MAP

PARSONS
19101 VILLAVIEW ROAD, CLEVELAND, OH 44119, PHONE: 216-486-9005

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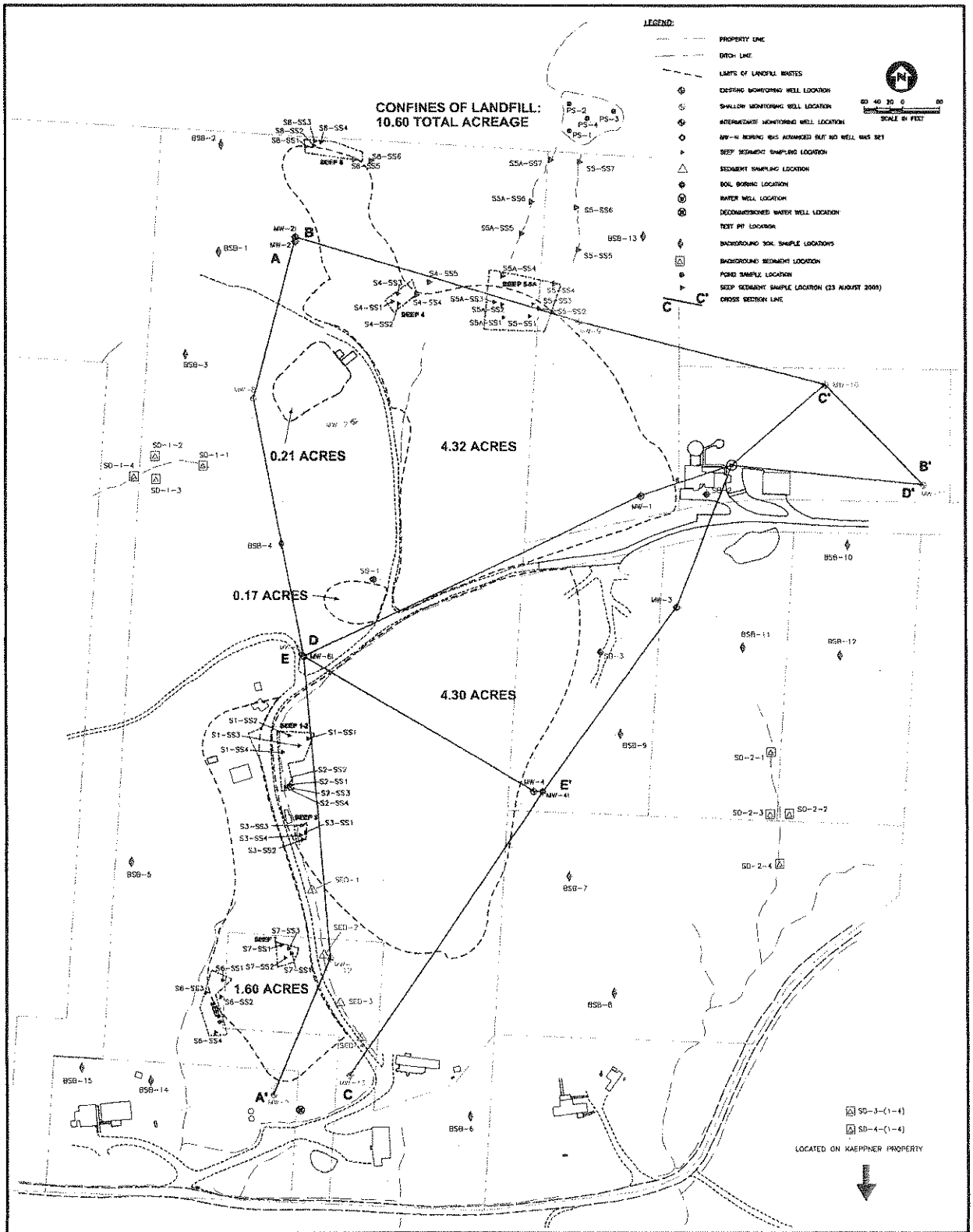
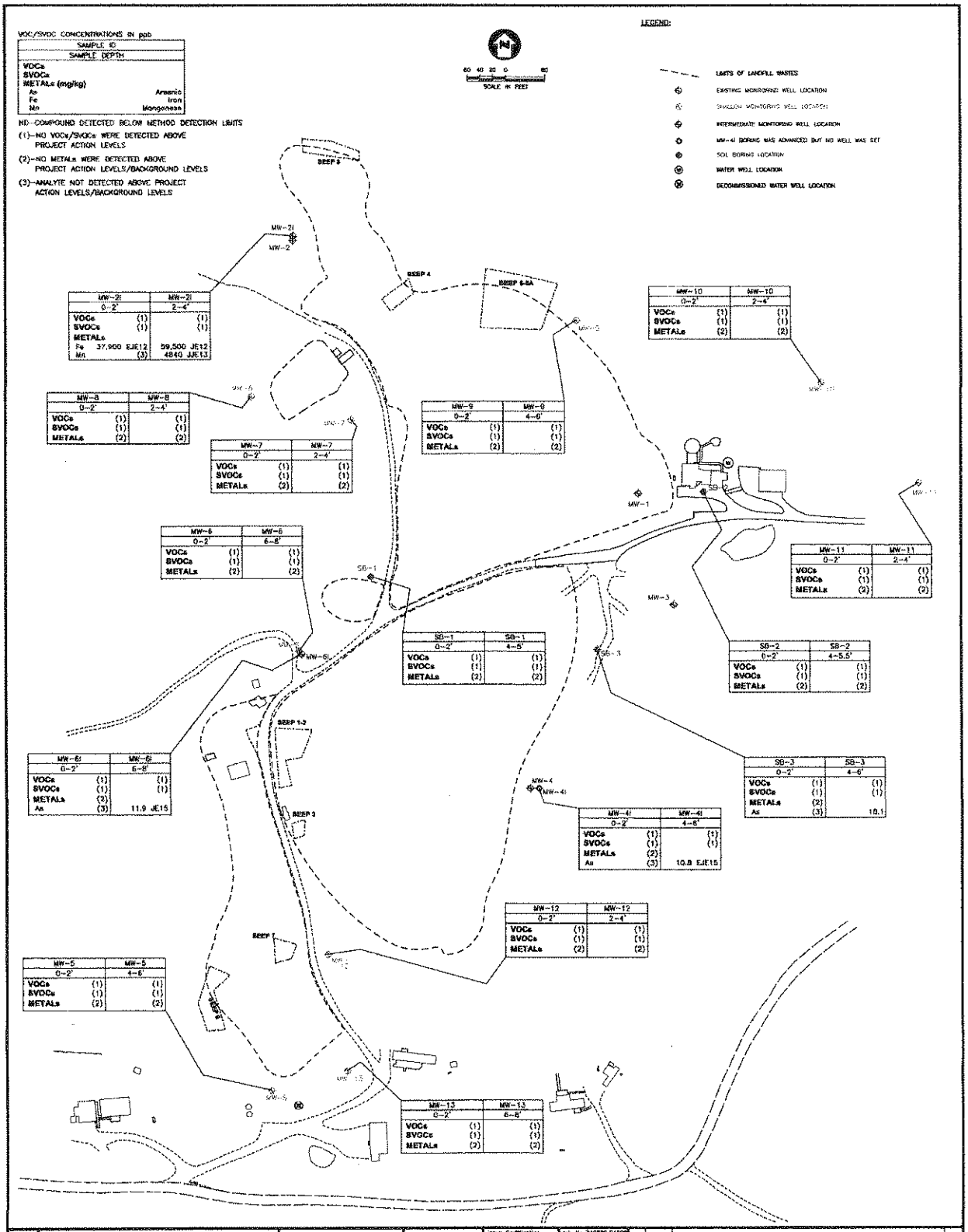


FIGURE NO. 2 REV. 1	THE GOODYEAR TIRE & RUBBER COMPANY GREEN 1 LANDFILL SITE PLAN	GOODYEAR HOCKING COUNTY, OHIO	PARSONS Cleveland, Ohio (216) 464-9005	Name Certification	Job No. 742539.07000 Designed RMV Drawn RSH Checked RMV Reviewed Approved Proj. No. Date 11/2/05 Rev Date Description By



THE GOODYEAR TIRE & RUBBER COMPANY
GREEN 1 LANDFILL

SOIL RESULTS ABOVE PROJECT ACTION LEVELS/BACKGROUND CONCENTRATIONS

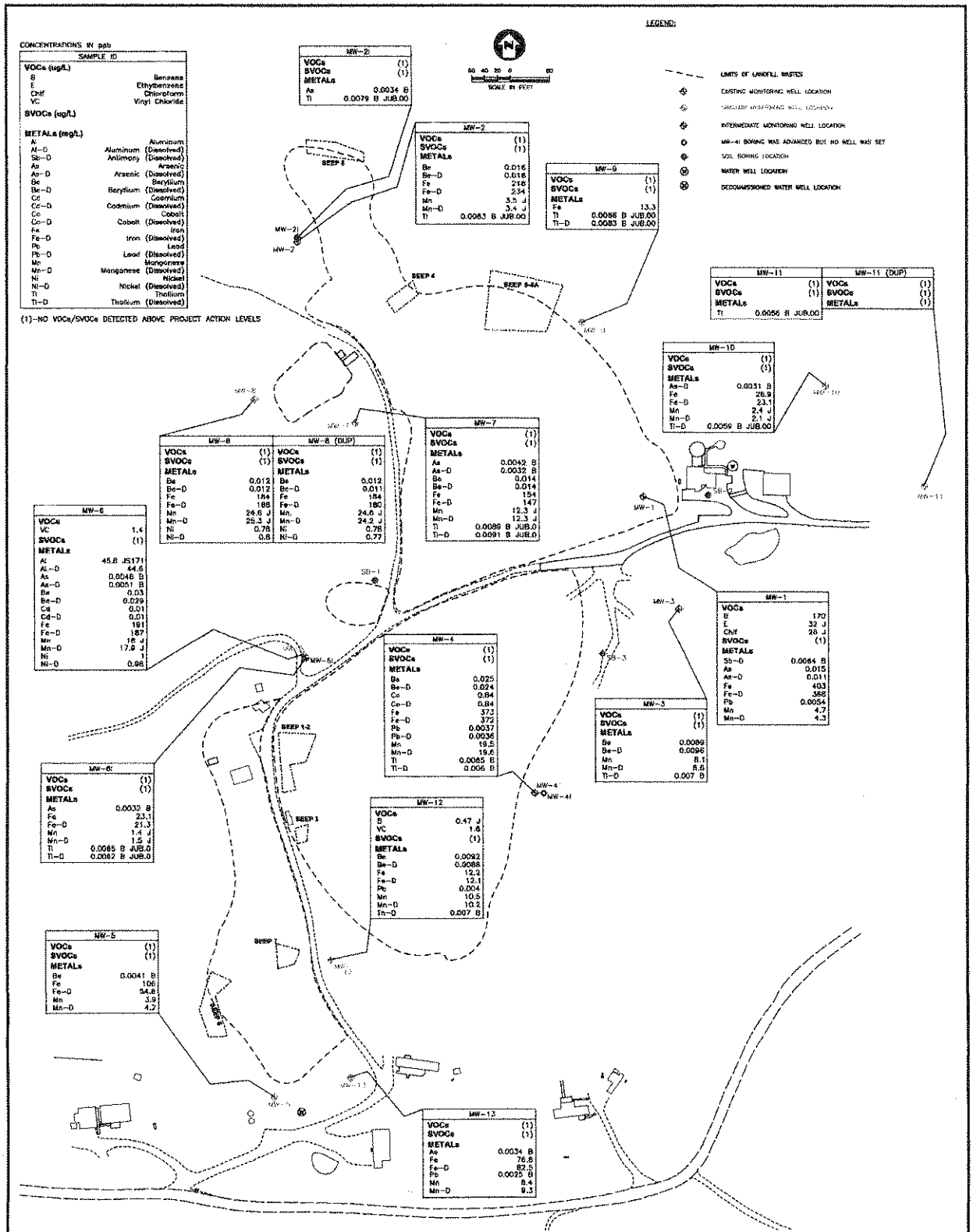
GOODYEAR
HOCKING COUNTY, OHIO

PARSONS
Cleveland, Ohio
(216) 464-9025

Issue Certification

Job No. 742829.01000
Designed TSC
Drawn SBM
Checked PMV
Released
Approved
Dwg. No.
Date 11/2/05

Rev	Date	Description	By
1			



THE GOODYEAR TIRE & RUBBER COMPANY
GREEN 1 LANDFILL

GROUNDWATER RESULTS ABOVE PROJECT ACTION LEVELS

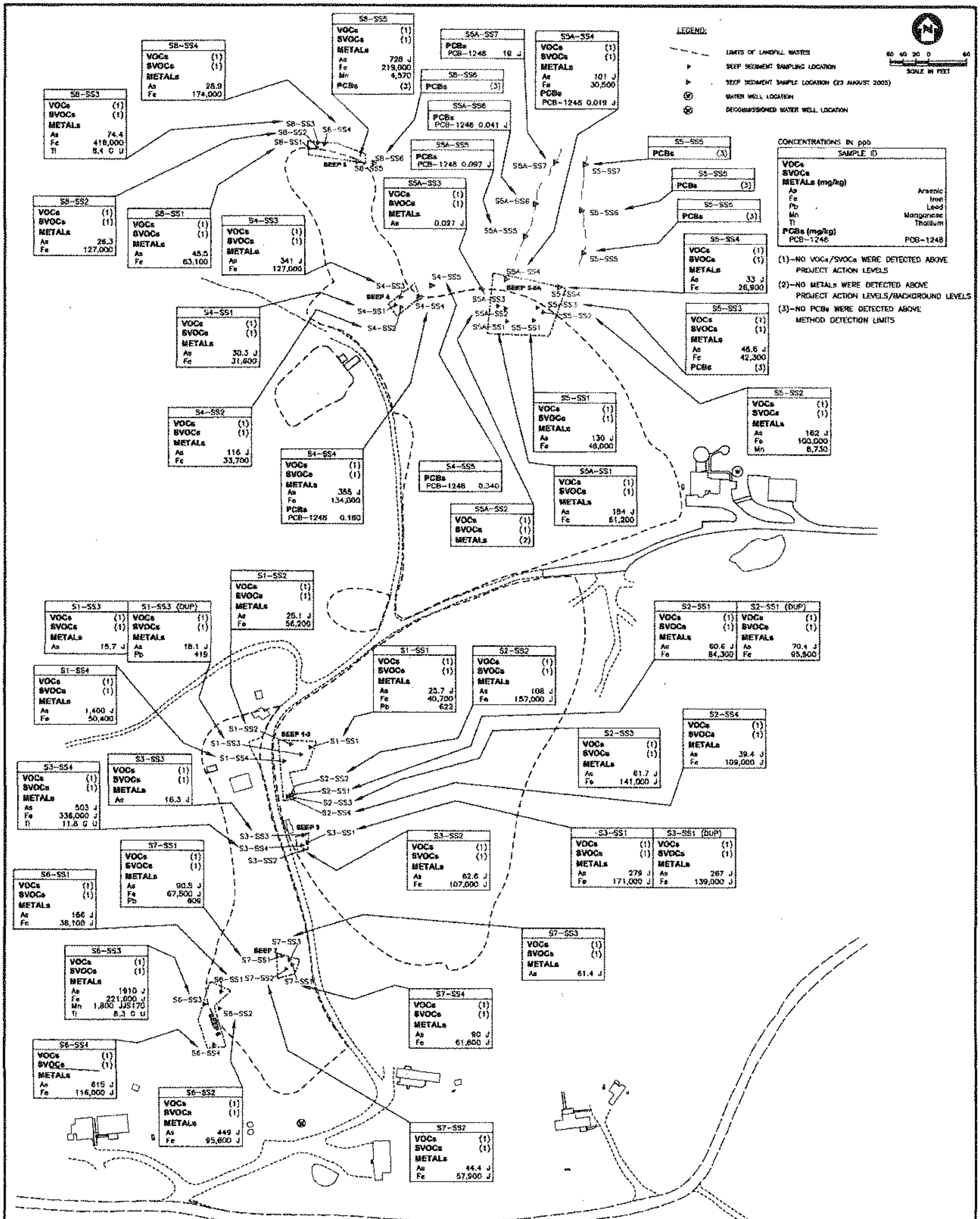
GOODYEAR
MEDINA COUNTY,
OHIO

PARSONS
Cleveland, Ohio
(216) 454-2000

Issue Certification

Job No. 743829.01000
Designed TPR
Drawn BSM
Checked RMV
Reviewed
Approved
Reg. No.
Date 11/8/00

Rev	Date	Description	By
1			



THE GOODYEAR TIRE & RUBBER COMPANY
GREEN 1 LANDFILL

FIGURE NO. 6 | REV. 1

LEACHATE SEEP SURFACE SOIL RESULTS ABOVE PROJECT ACTION LEVELS/ BACKGROUND CONCENTRATIONS

GOODYEAR
HOCKING COUNTY,
OHIO

PARSONS
Cleveland, Ohio
(216) 486-9005

Issue Certification

Job No. 742829.01000				
Designed TES				
Drawn SBM				
Checked RMV				
Reviewed				
Approved				
Reg. No.				
Date 11/8/05	Rev	Date	Description	By

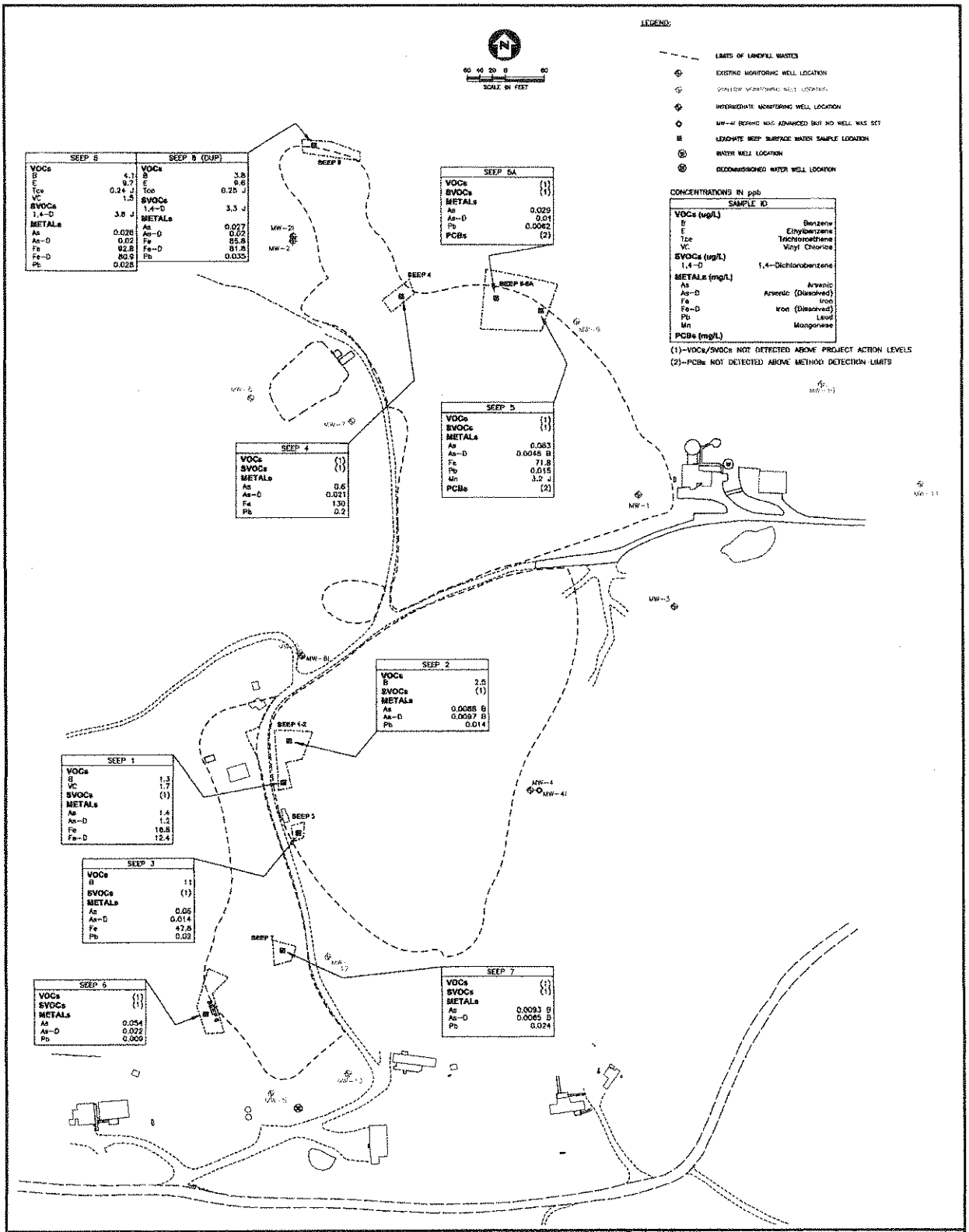
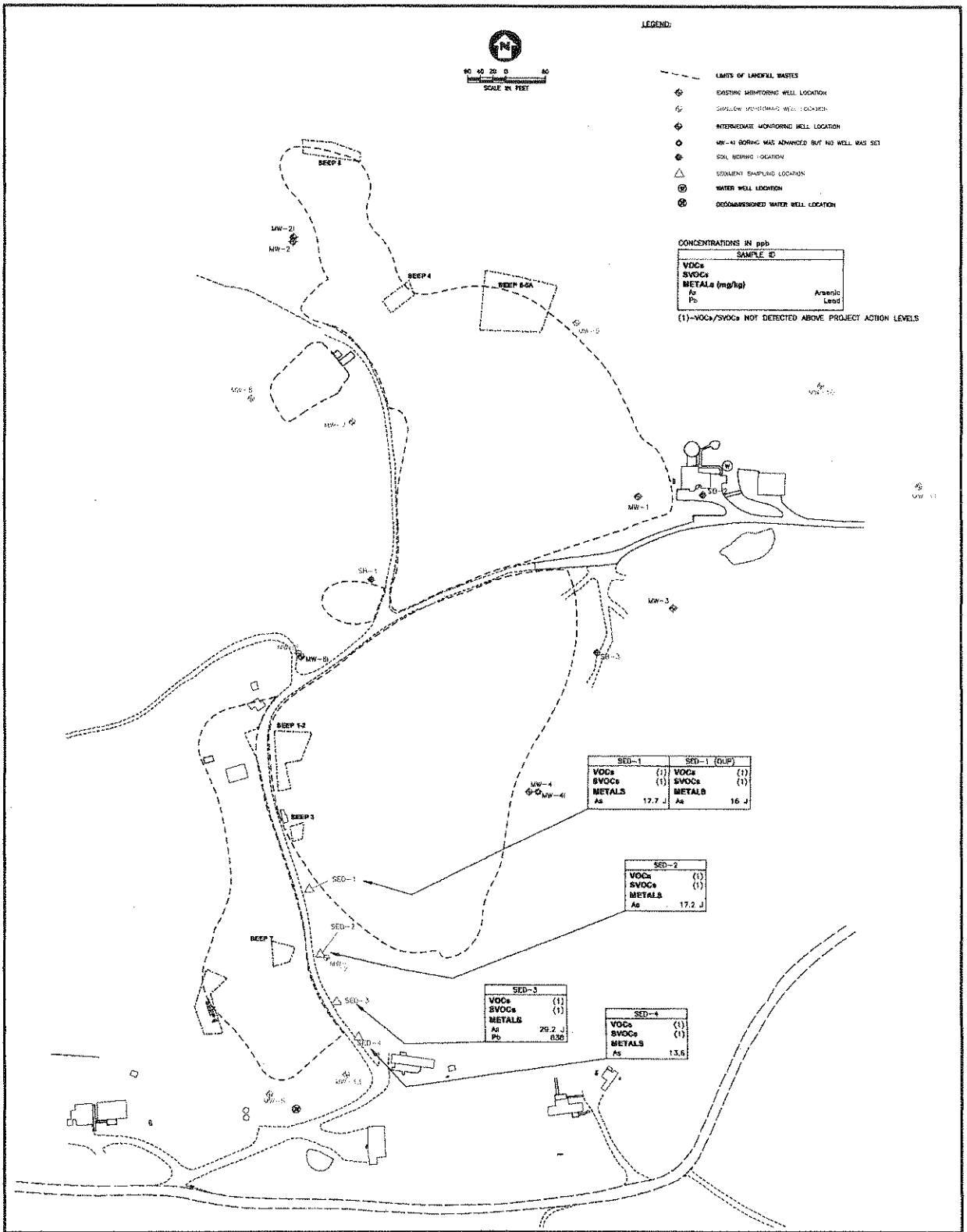


FIGURE NO. 1 OF 1	THE GOODYEAR TIRE & RUBBER COMPANY GREEN 1 LANDFILL LEACHATE SEEP SURFACE WATER RESULTS ABOVE PROJECT ACTION LEVELS	GOODYEAR HOCKING COUNTY, OHIO	PARSONS Cleveland, Ohio (216) 464-8005	Issue Definition	Job No. 743628.01000 Designed TSC Drawn BW Checked MW Reviewed Approved Req. No. Date 11/2/05 No. Date Description By



THE GOODYEAR TIRE & RUBBER COMPANY
GREEN 1 LANDFILL

DITCH SEDIMENT RESULTS ABOVE PROJECT ACTION LEVELS/ BACKGROUND CONCENTRATIONS

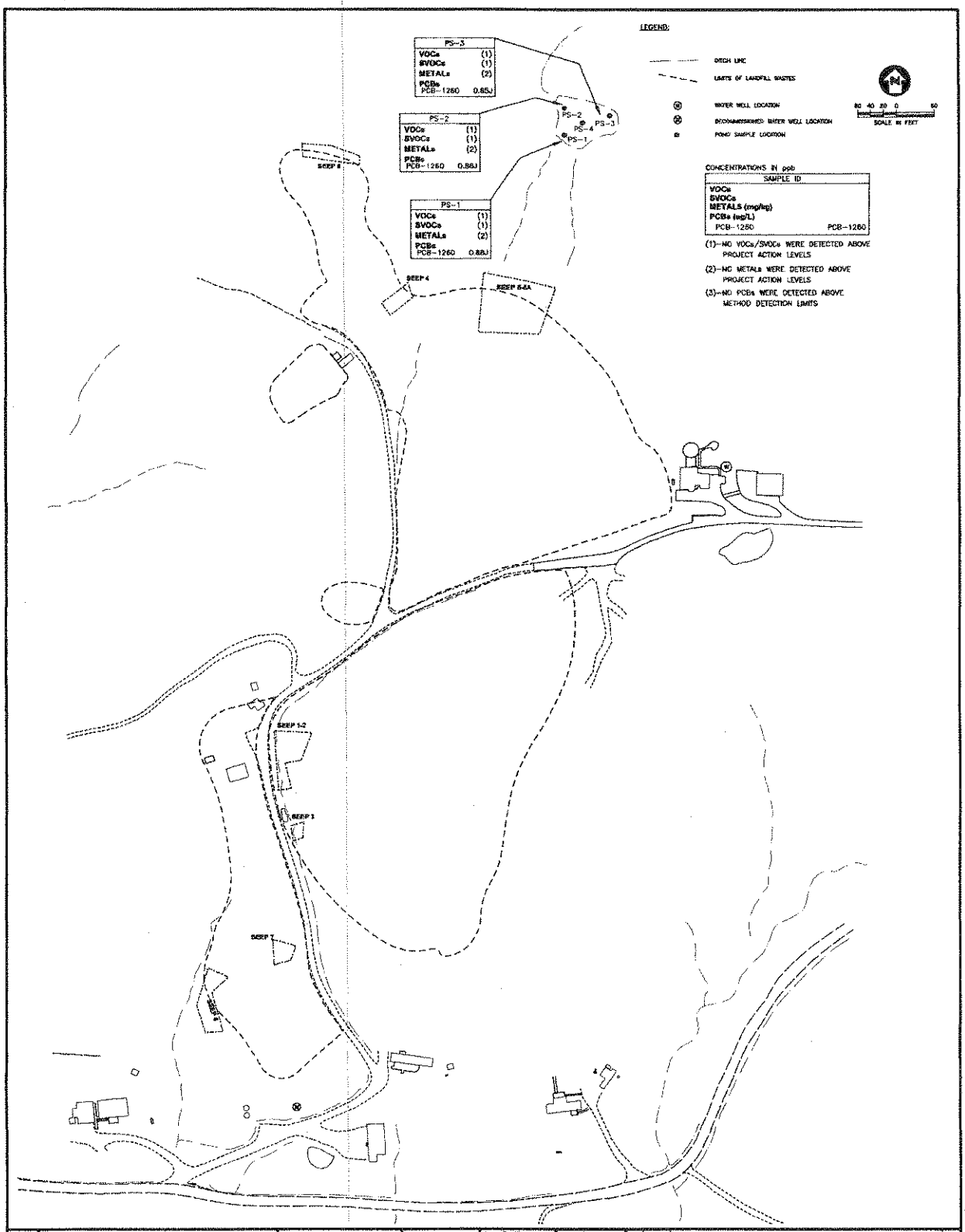
GOODYEAR
HOCKING COUNTY, OHIO

PARSONS
Cleveland, Ohio
(216) 455-9005

Issue Certification

Job No. 742629.01000
Designed TRC
Drawn MM
Checked RWV
Reviewed
Approved
Seq. No.
Date 11/2/05

Rev	Date	Description	By


LEGEND:
DITCH LINE
LIMITS OF LANDFILL WASTES
WATER WELL LOCATION
DECOMMISSIONED WATER WELL LOCATION
POND SAMPLE LOCATION
80 40 20 0 80
SCALE IN FEET
CONCENTRATIONS IN ppb
SAMPLE ID
VOCs
SVOCs
METALS (mg/kg)
PCBs (ug/L)
PCB-1260
PCB-1260
(1)-NO VOCs/SVOCs WERE DETECTED ABOVE PROJECT ACTION LEVELS
(2)-NO METALS WERE DETECTED ABOVE PROJECT ACTION LEVELS
(3)-NO PCBs WERE DETECTED ABOVE METHOD DETECTION LIMITS
PS-3
VOCs (1)
SVOCs (1)
METALs (2)
PCBs
PCB-1260 0.65J
PS-2
VOCs (1)
SVOCs (1)
METALs (2)
PCBs
PCB-1260 0.86J
PS-1
VOCs (1)
SVOCs (1)
METALs (2)
PCBs
PCB-1260 0.88J
PS-2
PS-4
PS-3
PS-1
SEEP 3
SEEP 4
SEEP 5-5A
SEEP 1-2
SEEP 1
SEEP
SEEP
THE GOODYEAR TIRE & RUBBER COMPANY
GREEN 1 LANDFILL
POND SURFACE WATER
RESULTS ABOVE ACTION LEVELS
GOODYEAR
MOSCOW COUNTY,
OHIO
PARSONS
Cleveland, Ohio
(216) 464-9005
Issued Certification
Job No. 742872.01000
Designed TWL
Drawn MW
Checked RWV
Reviewed
Approved
Proj. No.
Date 11/25/02
Rev Date Description By

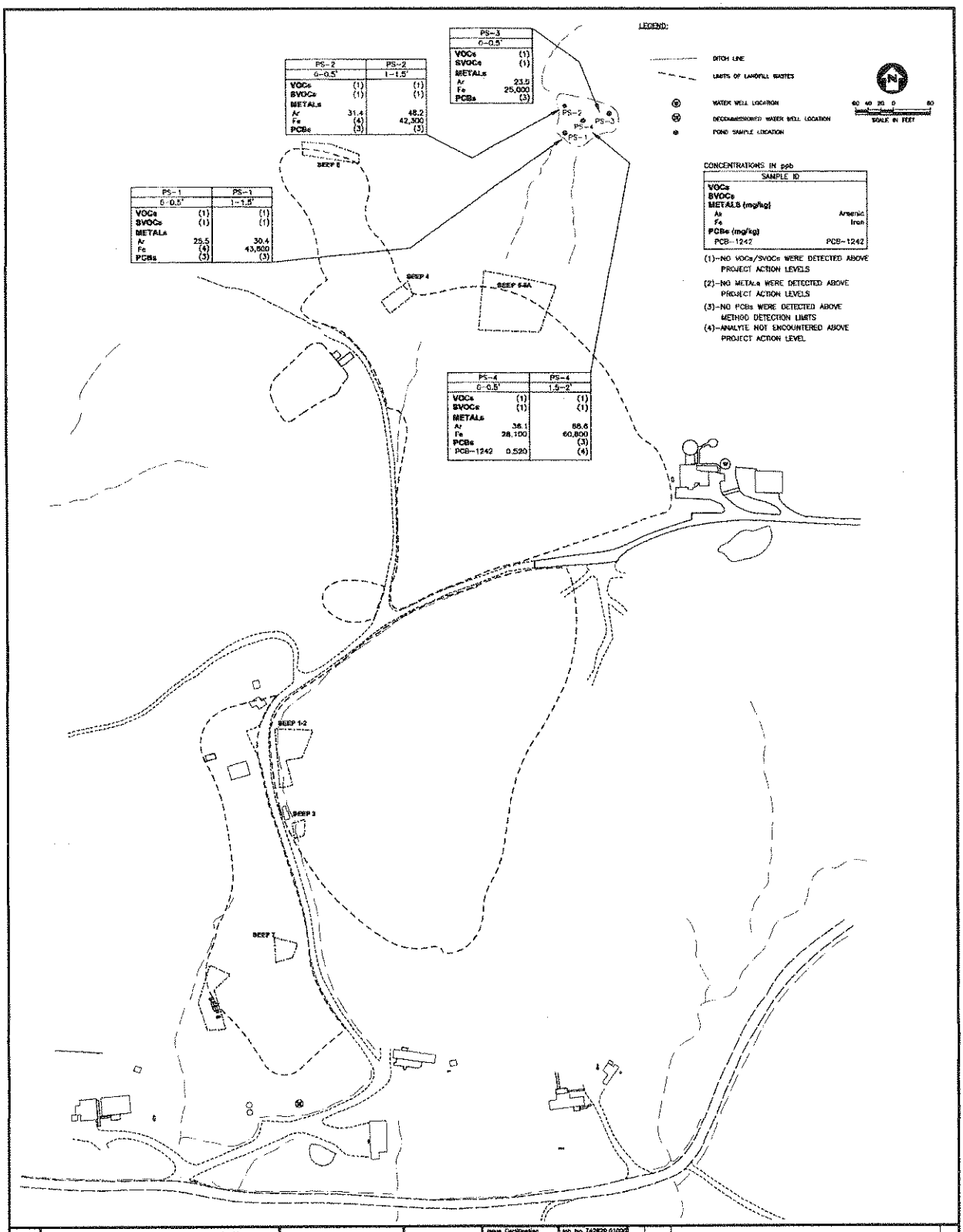


FIGURE NO. 10 REV. -	THE GOODYEAR TIRE & RUBBER COMPANY GREEN 1 LANDFILL POND SEDIMENT RESULTS ABOVE PROJECT ACTION LEVELS	GOODYEAR HOCKING COUNTY, OHIO	PARSONS Cleveland, Ohio (216) 485-9005	Above Certification

Job No. 742809.01000
Designed TSD
Drawn SBM
Checked RBW
Reviewed
Approved
Proj. No.
Date 11/8/05

Rev	Date	Description	By