DECISION DOCUMENT

FOR THE REMEDIATION OF THE HILLTOP LANDFILL SITE ELLSWORTH TOWNSHIP, MAHONING COUNTY, OHIO

Division of Environmental Response and Revitalization
Remedial Response Program
September 2014

Ohio EPA's Division of Environmental Response and Revitalization (DERR) - Assessment, Cleanup & Reuse Section Remedial Response Program			Decision Document For the Remediation of the Hilltop Landfill Site Ellsworth Township, Mahoning County, Ohio		
THE REMEDIAL RESPONSE PROCESS					
(1) Preliminary Assessment & Site Inspection **[Status: Completed]**	(2) Remedial Investigation & Feasibility Study **[Status: Completed]**	(3) Remedy Selection (Preferred Plan & Decision Document)	(4) Remedial Design	(5) Remedial Action	(6) Remedy Operation, Maintenance & Monitoring

Ohio EPA Announces Decision Document

On April 14, 2014, Ohio EPA issued a Preferred Plan that outlined Ohio EPA's preferred alternative to remediate contamination at the Hilltop Landfill site (Site). Ohio EPA held a public meeting on May 29, 2014 at the Ellsworth Township Town Hall, 11125 W. Akron Canfield Road, North Jackson, OH 44451. Oral and written comments were accepted at this meeting and during the comment period which ran from May 6, 2014 to June 6, 2014. Section 8.0 (Responses to Public Comments) of this Decision Document summarizes the comments and Ohio EPA's responses.

Based on the Preferred Plan and the consideration of comments received during the comment period, Ohio EPA is issuing this Decision Document identifying the selected remedial alternative for the cleanup of the contaminated soil, soil gas and ground water at the Site, and providing the rationale for the selection. It also includes summaries of other remedial alternatives evaluated for use at this site.

Ohio EPA is issuing this Decision Document in a manner consistent with Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It summarizes information found in detail in the remedial investigation and feasibility study reports and other documents contained in the administrative record file for this site. Ohio EPA encourages the public to review these documents to gain a better understanding of the site and the activities that have been conducted at the site.

ERAC Appeal Period: As a final action of the Director of Ohio EPA, the Decision Document may be appealed to the Environmental Review Appeals Commission (ERAC) pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with ERAC (77 South High Street, 17th Floor, Columbus, OH 43215) within thirty (30) days after notice of the Director's action.

Additional Information: Available from Ohio EPA's Northeast District Office, located at 2110 East Aurora Road, Twinsburg, Ohio, 44087 (contact: Sheila Abraham at (330) 963-1290 or at sheila.abraham@epa.ohio.gov).

DECLARATION

SITE NAME AND LOCATION

Hilltop Landfill (a.k.a Old Toth Landfill) Site
Akron-Canfield Road
Ellsworth Township,
Mahoning County
Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Hilltop Landfill site in Ellsworth Township, Mahoning 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 waste, hazardous waste or 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.

Hilltop Landfill accepted household, commercial, agricultural, light industrial, institutional and construction waste from 1969 until it closed prior to July 1976. In response to public complaints of leachate (i.e., water that collects contamination as it migrates through landfill waste) discharges from the landfill, the Agency investigated and subsequently entered into orders with General Motors (GM) and General Electric (GE) in 1990 to conduct interim corrective actions to mitigate leachate discharges to surface waters of the State. Subsequent investigation of Hilltop Landfill has documented leachate outbreaks emanating from the landfill as well as ground water impacts and soil cover deficiencies which pose a potential threat to human health and the environment and require a site remedy.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedial alternative include:

- Landfill cover: cover improvements; improved signage and fencing along the perimeter of the Site as needed; a long-term cover maintenance plan; and restrictions on cover disturbances;
- Leachate: seep packing; cover improvements supplemented by a phytocap to reduce water infiltration; abandonment/removal of the existing leachate collection system and the installation of a new expanded leachate collection system; and on-site treatment of leachate through an engineered wetland system with the goal of permitted discharge to the unnamed creek;

- Ground water: monitoring; and restrictions on ground water use; and
- Soil gas: restrictions on future occupied structures on the landfill unless they meet acceptable levels of risk.

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.

Craig W. Butler, Director

SEP 10 2014

Date

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TABLE OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
BFI	Browning-Ferris Industries of Ohio
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
CRA	Conestoga Rovers and Associates
DEHP	Bis (2-ethylhexyl) phthalate
DERR	Division of Environmental Response and Revitalization
DFFOs	Director's Final Findings and Orders
ERA	Ecological Risk Assessment
FS	Feasibility Study
GE	General Electric
GM	General Motors
HI	Hazard Index
HQ	Hazard Quotient
MCDBH	Mahoning County District Board of Health
MCL	Maximum Contaminant Level
MW	Monitoring Well
NCP	National Contingency Plan
OAC	Ohio Administrative Code
O&M	Operation and Maintenance
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
PCE	Tetrachloroethylene
PER	Pre-Investigation Evaluation Report
POTW	Publicly Owned Treatment Works
PRG	Preliminary Remediation Goal
PTI	Permit to Install
RAO	Remedial Action Objective
RG	Remediation Goal
RI	Remedial Investigation
RSL	Regional Screening Level (U.S. EPA)
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethylene
TDC	Technical Decision Compendium
VOC	Volatile Organic Compound
WQC	Water Quality Criteria

1.0 EXECUTIVE SUMMARY

On April 15, 2010, Browning-Ferris Industries of Ohio (BFI) entered into Director's Final Findings and Orders (DFFOs) with the Ohio Environmental Protection Agency (Ohio EPA) to investigate and develop remedial alternatives for the Hilltop Landfill site located immediately north of U.S. Route 224, approximately 1.5 miles west of the town of Canfield, in Ellsworth Township, Mahoning County, Ohio, and anywhere contamination may have migrated from the landfill area (Site). BFI developed a Remedial Investigation (RI) Work Plan to determine where contamination exists at the Site and at what concentrations. The RI Work Plan was approved by Ohio EPA on September 13, 2010, to investigate leachate outbreaks at the Site and potential contamination of soil, ground water, surface water, and sediment.

Investigations required under the RI Work Plan were completed and the data, along with historical data provided in a Pre-Investigation Evaluation Report (PER) were evaluated in the RI report. The RI report, approved by Ohio EPA on March 22, 2012, documents leachate outbreaks, ground water contamination, and soil cover deficiencies, which would require a site remedy[1]. The primary contaminants of concern (COCs) at the Site are shown in **Table 3.1 Contaminants of Concern/Remediation Goals and supporting tables** of this Decision Document, and include ammonia, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) including pesticides. Additional details concerning the health risks associated with each primary COC are located in **Appendix B: Primary Contaminants of Concern**.

The risk assessment conducted as part of the RI documented that there are no current unacceptable risks to human health as a result of waste disposed within the landfill. Future potential human receptors may be impacted by direct contact with leachate (in the outbreak areas on the surface of and from the edges of the landfill), exposure to contaminated ground water (if extracted for potable use), and potentially, exposure to contaminated indoor air (if occupied structures are constructed on the landfill). The ecological risk assessment documented that although cover soil and sediment have not been contaminated above acceptable levels, leachate seeps are entering the northern area of the unnamed creek that runs along the eastern and northern portions of the landfill, and leachate constituents have been periodically detected in surface water.

Based on this information, it was determined that remedial alternatives needed to be developed to address the risks posed by the Site. On December 5, 2013, Ohio EPA approved a Feasibility Study (FS) report, which developed and evaluated potential remedial alternatives for the Site. As part of the FS, a number of Remedial Action Objectives (RAOs) for the Site were developed to ensure protectiveness of human health and the environment.

Based on the approved RI and FS reports, Ohio EPA issued a Preferred Plan that outlined Ohio EPA's preferred alternative to remediate contamination at the Site. Ohio EPA held a public meeting on May 29, 2014 and accepted comments on the Preferred Plan during the public comment period. The Agency is now issuing a Decision Document based on the Preferred Plan, which takes into account public comments.

[1] The RI Report also evaluated the potential for explosive gas migration at the Site, but this pathway has since been demonstrated to be incomplete.

This Decision Document summarizes information on the range of remedial alternatives evaluated, identifies Ohio EPA's selected remedial alternative, and explains the reasons for the selected remedial alternative. The Decision Document is based on the Ohio EPA-approved RI and FS reports completed by BFI.

Ohio EPA's selected remedial alternative should yield a permanent solution for risks associated with the contaminated media at the Site. The expectations for the selected alternative include:

- Reduction of human health and ecological risks to within acceptable limits, and protection of human health and the environment from exposure to COCs in waste under the soil cover, ground water, leachate, and potentially contaminated soil gas.
- Short and long-term protection of public health and the environment.
- Compliance with applicable or relevant and appropriate requirements (ARARs).
- Cost-effectiveness and limitation of expenses to what is necessary to achieve the selected alternative expectations.

The major components of the selected remedial alternative include:

- Landfill cover: cover improvements; improved signage and fencing along the perimeter of the Site as needed; a long-term cover maintenance plan; and restrictions on cover disturbances;
- Leachate: seep packing; cover improvements supplemented by a phytocap[2] to reduce water infiltration; abandonment/removal of the existing leachate collection system; installation of a new expanded leachate collection system; and on-site treatment of leachate through an engineered wetland system, with the goal of permitted discharge[3] to the unnamed creek;
- Ground water: monitoring; and restrictions on ground water use; and
- Soil gas: restrictions on future occupied structures on the landfill unless they meet acceptable levels of risk.

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.

[2] At the Hilltop Landfill site, the term "phytocap" includes a proposed "phytoremediation/phytodewatering" zone along the north end of the landfill, as well as the vegetative cover on the surface of the landfill. See Section 4.3 and Appendix A for a more detailed description of the term.

[3] Discharge to the creek under a National Pollution Discharge Elimination System (NPDES) permit is under the regulatory authority of Ohio EPA's Division of Surface Water.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Site History

The Hilltop Landfill site is located in a mixed use (i.e., agricultural, limited residential, wooded and undeveloped) area on over 20 acres immediately north of U.S. Route 224, approximately 1.5 miles west of the town of Canfield, in Ellsworth Township, in Mahoning County, Ohio, as shown in **Figure 1: Site Location Map** and **Figure 2: Site Features Map**. An unnamed creek runs along the northern and eastern side of the landfill.

A list of owners, operators and/or disposers at the Hilltop Landfill is shown in **Table 1: Owners, Operators and/or Disposers**.

TABLE 1: OWNERS, OPERATORS AND/OR DISPOSERS

Owners, Operators and/or Disposers	Property Usage	Period
Maurice Jones and Steven Jesescko (Owners)	Landfill (leased property to Toth)	Unknown to March 1971 and June 1977
Toth and Company (Landfill operator)	Landfill	1969 to before July 29, 1976
General Motors (Generator)	Landfill	During landfill operational period
General Electric (Generator)	Landfill	During landfill operational period
Browning-Ferris Industries (Transporter)	Landfill	During landfill operational period
A&M Horvath (Owners)	Undeveloped land (closed landfill)	March 1971 to date
G&M Kyprianou (Owners)	Pasture (closed landfill)	June 1977 to date

Note: Only major generators/disposers are listed; municipal entities are excluded

Hilltop Landfill, also known as the Old Toth Landfill, was formerly a coal strip mine. It was operated as a landfill by Toth and Company, under license from the Mahoning County District Board of Heath (MCDBH), from 1969 until it closed prior to July 1976. During its period of operation, the landfill accepted household, commercial, agricultural, light industrial, institutional, and construction waste, as well as dead animals. The western portion of the Site property is currently owned by George and Patricia M. Kyprianou (parcel number 25-044-0-011.00-0 totaling approximately 23 acres), while the eastern portion is owned by the Arthur A. and Margaret C. Horvath Trust (parcel number 25-044-0-014.02-0 totaling approximately 21 acres); neither portion is actively being used or occupied.

Previous operations (from 1969 until the landfill closed prior to July 1976) that may have contributed to the contamination at the Site included disposal of waste by Toth and Company from companies such as General Motors (GM) and General Electric (GE), as well as transport of waste by companies, some of whom were subsequently acquired by BFI. MCDBH inspection reports in the late 1960s and early 1970s also indicated on-going problems with the landfill, including water in the landfill pit and the lack of daily cover. All this may have contributed to the release of contaminants, including but not limited to VOCs such as ethylbenzene, isopropylbenzene, toluene and xylene; semivolatile organic compounds

(SVOCs) such as diethylphthalate, 4-methylphenol, naphthalene, 2,4-dimethylphenol; pesticides such as 4,4'-DDE, beta-BHC and heptachlor; as well as ammonia at the Site. Contamination in the form of leachate seeps is also entering the unnamed creek.

Director's Final Findings and Orders were issued on September 7, 1990 (1990 DFFOs), to GM, GE and Mr. George Kyprianou[4] to investigate and conduct interim corrective actions to mitigate leachate discharge to surface waters. Director's Final Findings and Orders were issued to BFI on April 15, 2010 (2010 DFFOs), to conduct an RI and FS to address the contamination at the Site.

Prior interim remedial activities associated with the Site include: temporary leachate collection systems installed in 1992 and 1993; soil cover enhancements in 2005 and 2006; and packing of leachate seeps on an as-needed basis. The interim actions are detailed in the PER.

2.2 Site Characteristics and Investigation

Pursuant to the 2010 DFFOs, Conestoga Rovers and Associates (CRA) submitted, on behalf of BFI, RI and FS reports, which were approved by Ohio EPA, DERR on March 22, 2012, and December 5, 2013, respectively. The RI/FS activities identified the nature and extent of contamination at the Site, and as necessary, developed and evaluated remedial alternatives to address the contamination. The investigation also provided a description of Site geology, topography, hydrogeology and other Site characteristics, as well as land use.

Topographically, the Site slopes from south to north, dropping over 60 feet in elevation. The sides of the landfill slope both to the east and west. The majority of the landfill has a maintained grassy vegetative cover (of around 17.2 acres); a portion of the landfill (around 2.7 acres) has a vegetative cover including trees, shrubs and grass. The non-landfill portion includes wooded land (on the north, east and west) and an unnamed creek, located along the eastern and northern portion of the landfill. The creek flows towards a private pond, then to Palmyra Lake and ultimately into Meander Creek Reservoir. There is a gravel access road along the western portion of the Site; this road is located on the existing landfill cover. The leachate collection tank area is currently located on the north side, between the landfilled waste and the creek.

The Site geology is comprised of fill material overlying native unconsolidated material (comprised mainly of silty clay glacial till) overlying bedrock. Where glacial till is absent, any fill present lies directly on bedrock. The upper surface of the bedrock is highly weathered; beneath this it increases in soundness with occasional clay layers. The unconsolidated material thickness generally decreases towards the north end of the Site near the creek, where bedrocks outcrops are present. Mine spoils were observed intermittently, but not in any significant thickness.

Ground water is present in both the unconsolidated material (as localized perched aquifers) and bedrock. Ground water flow direction is generally north, towards the creek; a component also flows towards the northeast. Flow in the unconsolidated material is typically directed

[4] Mr. and Mrs. Kyprianou purchased the property subsequent to the closing of Hilltop Landfill and were thus never involved in the waste disposal activities.

down the slope of the bedrock aquifer. Bedrock flow is north, with a strong horizontal gradient near the south end of the landfill. The unconsolidated material in the north end of the Site is predominantly dry or moist, while the bedrock supports ground water flow.

Regionally, in Mahoning County, ground water is obtained from sandstone bedrock and glaciofluvial sand and gravel type aquifers. Water well records from nearby residences located upgradient of the Site show that some of the wells obtained ground water from the deep sandstone unit (greater than 150 feet below ground surface, bgs) while others obtained ground water from shallower shale zones (greater than 60 feet bgs). The wells screened in the shallower shale zones are screened in the same elevation range as some monitoring wells at the Site.

An overhead transmission line with a maintained clear-cut area crosses the Site from east to west; this limits remedial activities that can be conducted in this area.

The Site properties are currently zoned as agricultural land. However, the closed landfill occupies 15.8 acres of the Kyprianou property and 4.1 acres of the Horvath property. The properties surrounding the Site to the south are residential; the property to the west is undeveloped wooded land; and the properties to the north and east across the creek are also undeveloped land. The reasonably anticipated future land use for the Site, presented by BFI and concurred with by Ohio EPA and interested stakeholders, is that the Site will remain a former landfill. Any construction or intrusive activities on the landfill or within 300 feet of the limits of waste placement that are likely to impact the integrity of waste placement will be subject to the Ohio Administrative Code (OAC) 3745-27-13.

Investigative activities were conducted both during the RI and prior to the RI, pursuant to the 1990 DFFOs. The pre-RI activities are detailed in the PER, approved by Ohio EPA as part of the RI Work plan approval on September 13, 2010. A summary of the investigative activities is provided below:

- Contaminant source: The former landfill is the source of contamination at the Site. The horizontal extent of the landfill was delineated based on test trenches and is shown in Figure 2.
- Leachate: VOCs, SVOCs, organochlorine pesticides and ammonia above acceptable levels have all been detected in the leachate collected in the leachate collection system.[5] In the most recent sampling event in 2010, ethylbenzene, xylene, isopropylbenzene, 4,4'-DDE and ammonia are above site-specific standards. See Table 3.1.1 for a list of contaminants most recently detected in leachate.

  Between 1990 and 2012, multiple leachate outbreaks and/or seeps have been identified on the cover and along the edges of the landfill and entering the creek (in one area); most of these have been investigated and addressed as necessary. These include outbreaks along the northern and eastern edges of the landfill in 1990; in the location of the current leachate collection system in 1992; on the Horvath property and on the western side of the landfill in 2002 and 2004; on the landfill cover in 2004 and 2010 and entering the creek in 2010; along the western perimeter of the landfill in 2011 and on the north side of the landfill, close to the creek in 2012. Contaminants

[5] Metals detected above acceptable levels are not necessarily site-related; the landfill was an old strip mine.

detected in the leachate outbreaks include VOCs, SVOCs, organochlorine pesticides and ammonia.

- Landfill gas: During the 1991 corrective measures study, methane gas was monitored in residential basements and monitoring wells. Soil gas probes were also installed on the landfill cover and to investigate cap integrity. Methane gas is produced at the Site, mostly in the southern area (of the former strip mine). However, subsurface conditions probably act as a barrier to migration of landfill gas south, towards off-site residences. Methane gas seepage through the cover is also at least partly responsible for the areas of bare or sparse vegetation on the landfill cover.

  An explosive gas monitoring plan was implemented at the Site during the RI/FS, between 2011 and 2013. Four soil gas probes were installed to monitor for the presence of potential explosive gas between the landfill and occupied structures. Based on the data collected, explosive gas is not migrating beyond the boundaries of the Site, to occupied structures south of the landfill. There are no occupied structures within 1000 feet of the landfill[6] to the north, east, or west.

- Landfill cover (Soil): Based on the RI soil cover thickness evaluation in 2010 and 2011, 2 feet of soil cover is present over most of the landfill waste. The areas with less than 2 feet of soil cover are shown in Figure 3.

- Ground water: Twenty-four (24) monitoring wells[7] have been installed around the perimeter of the landfill waste disposal area to evaluate contaminated ground water migration. The monitoring wells have been nested (mostly in pairs) so that contamination can be evaluated in both the shallow ground water in unconsolidated material and the deeper bedrock ground water in the same area. Ground water sampling events were conducted in December 1991, April/May 1996, November 2001, February 2002, May 2002, and October 2010. For a list of contaminants detected in the monitoring wells in the most recent sampling event see Table 3.1.2.

  Based on the data collected, there is no site-related contamination above acceptable levels to bedrock ground water around the landfill[8]. In the most recent sampling event in 2010, VOCs were detected in a few monitoring wells (MW-9; MW-10; MW-11; MW-12, MW-18; and MW-25) downgradient of the landfill. However, all the contamination detected was below potable use ground water standards[9], such as the maximum contaminant levels (MCLs), or risk-based ground water screening standards, such as U.S. EPA's regional screening levels (RSLs).

  VOCs were detected in ground water in the unconsolidated material. Some detections were historic and only sporadic (for example 1,1,1-trichloroethane in 1996 in MW-5 and 1,1-dichloroethane and 1,2-dichloroethane in 2002 in MW-15). In the most recent sampling in 2010, VOCs were detected in MW-8, MW-15, MW-16, MW-22, MW-23,

[6] The distance commonly investigated under the solid waste regulations is 1000 feet.
[7] One monitoring well, MW-2, has been dry and so could not be sampled.
[8] Metals exceed potable use or risk-based screening levels, but metals are also high in upgradient ground water monitoring wells; the Site was a former strip mine.
[9] Historically, methylene chloride was higher than the MCL in MW-18 in 1996, but not in subsequent samplings. Methylene chloride is also a common laboratory contaminant.

and MW-24.[10] However, all VOC detections were below the MCLs and the RSLs. The exception was MW-17 in the north-west edge of the landfill.

In MW-17, methylene chloride was above the MCL in the 1991 sampling event and benzene, tetrachloroethene (PCE), trichloroethylene (TCE) and vinyl chloride were all above the MCLs in 1996. In the 2001-2002 sampling event benzene, TCE and vinyl chloride were above the MCLs. Three additional monitoring wells (MW-19, MW-20, and MW-21) were therefore installed between MW-17 and the Site boundary. VOCs were detected in these three monitoring wells, but none were above the MCLs and the RSLs. However, vinyl chloride was still above the MCL in the latest sampling in MW-17 in 2010.

One SVOC, bis (2-ethylhexyl) phthalate (DEHP) was sporadically detected in a few upgradient and downgradient monitoring wells in the unconsolidated material and bedrock (MW-4, MW-6, MW-7, MW-15, and MW-17); some detections were above the MCL (6 µg/L). However, DEHP was not detected in subsequent sampling in these monitoring wells when the wells were resampled using Teflon® tubing. It is possible that DEHP detections are linked to the plastic tubing used to sample ground water.

- Surface water: Surface water in the unnamed creek was investigated in 1991, 2002 and 2004. Cyanide was found above water quality criteria (WQC) in surface water in 1991. In the 2002 surface water sampling conducted by MCDBH, ammonia was detected at 14.6 mg/L in one location, above the WQC (1.1 mg/L to 5.6 mg/L); benzene was also detected below the WQC in another location. In the 2004 sampling conducted by MCDBH, barium was the only chemical detected above WQC. However, barium was detected in both upstream and downstream samples.

  In the 2010 sampling conducted by Ohio EPA, multiple seeps were detected entering the creek in one area on the northern side. One of the seeps was sampled as representative and analyzed for ammonia and VOCs. The seeps were determined to be leachate: ammonia was detected at 61 mg/L in the seep sample, above the site-specific WQC (of 1.1 mg/L to 5.6 mg/L). Xylene at 7.67 µg/L and tetrahydrofuran at 22.1 µg/L were also detected in the seep sample; both these contaminants were below the site-specific WQC.

- Sediment: Sediment in the creek and in the ponded area on Horvath property was investigated in 1991, 2002 and 2004. Site-related contamination was not detected in sediment.

A human health risk assessment was conducted to estimate the chance of health problems occurring if no actions were taken at the Site. An ecological risk assessment (ERA) was conducted in order to assess potential impacts of COCs on the environment (*e.g.,* animals, water bodies, plants, etc.) at the Site. Please refer to the RI and FS reports for more detailed information. These reports, along with other site-related materials, are located in the public site information repository and in Ohio EPA's Northeast District Office.

2.3 Interim or Removal Actions Taken to Date

Interim actions have been undertaken pursuant to the 1990 DFFOs.

[10] Not all of the VOCs listed were detected in all the monitoring wells listed. For the list of contaminants detected in each well see the RI.

- Two temporary leachate collection systems were installed on behalf of the respondents to the 1990 DFFOs, in 1992 and 1993. The systems were constructed along a part of the northern side of the landfill to intercept major leachate seepage prior to its entering the creek. Leachate collected is conveyed to holding tanks and transported and disposed, as necessary. This leachate collection is on-going. Based on the observance of leachate seeps on and from the landfill and modeling of ground water flow, Ohio EPA has concluded that not all of the leachate generated at the Site is being captured by the existing leachate collection system.
- Soil cover enhancements, to promote positive drainage off the landfill cover were conducted on behalf of GM in 2005 to 2006, with Ohio EPA's approval. Additional soil cover totaling over 9,300 cubic yards was placed over parts of the landfill and small bare areas and localized areas of subsidence were repaired. However, areas of stressed vegetation and rills are still evident, particularly on the northern slope of the landfill where the soil cover was not enhanced.
- Leachate outbreaks have been periodically noted along the edges of the landfill and on the cover; they have been addressed as needed with Ohio EPA's approval on an ongoing basis[11]. Leachate seeps along the western perimeter of the landfill were first packed in 1992 and 1993 by the respondents to the 1990 DFFOs and most recently in 2011 by GE. Leachate outbreaks on the cover of the landfill were addressed by the 2005 to 2006 soil cover enhancements conducted by GM; an area close to the creek where leachate outbreaks recur was addressed most recently in July 2012 by GE. Based on monthly reports, leachate outbreaks still recur in some areas, including areas where seeps have been packed, or in areas adjacent to where the seeps have been packed.

2.4 Summary of Site Risks

As part of the RI, a baseline risk assessment was conducted, to evaluate current and potential future risks to human 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/or ecological receptors sufficient to trigger the need for remedial actions. Additional information on the primary COCs can be found in **Appendix B**.

2.4.1 Risks to Human Health

The risk assessment for human health is an estimate of the likelihood of potential health problems occurring if no remedial actions were taken at the Site. To estimate baseline risk, a four-step process is undertaken. Below is a general overview of the human health risk assessment process.

Step 1. Data Collection and Evaluation (of Contamination): The concentrations of contaminants at the site, as well as any past scientific studies on the effects these contaminants have had on people, are reviewed. Comparisons of site-specific

[11] Currently, seeps that are packed on an as needed basis under the authority of the 1990 DFFOs are primarily those with the potential to reach surface water.

concentrations of COCs and concentrations reported in past studies help determine which contaminants are most likely to pose the greatest threat to human health.

Step 2. Exposure Assessment: The different ways that people might be exposed to the COCs, the concentrations that people might be exposed to, and the potential frequency and duration of exposure are evaluated. A reasonable maximum exposure scenario is calculated, which portrays the highest level of human exposure that could reasonably be expected to occur.

Step 3. Toxicity Assessment (of Potential Health Dangers): The information from Step 2 is combined with data on the toxicity of each COC to assess potential health risks. Two types of risk are considered: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a site is expressed as a probability of 1 in 100,000, or $1x10^{-5}$. In other words, for every 100,000 people that could be exposed, one extra case of cancer may occur as a result of exposure to site COCs. For non-cancer health effects, a hazard index (HI) or hazard quotient (HQ) is calculated (quotient refers to the effects of an individual COC, whereas index refers to the combined effects of all of the COCs). The key concept here is that a "threshold level" (measured as an HQ or HI of 1) exists below which non-cancer health effects are not expected to occur to exposed populations or individuals.

Step 4. Risk Characterization: A determination is made as to whether site risks are substantial enough to cause potential health problems for people at or near the site. The potential risks from the individual pathways (*e.g.*, inhalation, direct contact, ingestion, etc.), and individual chemicals as appropriate, are added together to determine the total cumulative risk to human health.

A human health risk assessment for the Site was prepared to evaluate potential impacts to human health posed by COCs in the soil cover, ground water, source media (landfill waste and leachate), and contaminated soil gas for the following exposure pathways: direct-contact, incidental ingestion and inhalation. If site-specific data were not available or were insufficient to modify standard default values, then the standard defaults provided in U.S. EPA guidance were used.

Soil cover:

The majority of the landfill is covered by an acceptable[12] cover thickness (2 feet of soil), except in specific limited areas as shown in Figure 3. In these areas, waste is present between 1 and 1.7 feet bgs. A robust vegetative cover is also present on most areas of the landfill. Available soil cover data does not indicate the presence of COCs at levels that would be harmful to human health. The direct-contact soil pathway is thus incomplete for most areas of the Site. The exceptions are:

- Areas lacking 2 feet of soil cover over waste;

[12] The landfill was closed prior to July 1976, under the then-applicable solid waste laws and regulations. The pre-1976 regulations did not require a minimum depth for the soil cover; however, then current guidance (Design and Operating Guidelines for Sanitary Landfills in Ohio, Ohio Department of Health, 1971) recommended 2 feet of suitable soil cover.

- Areas lacking vegetation or with stressed vegetation showing potential impacts from landfill gas; and
- Areas with leachate breakouts/seeps.

Based on the risk assessment, Ohio EPA has concluded that in these locations there is the potential for human health and the environment to be impacted by contamination.

Ground water:

- Ground water in the unconsolidated material around the perimeter[13] of the landfill area has been impacted by site-related contamination. Contamination has decreased over time. Based on the most recent sampling event in 2010, only vinyl chloride in monitoring well MW-17 was above potable use standards (*i.e.,* MCLs). However, as discussed in Section 2.2., based on data from monitoring wells installed immediately downgradient of MW-17, contamination above acceptable levels has not migrated beyond the property boundaries.
- Ground water in the bedrock around the perimeter of the landfill has not been impacted by site-related contamination above the potable use standards.

For a complete list of contaminants of concern detected in the monitoring wells in the most recent sampling event and comparisons to concentrations protective of potable use, see Table 3.1.2.

Based on the risk assessment, Ohio EPA has concluded that, given probable contamination of ground water above acceptable levels within the limits of waste placement, remedial actions should be focused on preventing exposure to Site ground water. Ground water in the MW-17 area will also need to be monitored, to ensure that site-related contamination does not migrate beyond the property boundaries.

Landfill gas:

Landfill gas above explosive levels is not migrating beyond the boundaries of the Site to occupied structures. Risks above acceptable levels were thus not documented from exposure to explosive levels of landfill gas.

Leachate:

- COCs in the landfill leachate captured by the current leachate collection system were compared to site-specific surface water standards. As stated in Section 2.2, several site-related COCs are above applicable standards. Continued leachate collection and disposal and/or treatment are thus necessary to protect human health and the environment.

[13] Monitoring wells were not drilled through waste; thus there is no information on ground water contamination within the limits of waste placement.

- All the leachate generated at the Site is not being captured by the leachate collection system: leachate breakouts and seeps are evident in some areas on and along the edges of the landfill cover. Leachate seeps have also been documented entering the unnamed creek on the north side of the landfill.

Based on the risk assessment, Ohio EPA has concluded that remedial actions are necessary to capture the leachate generated at the Site and prevent leachate breakouts and seeps, including those entering the unnamed creek.

2.4.2 Risks to Ecological Receptors

An ERA was conducted as part of the RI at the Site. The ERA was conducted in order to assess potential impacts of COCs on ecological receptors (*e.g.*, animals, water bodies, plants, etc.) at the Site. The ERA was completed pursuant to Ohio EPA guidance. Specifically, a Level I scoping ERA determined that based on the history of activities at the Site and the surrounding land use, the Site has the potential to pose a risk to the environment. Thus, a Level II screening ERA was conducted. The Level II ERA for the Site 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 COCs.

Most of the landfill area of the Site is covered by grasses and forbs; a part of the landfill area is undergoing succession to forest. A creek traverses the eastern and northeastern edge of the Site. Based on Ohio EPA's evaluation, the physical habitat is of high quality, particularly in the area where leachate seeps have been observed entering the creek. Fish, amphibians and macroinvertebrates have been observed by Ohio EPA during the stream evaluation. Several small isolated wetlands are also present at the Site. There are likely no rare, threatened or endangered species inhabiting the Site.

The COC levels detected in soil, surface water, and sediment were compared to protective screening benchmarks.

- The soil pathway does not pose a risk to ecological receptors above acceptable levels.
- Sampling data indicate that the landfill has not impacted sediment in the creek.
- Site-related COCs were detected in creek surface water: ammonia was above the site-specific water quality standard in one sampling event; benzene was below the site-specific water quality standard. Ammonia was also above the WQC in the leachate seep entering the creek; other VOCs detected in the seep (xylene and chlorobenzene) were below the WQC.
- Leachate, if not collected, has the potential to impact the creek as the COC concentrations are above site-specific water quality standards. See Table 3.1.1 for a comparison of the contaminant levels in leachate in the most recent sampling event to site-specific surface water quality standards.

In summary, upon completion of the baseline ERA for the Site, the following COCs in various media were determined to pose a potential risk to ecological receptors:

TABLE 2: COCs POSING A POTENTIAL RISK			
Media	**COC(s)**	**Receptor(s)**	**Applicable Standards**
Landfill cover (Soil)	*n/a*	*n/a*	*n/a*
Ground water	*n/a*	*n/a*	*n/a*
Surface water	Ammonia; Benzene	Aquatic plants and organisms	Above site-specific surface water quality standards
Sediment	*n/a*	*n/a*	*n/a*
Leachate	Ammonia; Ethylbenzene; Isopropylbenzene; Xylenes; 4,4-DDE	Aquatic plants and organisms	Above site-specific surface water quality standards

n/a: Not applicable, either because the medium met applicable standards or was not impacted above acceptable risk levels.

3.0 REMEDIAL ACTION OBJECTIVES

An FS, to define and analyze appropriate remedial alternatives, was completed with Ohio EPA oversight and was approved on December 5, 2013.

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with Section 300.430 of the NCP, pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 et seq., as amended, and U.S. EPA guidance (*i.e.,* RI/FS Guidance (EPA/540/G-89/004, and others). The RAOs are goals that a remedy should achieve in order to ensure protection of human health and the environment.

The RAOs for the Site include those listed in **Table 3: Remedial Action Objectives**:

TABLE 3: REMEDIAL ACTION OBJECTIVES	
Landfill Cover	
Human Health and Environmental Risk	Prevent direct contact exposures to waste.
Ground Water	
Human Health and Environmental Risk	Prevent future potential direct contact exposures to potable and non-potable ground water above site-specific remediation goals.
Soil Gas	
Human Health Risk	Prevent exposures to contaminated vapors (from ground water and/or waste material) into future occupied Site structures unless it can be documented that applicable indoor air standards will be met in the occupied structures.
Surface Water	
Human Health and Environmental Risk	Prevent leachate seeps from entering the surface water.
Leachate	

Human Health and Environmental Risk	Prevent exposures to leachate breakout(s) or leachate seeps on or emanating from the landfill.

In the process of scoping and conducting the RI, generic preliminary remediation goals (PRGs) were established for ground water and surface water. These PRGs were converted to site-specific remediation goals (RGs) following completion of the RI and FS phase of the project.

The human health RGs for potable ground water are the MCLs. For COCs lacking MCLs, the human health RGs 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 August 21, 2009. These goals are given as $1x10^{-5}$ (*i.e.*, 1 in 100,000) excess lifetime cancer risk and a HQ or HI of 1, and were established using the default exposure parameters provided by U.S. EPA. This TDC can be found at http://www.epa.ohio.gov/portals/30/rules/riskgoal.pdf. The risk-based single-chemical RGs for site-related COCs are shown in Table 3.1.2; these RGs must be adjusted, depending on the chemicals detected, to meet the cumulative risk goal.

For surface water, site-specific ambient water quality standards were established based on the surface water regulations as codified in OAC 3745-1.

The COCs and the RGs, now termed final remediation levels (RLs) for the Site, are summarized in **Table 3.1: Contaminants of Concern/Remediation Levels** and detailed in **Tables 3.1.1 and 3.1.2**.

TABLE 3.1: CONTAMINANTS OF CONCERN (COCs) / REMEDIATION LEVELS (RLs)

Medium	COC	RL	RL Basis
Soils: Human Direct Contact	*n/a*		
Soils: Vapor Intrusion to Indoor Air	*n/a [Waste not sampled; hence no numeric RGs for the landfill]*		
Soils: Leaching to Ground Water	*n/a [contamination has already leached, impacting ground water]*		
Soils: Ecological	*n/a [soil meets acceptable risk]*		
Ground Water: Potable	See Table 3.1.2	See Table 3.1.2	MCLs
	See Table 3.1.2	See Table 3.1.2	Risk-based single-chemical RG
Ground Water: Vapor Intrusion to Indoor Air	*n/a [no COC information as ground water not sampled within the limits of waste placement]*		
Ground Water: Non-Potable	*n/a [no COC information as ground water not sampled within the limits of waste placement]*		
Ground Water: to Surface Water	Surface water standards at ground water-surface water interface		
Surface Water: Potable	*n/a [not a medium of concern at the Site]*		

Surface Water: Non-Potable Use	*n/a [not a medium of concern at the Site]*		
Surface Water: Ecological	See Table 3.1.1	See Table 3.1.1	Surface water standards
Sediments: Human Direct Contact	*n/a [medium not impacted by Site-related contamination]*		
Sediments: Ecological	*n/a [medium not impacted by Site-related contamination]*		
Other Pathway (Leachate)	*n/a [No numeric standards; exposure to leachate outbreaks must be controlled]*		

4.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of five remedial alternatives were considered in the FS[14], as identified in **Table 4: Summary of Site Remedial Alternatives**. The distinction between the remedial alternatives is primarily for leachate; the remedial alternatives for the landfill cover, landfill gas, vapor intrusion, and potable ground water are common to all the alternatives evaluated. 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 report.

TABLE 4: SUMMARY OF SITE REMEDIAL ALTERNATIVES

Media	Alternative	Description of Remedial Alternative
Landfill Cover		
	LC1	No action
	LC2	Cover improvements; access restrictions; improved fencing and signage; a long-term maintenance plan
Ground Water (Potable Use)		
	G1	No action
	G2	Access restrictions and monitoring
Soil Gas (Vapor intrusion)		
	SG1	No action
	SG2	Access restrictions
Leachate[15]		
	L1	No action
	L2	Abandonment/removal of the current leachate collection system and installation of an expanded leachate collection system; off-site transport and disposal of leachate
	L3	Abandonment/removal of the current leachate collection system and installation of an expanded leachate collection system; off-site discharge of leachate via forcemain
	L4	Abandonment/removal of the current leachate collection system

[14] One option that was not evaluated in detail was excavation and removal of substantial portions or the entirety of the landfill mass since it is cost-prohibitive. As a goal of the preferred plan is the limitation of expenses to what is necessary to achieve the selected alternative expectations, a remedial alternative involving a substantial removal scenario is not included in this Decision Document.

[15] Abandonment/removal of the current leachate collection system and expansion of the leachate collection system are common elements in all the leachate control alternatives except for L1, the no action alternative. The distinction between the leachate control alternatives is in how the collected leachate will be treated and/or disposed and is further discussed in Section 4.3.

		and installation of an expanded leachate collection system supplemented by a phytocap; on-site treatment of leachate via an engineered wetland, with the goal of a permitted discharge to the creek
	L5	Abandonment/removal of the current leachate collection system and installation of an expanded leachate collection system supplemented by a phytocap; on-site treatment of leachate via a treatment plant, with the goal of a permitted discharge to the creek

Note: Ohio EPA anticipates that surface water impacts will be addressed by the remedial alternatives to prevent leachate outbreaks and seeps, including those to the creek.

4.1 No Action Alternatives (LC1, G1, SG1, L1)

The "no action alternatives" for the landfill cover, ground water, soil gas and leachate have been included in a single section for efficiency. The NCP requires evaluation of a "no action" alternative to establish a baseline for the comparison of other remedial alternatives. Under this alternative, no remedial activities or monitoring are conducted at the Site to prevent exposure to contaminated media.

An alternate to the "no action" would be to continue to operate the existing leachate collection system, even though all the leachate generated is not being captured by this system. The total cost for 30 years of operation and maintenance for this alternative in net present value (NPV) has been priced in the FS at $8,612,000[16].

4.2 Elements Common to the Alternatives

The elements common to all alternatives (common elements) are discussed below in a single section for efficiency. A summary table with the costs for the common elements is also provided.

Landfill Cover:

- The landfill cover will be improved by packing and regrading (i) areas lacking 2 feet of cover over waste; (ii) areas of leachate breakouts on or from the edges of the landfill[17]; (iii) areas of bare or thin vegetative cover; and areas where surface water can pond on the cover and infiltrate into the landfill, thus increasing leachate production. The additional soil cover material will be appropriate to foster growth of an acceptable vegetative cover and will be planted with a vegetative mix appropriate for the establishment of a robust soil vegetative cap suitable for the Site. The type of soil cover material and vegetative mix to be used for the landfill cover will be addressed during the remedial design phase of the project. Evaluation criteria and corrective measures to ensure long-term maintenance of the cover will also be determined during the remedial design phase of the project.
- Fencing around the entire Site is not necessary to protect human health or the environment. Access is currently restricted by gates at the access road to the landfill

[16] Costs are rounded to the nearest $1000; more exact costs are provided in the FS.
[17] This includes areas with leachate seeps/breakouts documented in the monthly reports submitted per the 1990 DFFOs.

and agricultural fencing in certain areas; signage identifying the Site has also been installed to discourage intruders. To discourage future trespassers, additional signage will be placed in strategic locations along the boundary of the Site, for example, in the area of the overhead utility lines where it is not possible to install fencing[18]. Additional fencing will be installed at the southeast corner of the Site and along the access road, and existing fencing along the southern boundary of the Site will be repaired with equivalent agricultural fencing.

- An environmental covenant[19] should be placed on the Site to prevent intrusive activities and restrict public access.
- A long-term operation and maintenance (O&M) plan will be developed to evaluate the performance of the landfill cover and the performance of the engineering controls (fencing and signage) and institutional controls (environmental covenant). The O&M plan will include performance standards that will trigger correction of any problems with the landfill cover.

The landfill cover remedy will thus address the RAO by preventing direct contact exposures to waste by maintaining 2 feet of soil cover and an adequate vegetative cover over the landfill. The landfill cover remedy (together with the leachate remedy) will address the leachate RAOs by preventing exposures to leachate breakout(s) or leachate seeps on or emanating from the landfill.

Ground water:

- Ground water will be monitored for a minimum of 5 years. Post-remedy construction sampling will occur in the MW-7 area to document that site-related COCs (VOCs) are not migrating beyond the Site boundaries and into bedrock and the bedrock aquifer. Based on the data trends in the ground water to date, the Agency does not anticipate that VOCs at concentrations exceeding the RGs will migrate beyond the Site boundaries. Criteria and corrective measures to address ground water impacts, if any, beyond the Site boundaries will be determined during the remedial design process.
- An environmental covenant should be placed to prevent installation of new water wells on the Site (except for investigative and cleanup purposes), and thus eliminate potential exposure to contaminated ground water.

The ground water remedy will thus address the RAO by preventing future direct contact exposures to potable and non-potable ground water above site-specific RGs.

Soil gas:

- An environmental covenant should be placed on the Site to prevent/control development in the immediate vicinity of the landfilled waste[20] and ensure that any

[18] Fencing cannot be installed in the area of the overhead utility lines as this could block access by the utilities.
[19] All environmental covenants can only be placed with the consent of the property owners.
[20] Per OAC 3745-27-13, permission from the Director of Ohio EPA will be required for construction within 300 feet of the landfill if such activities are likely to impact the integrity of waste placement or any ancillary structures.

future occupied structures on the landfill are properly engineered to vent subsurface gases.

The soil gas remedy will address the RAOs by preventing exposures to contaminated vapors (from ground water and/or waste material) into future occupied structures at the Site unless it can be documented that applicable indoor air standards will be met in the occupied structures.

TABLE 4.1: SUMMARY TABLE OF COMMON ELEMENTS COSTS	
Estimated Capital Costs[21]	
Access Restrictions (surveying; additional fencing; signage; environmental covenants)	$26,430
Ground water monitoring and landfill cap improvements	$238,616
Estimated O&M Cost	
Ground water monitoring (5 events, NPV)	$33,142
Cap maintenance (30 years, NPV)	$195,765
Total Capital and O&M Costs (excluding tax)	**$493,952**
Estimated Construction Time	1 year
Estimated Time to Achieve RAOs	On completion of construction

NPV: Net present value

4.3 Leachate Control Alternatives

As in the case of the general common elements, there are some elements that are common to the leachate control alternatives: (i) all leachate control alternatives call for the abandonment/removal of the existing leachate collection system and (ii) the installation of an expanded leachate collection system. The leachate control alternatives differ mainly in how the collected leachate will be treated and disposed.

All the leachate control alternatives would satisfy the RAOs and protect human health and the environment by collecting and treating leachate. Together with the landfill cover alternative, they would protect human health and the environment by preventing exposures to the leachate breakout(s) or leachate seeps on or emanating from the landfill.

Common elements (Abandonment/removal of the current leachate collection system and expansion of the leachate collection system):

The existing leachate collection system, including the current tanks[22], will be abandoned/removed and replaced by an expanded leachate collection system. The expanded leachate collection system will wrap around the north (downgradient) portion of the landfill and collect leachate currently not being captured by the interim leachate collection system.

[21] Capital costs for all alternatives include project management expenses for the potentially responsible parties; details on project management costs for different components of the alternatives are in the FS.

[22] The existing leachate collection system was an interim measure to intercept known leachate seepage prior to surface outbreak from the landfill and convey the leachate to holding tanks for off-site disposal. The existing leachate collection system is limited to the area north of MW-11 and west of the MW-12/MW-14 cluster.

Estimated Capital Costs	$492,261
Estimated O&M Cost for 30 years (NPV)	$146,430
Total Capital and O&M Costs	**$638,691**
Estimated Construction Time	1 year
Estimated Time to Achieve RAOs	On completion of construction

NPV: Net present value
Total costs do not include tax

Alternative L2 (Off-site transport and disposal):

Under Alternative L2, the leachate collected in the expanded leachate collection system would, as is done currently, be collected into temporary storage tanks and periodically pumped for transport by truck and disposal at the city of Alliance Waste Water Treatment Plant (WWTP).

Estimated Capital Costs	$135,744
Estimated O&M Cost for 30 years (NPV)	$34,104,000
Total Capital and O&M Costs	**$34,239,744**
Estimated Construction Time[23]	1 year
Estimated Time to Achieve RAOs	On completion of construction

NPV: Net present value
Total costs do not include tax

Alternative L3 (Off-site discharge via force main):

Under Alternative L3, leachate collected in the expanded leachate collection system would be transported to the public sewage system via a force main tie-in. The collected leachate would be pumped directly through over 2 miles of underground piping to the nearest off-site public sanitary sewer for subsequent treatment at the Mahoning County publicly-owned treatment works (POTW). Implementation issues include obtaining consent from local entities for the tie-in.

Estimated Capital Costs	$1,746,506
Estimated O&M Cost for 30 years (NPV)	$2,414,073
Total Capital and O&M Costs	**$4,160,578**
Estimated Construction Time[24]	1 year
Estimated Time to Achieve RAOs	On completing of construction

NPV: Net present value
Total costs do not include tax

Alternative L4 (On-site engineered wetland treatment system):

[23] No additional construction time will be required for Alternative 2, beyond that necessary for abandoning/removing the existing leachate collection system and constructing an expanded leachate collection system.
[24] Estimated construction time will also be affected by the time required to obtain any necessary permits.

Under Alternative L4, leachate, after volume reduction by the phytocap[25], would be collected in the expanded leachate collection system and treated in an engineered wetland. Conceptually, the proposed phytocap will consist of a phytodewatering zone along the north end of the landfill, as well as the vegetative cover on the surface of the landfill. The goal of the phytodewatering zone is to reduce the volume of leachate entering the wetland treatment zone; the proposal is to plant parallel, staggered rows of poplar or similar trees along a length of approximately 700 feet in this area immediately upgradient of the proposed leachate collection trench. The goal of the engineered wetland treatment system is to treat leachate to achieve site-specific WQC (i.e., the surface water RG) so that the leachate, post-treatment, can be discharged to the creek. Any discharge of leachate to the creek will be subject to the requirements of a National Pollution Discharge Elimination System (NPDES) permit and a Permit-to-Install (PTI), issued by Ohio EPA's Division of Surface Water. Leachate may need to be collected and disposed off-site until the wetland is fully functional and leachate meets water quality standards for discharge

Estimated Capital Costs	
Phytocap	$78,400
Engineered wetland	$1,030,120
Estimated O&M Cost for 30 years (NPV)	
Phytocap	$184,240
Engineered wetland	$301,840
Total Capital and O&M Costs	$1,594,600
Estimated Construction Time	Dependent on wetland establishment
Estimated Time to Achieve RAOs	Function of permit(s) conditions

NPV: Net present value
Total costs do not include tax
NOTE: There may be additional costs associated with off-site leachate disposal until the wetland is fully functional and leachate discharge to the unnamed creek is permitted.

Alternative L5 (On-site treatment plant):

Under Alternative L5, leachate, after reduction by the phytocap, would be collected in the expanded leachate collection system and treated in an external treatment plant. The leachate would be treated to achieve the site-specific WQC (surface water RG) with the goal, post-treatment, of discharge to the creek. Any discharge of leachate to the creek will be subject to the requirements of an NPDES permit issued by Ohio EPA's Division of Surface Water. Leachate may need to be collected and disposed off-site until it can be demonstrated that leachate meets water quality standards for discharge.

Estimated Capital Cost	$872,844
Estimated O&M Cost for 30 years (NPV)	$5,935,664
Total Capital and O&M Costs	**$6,808,508**
Estimated Construction Time	1 year
Estimated Time to Achieve RAOs	Dependent on permit conditions

NPV: Net present value

[25] The details of the proposed phytocap and criteria to determine long-term effectiveness will be determined in remedial design.

Total costs do not include tax
NOTE: There may be additional costs associated with off-site leachate disposal until leachate discharge to the unnamed creek is permitted.

5.0 COMPARISON AND EVALUATION OF ALTERNATIVES

5.1 Evaluation Criteria

Ohio EPA considers eight criteria, as outlined in the NCP, to evaluate the various remedial alternatives individually and compare them with each other in order to select a remedy. A more detailed analysis of the remedial alternatives can be found in the FS report. The eight evaluation criteria, including the threshold, balancing and modifying criteria, are shown below in **Table 5: Remedial Alternative Evaluation Criteria**.

TABLE 5: REMEDIAL ALTERNATIVE EVALUATION CRITERIA
Threshold Criteria
1. **Overall Protection of Public Health and the Environment** - determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, treatment, etc.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** - evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Balancing Criteria
3. **Long-Term Effectiveness and Permanence** – evaluates the ability of an alternative to maintain protection of human health and the environment over time.
4. **Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment** – evaluates the amount of contamination present, the ability of the contamination to move in the environment, and the use of treatment to reduce harmful effects of the principal contaminants.
5. **Short-Term Effectiveness** – evaluates the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
6. **Implementability** – evaluates the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
7. **Cost** – includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying Criterion
8. **Community Acceptance** – considers whether the local community agrees with Ohio EPA's analyses and preferred alternative. Comments received on the Preferred Plan are an important indicator of community acceptance.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative. 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 evaluated through public comment on the alternatives received during the comment period.

5.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives listed in Section 4.0 and compares how the alternatives achieve the evaluation criteria.

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 Cover Alternative:
Overall protection of human health and the environment will be achieved by preventing exposure to source areas (landfill waste and leachate).
Groundwater Alternatives:
Overall protection of human health and the environment will be achieved by preventing exposure to contaminated ground water.
Soil Gas Alternatives:
Overall protection of human health and the environment will be achieved by preventing exposure to contaminated soil gas.
Leachate Control Alternatives:
With the exception of the "no action" alternative, overall protection of human health and the environment will be achieved by collecting and disposing of leachate and by preventing leachate outbreaks on the surface of and from the landfill, and thus preventing exposure to contaminated source(s). A detailed comparison of how each leachate control alternative achieves this criterion is provided in summary Table 5.1.

Compliance with ARARs

Landfill Cover Alternative:
Compliance with solid waste ARARs will be achieved by placement and maintenance of an adequate soil cover over waste.
Ground Water Alternative:
On-site institutional controls will be necessary since compliance with potable ground water

standards (MCLs and/or risk based levels) may not be achieved on-site. Compliance with potable ground water standards will be achieved off-site.
Soil Gas Alternative: On-site institutional controls will be necessary unless it can be demonstrated that potential occupied structures on-site can meet acceptable levels.
Leachate Control Alternative: With the exception of the "no action" alternative, once leachate control is successfully implemented, existing leachate outbreaks and seeps, including those entering surface water should comply with the ARARs. A detailed comparison of how each leachate control alternative achieves this criterion is provided in summary Table 5.1.

As the "no action alternatives" (discussed in Section 4.1) do not meet the two threshold criteria (overall protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements), they were eliminated from consideration under the remaining criteria.

Long-Term Effectiveness and Permanence

Landfill Cover Alternatives: An operation and maintenance plan will need to be implemented to ensure the long-term effectiveness and permanence of the landfill cover.
Ground Water Alternatives: The institutional controls anticipated to be imposed as part of an environmental covenant will need to be monitored to ensure the long-term effectiveness and permanence of the ground water alternative.
Soil Gas Alternatives: The institutional controls anticipated to be imposed as part of an environmental covenant will need to be monitored to ensure the long-term effectiveness and permanence of the soil gas alternative.
Leachate Control Alternatives: All leachate control alternatives should be equally effective and permanent in the long-term if they can be successfully implemented. Once implemented, the effectiveness and permanence will be monitored under an operation and maintenance plan. A detailed comparison of how each leachate control alternative achieves long-term effectiveness and permanence is provided in summary Table 5.1.

Reduction of Toxicity, Mobility or Volume by Treatment

Landfill Cover Alternatives: No treatment is associated with the landfill cover alternative. Contaminant toxicity and mobility and volume will thus not be reduced. Contaminant volume should be reduced by the vegetative cover.
Groundwater Alternatives: No treatment is associated with the ground water alternative. Contaminant toxicity, mobility, and

volume will thus not be reduced. Contaminant volume should be reduced by the vegetative cover.

Soil Gas Alternatives:

No treatment is associated with the soil gas alternative. Contaminant toxicity, mobility, and volume will thus not be reduced.

Leachate Control Alternatives:

All leachate control alternatives (except for the "no action" alternative 1) will capture additional leachate and thus reduce the volume of contaminants on-site; an adequately vegetated cover over landfill waste will also help to reduce the volume of leachate generated and thus the volume of contaminants. Leachate control alternatives 2 and 3 will not reduce contaminant toxicity and mobility on-site, but contaminant toxicity and mobility should be reduced by off-site treatment. Leachate control alternatives 4 and 5 will reduce contaminant toxicity and mobility by on-site treatment. A detailed comparison of how each leachate control alternative achieves this criterion is provided in summary Table 5.1.

Short-Term Effectiveness

Landfill Cover Alternatives:

The soil cover enhancements pose minimal short-term risks to construction workers, if they come into contact with waste and/or leachate. This potential can be addressed by a construction risk mitigation plan.

Groundwater Alternatives:

The ground water alternative should be effective in the short-term.

Soil Gas Alternatives:

The soil gas alternative should be effective in the short-term.

Leachate Control Alternatives:

The abandonment/removal of the existing system and construction of an expanded leachate collection system will increase the exposure risk to construction workers to the leachate in the short-term; this will be addressed by a construction risk mitigation plan (RMP). Leachate control alternatives 2 and 3 will be effective in the short-term. Leachate control alternatives 4 and 5 may need a longer time period before it can be demonstrated that the leachate meets performance standards (surface water RGs); however, the leachate will be collected and appropriately disposed of, so these alternatives are still effective in the short-term. A detailed comparison of how each leachate control alternative achieves this criterion is provided in summary Table 5.1.

Implementability

Landfill Cover Alternatives:

The alternative is implementable, but placement of the access restrictions that are part of this alternative will need cooperation from the property owners. Also, the existing fencing does not completely follow the southern property boundaries on parcel 25-044-0-011.00-0.

Ground Water Alternatives:

The alternative is implementable, but placement of the access restrictions that are part of this

alternative will need cooperation from the property owners.
Soil Gas Alternatives: The alternative is implementable, but placement of the access restrictions that are part of this alternative will need cooperation from the property owners.
Leachate Control Alternatives: Leachate control alternative 2 has the least issues with implementation. Physically, the other alternatives can be implemented by conventional construction methods but there may be technical and administrative feasibility issues. For example, compliance with any permitting requirements for construction along public roads and pumping leachate are potential issues for the leachate control alternative 3; this alternative appears to be currently infeasible due to local authority reasons. Similarly, leachate control alternative 4 and potentially, 5, may have issues with compliance with permitting requirements. A detailed comparison of this criterion for each leachate control alternative is provided in summary Table 5.1.

Cost

Costs for the remedial alternative included in this selected plan have been calculated based on 30 years of O&M. However, certain remedial components will need to be maintained beyond the 30 year period. For example, leachate collection and treatment will probably need to be continued beyond the 30 year period and there may be an on-going cost associated with maintenance of the leachate collection system beyond the 30 year period.

Landfill Cover Alternative: The landfill cover alternative is common to all alternatives. For costs, see the summary table in Section 4.2.
Ground Water Alternative: The ground water alternative is common to all alternatives. For costs, see the summary table in Section 4.2.
Soil Gas Alternative: The soil gas alternative is common to all alternatives. For costs, see the summary table in Section 4.2.
Leachate Control Alternatives: Abandonment/removal of the existing leachate collection system and expansion of the leachate collection system is common to all the alternatives. For these costs, see the summary table in Section 4.3. The most expensive alternate in terms of capital costs is Alternative L3 (off-site discharge to a force main), followed by Alternative L4 (the on-site engineered wetland system), then Alternative 5 (the on-site treatment plant) and lastly, Alternative L2 (off-site treatment and disposal). When O&M costs are also considered, Alternative L4 is the most cost-effective alternative in the long-term, followed by Alternative L3, then Alternative L5 and finally Alternative L2. A comparison of this criterion for each leachate control alternative is provided in Section 4.3 and a summary in Table 5.1.

Community Acceptance

Ohio EPA received comments from interested parties during the public comment period, which ran from May 6, 2014 to June 6, 2014. Those comments and Ohio EPA's responses are included in Section 8.0 (Response to Public Comments) of this Decision Document. The Agency did not receive any comments at the public meeting held on May 29, 2014 at the Ellsworth Township Town Hall in North Jackson, Ohio.

5.3 Summary of Evaluation Criteria

A summary of the evaluation of the Site remedial alternatives is included in **Table 6: Evaluation of Site Remedial Alternatives**. A more detailed evaluation of the leachate control alternatives is provided in Table 5.1.

TABLE 6: EVALUATION OF SITE REMEDIAL ALTERNATIVES

Remedial Alternatives	Threshold Criteria		Balancing Criteria					Modifying Criteria
	1. Protects Human Health & Environment	2. Compliance with ARARs	3. Long Term Effectiveness	4. Reduces T, M and/or V by Treatment	5. Short Term Effectiveness	6. Implementable	7. Costs	8. Community Acceptance
Landfill Cover								
LC1	◘	◘	□	□	◘	□	No additional costs (other than those being incurred under the 1990 Orders)	
LC2	■	■	■	◘	◘	■	■	
Ground water								
G1	□	□	□	□	□	□	No additional costs	
G2	■	■	■	□	■	■	■	
Soil Gas								
SG1	□	□	□	□	□	□	No additional costs	
SG2	■	■	■	□	■	■	■	
Leachate Control								
Alternative L1	□	□	□	□	□	□	See Costs Table	
Alternative L2	■	■	■	◘	◘	■	See Costs Table	
Alternative L3	■	■	■	◘	◘	□	See Costs Table	

Alternative L4	■	■	■	■	◘	◘	See Costs Table	
Alternative L5	■	■	■	■	◘	◘	See Costs Table	
■ = Fully Meets Criteria ◘ = Partially Meets Criteria □ = Does Not Meet Criteria								

6.0 OHIO EPA'S SELECTED ALTERNATIVE

Ohio EPA's selected remedial alternative for the Hilltop Landfill site is a combination of the common elements (Soil Alternative, Ground Water Alternative, Soil Gas Alternative), the common elements of the Leachate Alternative and Leachate Alternative # 4 (on-site treatment via an engineered wetland supplemented by a phytocap).

The selected leachate control alternative was chosen over the other leachate alternatives because based on information presently available, the selected remedial alternative best satisfies the criteria defined in Table 6 Evaluation of Site Remedial Alternatives. The elements of the selected remedial alternative are provided below. See Section 4.2 and Section 4.3 for additional details on each alternative.

Performance standards for each medium of concern to be remediated are specified for each medium of concern that needs to be remediated; numerical performance standards for surface water and ground water are provided in Tables 3.1.1 and 3.1.2. Performance standards are used to identify the specific measurements that are appropriate to determine whether each portion of the selected remedial alternative is successful (*i.e.*, each RAO is met).

Based on information presently available, it is Ohio EPA's conclusion that the selected remedial alternative best satisfies the criteria defined in Table 6 Evaluation of Site Remedial Alternatives. The elements of the selected remedial alternative are as follows:

6.1 Landfill Cover Remedial Alternative

Landfill areas will be covered with a minimum of 2 feet of soil; the cover will be graded to ensure positive drainage and planted with an appropriate grass cover mix to establish robust vegetation. Any bare areas or areas of stressed vegetation will be addressed to protect against exposure to contaminant source areas. Current leachate breakouts and/or seeps on or emanating from the landfill will be addressed during construction; any future breakouts will be addressed in an O&M plan. Additional signage and fencing will be installed at strategic locations along the Site boundary and existing fencing will be repaired.

Institutional controls will be established on the Site property to prevent cover disturbances and protect human health and the environment from exposure to the waste. Property owner concurrence will be necessary for establishment of the institutional controls.

A long-term O&M Plan that includes inspections of the landfill cover will be developed during the remedial design phase of the project to ensure the performance of the landfill cover remedy.

The performance standards are met when:

- Cap improvements (*i.e.*, landfill areas are covered with a minimum 2 feet of soil cover, graded to ensure positive drainage, and a vegetative cover is established) are completed to prevent exposure to waste. The cap will pass an Ohio EPA inspection to ensure that each improvement has been implemented.

- A long-term term O&M program for the cap is implemented and the cap passes Ohio EPA inspections during the O&M period.

- Site access controls (*i.e.*, fencing and signage) are established and pass periodic compliance inspections.

- Environmental covenants, including restrictions to prevent intrusive activities on-site, have been recorded in the Mahoning County Recorder's Office and copies are provided to Ohio EPA.

6.2 Ground Water Remedial Alternative

Ground water in areas with the potential to be above Site RGs will be monitored for a minimum of 5 years, post-remedy construction. This will help determine whether site-related contamination is migrating off-site and whether it is impacting human health and the environment.

Institutional controls will be established on the Site to prevent extraction and use of ground water (except for investigative and cleanup purposes) to prevent exposure to contaminated ground water. Property owner concurrence will be necessary to establish the institutional controls.

The performance standards are met when:

- A ground water monitoring program capable of detecting off-site migration of contaminated ground water is established. A ground water monitoring plan will be developed during the remedial design phase of the project.

- Ground water sample analyses in the MW-17 area must meet the numerical performance standards in Table 3.1.2 before the ground water monitoring program can be terminated.

- Environmental covenants, including restrictions on the use of ground water, have been recorded in the Mahoning County Recorder's Office and copies are provided to Ohio EPA.

6.3 Soil Gas Alternative

Institutional controls will be established on the Site property to control future construction of occupied structures, unless it can be documented that these structures meet applicable standards. This will help prevent exposure to contaminated soil gas and protect human

health. Property owner concurrence will be necessary for establishment of the institutional controls.

The performance standard is met when:

- Environmental covenants, including restrictions on construction of occupied structures, have been recorded in the Mahoning County Recorder's Office and copies are provided to Ohio EPA.

6.4 Leachate Control Alternative (L4)

The existing leachate collection system will be abandoned/removed and replaced by an expanded leachate collection system that will, at a minimum, wrap around the north portion of the landfill and collect leachate currently not being captured by the interim leachate collection system. The leachate collection system will be supplemented by a phytocap[26]. Ohio EPA anticipates that the expanded leachate collection system will capture leachate outbreaks as well as seeps, some of which are currently entering the creek.

Leachate collected will be treated in an engineered wetland; the details of the phytocap and engineered wetland will be determined during the remedial design phase of the project. Leachate will be collected at the outlet of the engineered wetland post-treatment. A sampling and analysis program will be implemented to document that the leachate meets the performance standards (chemical-specific WQC) and can be discharged to the creek. See Table 3.1.1 for the site-specific WQC. Leachate will need to be collected and disposed off-site until this demonstration can be made.

Any discharge of leachate to the creek will be subject to the requirements of an NPDES permit and a PTI issued by Ohio EPA's Division of Surface Water. The selected remedial alternative will also need to comply with other applicable permits identified during the remedial design and remedial action process.

The performance standards are met when:

- The leachate collection system construction is completed such that leachate emanating from the landfill is collected.
- The leachate treatment system is completed and meets the conditions of the NPDES and PTI permits issued by Ohio EPA's Division of Surface Water.

7.0 Documentation of Significant Changes

Ohio EPA received comments on the Preferred Plan, but no significant changes have been made to the selected remedial alternative. The Agency's responses to the comments are provided in Section 8.0, below.

[26] See Section 4.3, Alternative L4 for a conceptual overview of the proposed phytocap at the Hilltop Landfill site.

8.0 Responses to Public Comments

A public meeting/hearing was held on May 29, 2014 to present the Agency's Preferred Plan for the Hilltop Landfill site and to solicit public comment. Ohio EPA did not receive any comments at the public meeting. Ohio EPA received written comments from three (3) entities during the public comments period that ended on June 6, 2014:

- Browning-Ferris Industries of Ohio (BFI)
- General Electric (GE)
- Mahoning County District Board of Health (MCDBH)

The comments are in italics, and responses are provided below. A copy of the comments is also provided in Appendix C of the Decision Document.

Browning-Ferris Industries comments:

BFI agrees with Ohio EPA's preferred alternative for completing the remediation. Our only significant comment regarding the preferred alternative is that the FS discussed it may be feasible to use the trees/vegetation of the phytocap in an engineered system to assist in the leachate treatment or to consume leachate. BFI has successfully implemented such systems at other landfills and can provide basic information to Ohio EPA on this technology. Language needs to be added to the Decision Document to allow flexibility to evaluate this possibility during the Remedial Design, along with the noted engineered wetlands.
BFI believes some of the background information on Site conditions may be misunderstood by the public that conditions are worse than actual conditions. We ask that Ohio EPA consider the following examples and information in preparing its presentation for the public meeting and in future documents:

- *Ohio EPA's use of "numerous" to describe the number of leachate seeps/outbreaks entering the northern area of the unnamed creek or emanating from the landfill cap appears to overstate conditions. We believe the number of seeps has been relatively small, most of the seeps have been intermittent, and some were observed only during a period of record rainfall in 2011 and have not been observed historically. BFI also believes there are very few locations (perhaps only one) where seeps with demonstrated leachate constituents exist actually entering the creek. The flow at the one previously sampled seep is very slow and may be considered de minimis with respect to environmental harm. Although leachate seeps have occurred at other areas of the Site over the past 20+ years, most have been have been addressed promptly and effectively by the various Order respondents. It also should be noted that some of the areas assumed to represent leachate seeps due to rust-colored staining may actually be due to the effects of historic coal mining at the Site.*

- *Ohio EPA identifies in tables many chemicals as Contaminants of Concern (COCs) that have only a few estimated (J-value) detections and/or concentrations below risk levels. This may give the public the impression that conditions are worse than the data and risk assessment show. It is our experience that COCs should be those chemicals detected above standards, not all chemicals detected. It should be remembered that some of the detection limits used for analyses were very low.*

- *There is also some inconsistency and confusion in Ohio EPA's listing of contaminants of concern (COCs). The public notice lists SVOCs and ammonia but the Executive Summary does not. The text lists VOCs and pesticides as COCs. We believe pesticides are not significant at the Site. 4,4-DDE is the only pesticide listed in Table 3.3.1 with a result above a risk value, the concentration was a very low, estimated J-value, and may have been false positives. It should also be clarified that there are limited VOCs present in Site media. The only VOC listed in Table 3.1.2 with a result for groundwater above risk levels is vinyl chloride. The RI has shown vinyl chloride is limited to a very small area of the site, has not migrated, and there are no current or expected future exposures to impacted groundwater. Ammonia has not been detected above protective levels in samples from the creek with the exception of one sample from 2002.*

- *BFI also suggests Ohio EPA's discussion of COCs should focus on current conditions. For example, since 1992, the quality of leachate has been monitored periodically. Organic concentrations in the leachate have substantially decreased over time, including a greater than 85% reduction in total volatile organic compound (VOC) levels and greater than 90% reduction in total semi-volatile organic compound (SVOC) levels. Based on BFI's and CRA's experience with other landfills in Ohio, the Site leachate is relatively dilute.*

- *Additional examples in the text where Ohio EPA uses descriptive words that may overstate the condition of the Site include "numerous problems with the landfill" (p. 3), "strong horizontal gradient" (p. 4), and "persistent leachate outbreak" (p. 8).*

The RI/FS has demonstrated that current conditions at the Site pose limited to no risk to human health or the environment. The primary focus for the remaining remedial measures is to address the small leachate seeps at the north end of the Site that may discharge into the creek. This focus is not due to a demonstrated risk to the creek but is based more on Ohio EPA policy against such discharges without a permit. In fact, the ecological risk assessment work and healthy flora and fauna in the stream documented by Ohio EPA have demonstrated that minor leachate seeps have not caused an adverse effect. The habitat is actually thriving in the area as noted by the Ohio EPA throughout the RI/FS process and in the Preferred Plan.

Path Forward

Once the Preferred Plan is finalized and the Decision Document is issued, BFI understands the Ohio EPA will seek to negotiate a Remedial Design/Remedial Action (RD/RA) Order. The remaining remedial measures should be implemented in a phased approach. Most importantly, BFI's experience at multiple landfills in Ohio and across the U.S. indicates the landfill cover improvements should be completed as a first phase. This phase will include improving the landfill cover, grading, and surface water run-on/run-off. It may include vegetation improvements and a phytocap to consume water and reduce infiltration into the landfill. A pilot study and/or monitoring program may be completed as part of a pre-design to gather additional data for design of the expanded leachate collection system and anticipated engineered wetland.

Time should be allowed after completing the first phase to monitor the effects because the improvements should significantly reduce leachate generation, possibly even to the point of eliminating the seeps. Monitoring the first phase may also identify additional design considerations, modifications, or solutions that could improve the overall condition of the Site. This will provide for a focused and practical design for leachate collection system enhancements as the second major phase of the work. BFI's experience indicates some landfills have over-designed leachate collection systems that recover more groundwater than leachate, even inducing subsurface flow from adjacent streams/creeks. This can lead to handling of excessive volumes of water/leachate and could lead to impairing the stream by reducing its base flow.

Regarding the RD/RA Order, as the agency is aware; BFI never owned or operated the landfill but agreed to complete the RI/FS. Other PRPs for the site should be named on the RD/RA Order, just as they have been in the past. We expect to work together with Ohio EPA and other named PRPs to assure work is completed.

In summary, BFI is in agreement with the Ohio EPA's Preferred Plan for the Site. BFI believes that the remedy can be a benchmark for a relatively passive, sustainable, and environmentally conscious solution.

Ohio EPA response (to BFI's comments):

Ohio EPA appreciates BFI's concurrence with the preferred alternative. Regarding BFI's comment on the phytocap, the Preferred Plan summarizes the phytocap design in a footnote when describing the on-site engineered wetland; the footnote has been moved into the body of the text in the Decision Document to address BFI's comment. The Agency anticipates that the Decision Document will be sufficiently flexible to allow for evaluation, appropriate design, and implementation of the phytocap.

With respect to BFI's comment on background information presentation:

- The Preferred Plan uses the word "numerous" twice in connection with the seeps/outbreaks: (i) on page 5 to describe the leachate seeps that have occurred from 1990 to date; and (ii) on page 7 to describe the seeps entering the creek on the north side of the landfill. Ohio EPA agrees that seep areas are relatively small in comparison to the total area of the landfill, but the seeps are persistent and recurring mainly in the same areas over the years. This is true even in locations where the seeps have been packed (for example along the access road on the west side and upslope from the leachate collection tanks). While some seeps are intermittent during dry spells, seeps are not limited to years with record rainfall, as documented in recent monthly reports. Ohio EPA agrees that the seeps entering the stream are concentrated in one area and the flow is low, but multiple seeps are evident in this area, and one was sampled as representative. Areas are not identified as seeps in the FS based on iron staining; the term is reserved for areas where site-related contamination in the form of VOCs or ammonia has been detected. However, in deference to BFI's expressed concern, Ohio EPA has attempted to clarify the term "numerous" in the Decision Document.

- Ohio EPA recognizes the validity of BFI's concern regarding portraying conditions at the Site as worse than reality; the Agency's objective in the Preferred Plan is to be transparent, and provide all relevant information to the public. Therefore, information on chemicals detected in ground water and leachate in the most recent (not historical) sampling is provided; the tables also very clearly indicate which chemicals are above any applicable standards. With respect to BFI's concern regarding providing 'J' values: these values are used for risk assessment purposes and to demonstrate compliance with applicable standards and as such are included in the tables.

- Ohio EPA regrets any differences between the Executive Summary in the Preferred Plan and the Public Notice sent to media: VOCs, pesticides (which are SVOCs) and ammonia are all COCs at the Site. The Executive Summary in the Decision Document will be clarified to exactly reflect the body of the document. Vinyl chloride is the only VOC above applicable standards that has been detected in ground water and is limited to the north-west corner of the Site. However, ground water data is limited to the perimeter of the landfill (i.e., there is no ground water data on contamination under the landfill area). While ammonia may have been detected only once in creek water samples, there is constant influx of leachate high in ammonia into the creek and sampling in the creek has been limited to four events. Further, while the levels of pesticides such as 4,4-DDE are low in the leachate collected, they have been consistently detected in leachate when analyzed with an appropriate detection limit.

- As stated above, the Agency strives to be transparent and historical information is provided to set site decisions in context. However, to avoid confusion, only the most current sampling event results are shown in the leachate and ground water tables. The Agency is unable to comment on BFI's contention that the leachate is relatively less contaminated compared to other landfills since we do not conduct relative comparisons; the basis for Site clean-up is that potential exposure to contamination above applicable standards needs to be addressed.

- Re the "overstated descriptive words":

    - "Numerous" was used to describe the problems identified in the MCDBH inspection reports during the landfill's operational period; the Agency believes this is an accurate description of the situation. However, in deference to BFI's expressed concern, Ohio EPA has revised the term.

    - "Strong horizontal gradient" is the same language used in the Remedial Investigation Report submitted by BFI/CRA to describe the hydrogeology.

    - The leachate outbreaks on the cover and emanating from the landfill have occurred in the same areas, and are recurring in spite of cover enhancements and seep packing of some of the outbreaks; the term "persistent" is thus not inappropriate. However, in deference to BFI's comment, the term "persistent" has been modified.

The interim remedy for the Site addresses current risk; however a final, comprehensive remedy is necessary as discussed in the Preferred Plan. With respect to the leachate, based on the Agency's technical assessment, only a portion of the leachate being generated is captured by the existing leachate collection system. Leachate is thus emanating from the landfill and entering the creek in one area, in violation of the Ohio Revised Code (ORC) 6111.04. Leachate seeps are also evident in other areas of the Site. Ohio EPA agrees that the creek provides excellent habitat based on the Agency's observations; addressing leachate seeps will, in all probability, improve the creek fauna and flora.

Path Forward:

Ohio EPA is open to conducting the remedial measures in an appropriately phased manner and supports any additional data that needs to be collected to support the remedy chosen. However, based on the investigation conducted to date, landfill cover improvements alone will be insufficient to address leachate seeps on or emanating from the landfill, unless a fully functional Subtitle D cap is installed over the landfill area (20 acres). BFI and itsr RI/FS consultant, CRA, recognized this and, in all the remedial alternatives proposed, included as a common element, an expanded leachate collection system at an appropriate depth to capture leachate that is not being captured by the existing system.

In summary, Ohio EPA supports collecting all the requisite information during the design phase to construct an appropriate leachate collection system and address other issues identified at the Site. The Agency looks forward to working with potentially responsible parties to complete a successful permanent remedy for the Site.

General Electric comments:

GE is in general agreement with OEPA's expectations for the selected remedial alternatives noted in the Preferred Plan. GE's most significant concerns relate to the focus of the selected remedial alternatives on expanded leachate collection and treatment rather than on reducing (or possibly eliminating) the volume of leachate and the leachate seeps through landfill cover improvements. Additionally, GE notes the lack of data required to determine if and when the leachate will meet the chemical-specific water quality criteria ("WQC") so that it can be discharged to the creek. GE is also concerned with the significant leachate disposal costs that will be incurred until WQC are met and leachate may be discharged. Other than continuing with off-site leachate disposal, GE notes the apparent absence of any contingency plan in the selected remedy in the event that the engineered wetlands are not successful in treating leachate to the WQC.

Improving Landfill Cover & Reducing Leachate Volumes
First and foremost, GE believes that the remedy should focus on reducing rainwater infiltration through the landfill that is apparently producing leachate and resulting in leachate seeps on the landfill's surface. By reducing rainwater infiltration through landfill cap improvements, the amount of leachate in the landfill and the resultant seeps may be reduced. Furthermore, cap improvements will reduce the need for leachate management and the volume of leachate requiring treatment in the proposed engineered wetlands.

By way of background, over 900 gallons of leachate is currently being collected daily from the leachate collection trench system (comprised of 60 feet of combined trench) located on the

down gradient edge of the Hilltop Landfill Site. The leachate is temporarily stored on-site and periodically transported off-site to the City of Alliance, Ohio wastewater treatment facility at a significant cost. Seep areas are also routinely inspected and packed with low permeability soils to reduce their occurrence. GE is responsible for interim leachate management and seep packing pursuant to an Ohio EPA Director's Final Findings and Orders dated September 7, 1990 (hereinafter, "1990 Orders").

The selected alternative under the Preferred Plan proposes to reduce the occurrence of leachate seeps partly by increasing the collection trench's length to 700 linear feet (a 12 fold expansion) followed by on-site leachate treatment at an engineered wetlands. Based on the current rate of leachate generation, this expansion would result in the collection of approximately 11,000 gallons of leachate per day or 4-5 million gallons per year (Feasibility Study Report, CRA, 2013).

Additionally, GE notes there are no leachate monitoring wells within the landfill itself to assess leachate levels within the Landfill materials. The shallowest depth to groundwater in monitor wells surrounding the landfill is approximately 8 feet below ground surface (i.e., MW-8, RI Report, Oct 25, 2010). The existing interim leachate collection trenches are approximately two feet deep. The draft 2007 design document (CRA, 2007) shows a depth of 2-4 feet for the proposed collection trench. Based on this limited data, it would appear that the existing (and proposed) leachate collection trench is collecting perched water infiltrating through the soil cover. Figure 3.3 of the RI report compares leachate generation to precipitation and indicates that leachate generation is typically higher during spring wet weather conditions and lower during late summer or early fall dry weather conditions. Thus, there appears to be a relationship between precipitation and leachate levels suggesting that leachate may be due in part to infiltration from perched water.

To fully understand the reason for the large volume of leachate currently being produced and to properly evaluate the need for, and design of a leachate collection trench, GE recommends monitoring leachate head levels from observation wells constructed within the landfill, evaluating groundwater levels beneath and around the landfill, and assessing the current cap conditions (permeability and surface conditions). This information will support the proper design of a leachate management system.

Moreover, the remedial action objective (RAO) for leachate is to prevent exposures to leachate breakouts or leachate seeps on or emanating from the landfill. GE believes this RAO could be substantially, if not fully, met by improvements in the landfill cover that are likely to significantly reduce the infiltration of perched water. GE suggests testing the permeability of the current landfill cover to determine exactly where cover and surface drainage improvements are necessary. After cover improvements have been implemented, a performance evaluation could be conducted over the course of a year to establish if the RAOs for leachate seeps have been met. If so, routine inspections as part of an O&M program could be conducted going forward to confirm that the RAOs are continuing to be met.

Discharge of Leachate to Surface Water in Compliance with WQC
While the selected remedial alternative for leachate management calls for leachate to ultimately be discharged to the creek after treatment in the engineered wetlands. GE notes that the engineered wetlands will take time to construct and effectively treat leachate. In fact,

at the public meeting on May 29, 2014, Ohio EPA estimated that it could take up to a year after construction for the engineered wetlands to be able to effectively treat leachate in a manner that would comply with the chemical-specific WQC and allow discharge to surface water.

Historic leachate quality data is limited to leachate collected from the current 60-foot long collection trench. Given the selected remedy's focus on treatment of leachate via the engineered wetlands in order to ensure compliance with chemical-specific WQC and allow ultimate discharge to surface water, GE is concerned that this data may not be representative of the leachate quality that may be collected from the proposed 700-foot long collection trench. As part of remedial design, GE recommends that further analysis of leachate be conducted along the proposed leachate collection trench alignment to determine if and when leachate will meet chemical-specific WQC after treatment via the engineered wetlands.

Potential for Significant Offsite Leachate Disposal Costs
The Preferred Plan does not describe how leachate will be managed during the time period that the engineered wetlands is still being established and the leachate does not yet meet chemical-specific WQC. If Ohio EPA anticipates that leachate will be disposed of offsite during this interim period, these costs could be significant, but were not included in the Preferred Plan. Based on the projected leachate volume of 4-5 million gallons per year, GE estimates that the expansion of the leachate collection system would result in $1.5-2M per year in leachate collection, loading, hauling and offsite disposal costs during the time period that leachate does not yet meet chemical-specific WQC and cannot be discharged to the creek.

Lastly, given the significant costs associated with offsite disposal of the leachate. GE strongly recommends the Ohio EPA consider pilot testing the proposed leachate collection and treatment system or developing a contingency plan other than offsite disposal if the engineered wetlands has not meet performance standards within a certain time period. Additionally, a focused FS may be needed to evaluate contingency options.

<u>Next Steps & GE Nexus</u>
As mentioned previously, GE is currently responsible for conducting interim action activities to ensure proper management of the landfill's leachate pursuant to the 1990 Orders. As a result of GM's bankruptcy in 2009, GE has unilaterally performed these obligations for the past several years. Despite little to no nexus information related to GE's waste disposal activities at the Site. GE has spent well over $2M implementing these interim activities. With this in mind, GE strongly contends that Ohio EPA should pursue potentially responsible parties other than GE for the design and implementation of the final remedy at the Hilltop Landfill Site.

GE has been performing under the 1990 Orders despite a discernable lack of nexus information related to GE's waste disposal activities at the Hilltop Landfill Site. While there is evidence that GE explored the possibility of disposing certain materials at the Hilltop Landfill, there is no documentation indicating that GE actually sent any hazardous waste to the Hilltop Landfill Site. See Ohio EPA's letter, dated December 17, 2008, enclosed for your reference. Moreover, GE's January 26. 2009 letter to Ohio EPA provides waste characterization data to document that the calcium fluoride waste generated at GE's Niles plant and considered for disposal at the Hilltop Landfill Site was RCRA non-hazardous waste. A copy of this letter is

enclosed for your reference. Thus, even if GE's waste was disposed of at the Hilltop Landfill, the waste was not a hazardous waste.

Given the uncertainties discussed above regarding expanded leachate collection and treatment via the engineered wetlands. GE believes that the Remedial Design/Remedial Action ("RD/RA") Orders should cover leachate management from Day 1. The final RD/RA Orders should terminate the 1990 Orders and incorporate any further interim leachate management activities during design, construction and start-up of the final remedy. This will incentivize a more efficient remedy design and implementation process.

Lastly, based on GE's interim leachate management efforts under the 1990 Orders despite its lack of nexus to the Hilltop Landfill Site, GE strongly contends that BFI and other potentially responsible parties should be responsible for the final remedy under the RD/RA Orders. Moreover, the proposed remedy was developed by BFI during the RI/FS process. BFI and its parent, Republic Services, Inc. are clearly experts on landfill remediation projects. They are well suited to design and implement the engineered wetlands and phytoremediation project for the Hilltop Landfill Site that they advanced before Ohio EPA during the RI/FS process.

* * *

In summary, GE has concerns regarding the selected remedial alternative for landfill cap improvements and leachate management under Ohio EPA's Preferred Plan. GE believes that further analysis may be required to understand landfill cap conditions, expected leachate volumes and if and when the leachate will meet chemical-specific WQC and be capable of discharge to the creek. GE also contends that Ohio EPA should consider a contingency plan other than offsite leachate disposal in the event that leachate does not meet WQC. Moreover, GE believes that the new RD/RA Orders should terminate the 1990 Orders and incorporate any interim leachate management obligations during remedial design, construction and implementation.

Ohio EPA response (to GE):
Ohio EPA has focused on a well-designed system to collect leachate rather than on reducing or eliminating leachate generation for the reasons detailed below (see the response to GE's comments on improving landfill cover and reducing leachate volumes). Potential compliance with the WQC is based on contaminant levels in leachate collected in the current system; it is difficult, pre-construction, to project contaminant levels in the proposed expanded leachate collection system as discussed in the detailed responses below and post-construction data will be necessary to demonstrate compliance with the WQC. However, BFI has cited several examples in the FS documenting that the WQC can be achieved through treatment in the engineered wetland system. Ohio EPA acknowledges that there will be disposal costs associated with leachate disposal until the wetland is fully functional and leachate is allowed to discharge to the stream; this has been clarified in the Decision Document.

<u>Improving landfill cover and reducing leachate volumes</u>:
As GE has stated, leachate generation in the current system appears strongly correlated with infiltration. However, based on the investigations conducted to date, the Agency believes that compliance with the remedial action objective of preventing exposure to leachate seeps and outbreaks cannot be achieved only by the cover improvements suggested in GE's comments. While targeted cover improvements supported by long-term operation and maintenance will address leachate outbreaks on the landfill cover and emanating along the

western side of the access road, leachate seeps are also flowing into the unnamed creek on the north side of the landfill, most probably via pathways though the bedrock. Based on EPA's experience with old landfills, a Subtitle D solid waste compliant cap (multilayer cap with an impermeable membrane) is the only cover system that may be successful in addressing leachate seeps. Open clay caps crack during freeze-thaw cycles, permitting infiltration. The Agency had originally advocated for such a cap under the 1990 Director's Final Findings and Orders; however the cost of such a cover system (estimated around $150,000 to $200,000/ acre) would add significantly to the remedy costs.

Under the circumstances, a well-designed leachate collection system is necessary to address leachate seeps emanating from the landfill. The Agency anticipates that additional information necessary to design an appropriate leachate collection and treatment system will be collected during remedial design.

Leachate discharge to surface water:
To clarify the time element, if the engineered wetland is capable of meeting applicable discharge standards once established, the wetland establishment period may be less than a year. However, the Agency would require a demonstration that leachate, year-round, can meet water quality standards for discharge; this demonstration may take up to a year or more.

The Agency agrees that data from the current system may not be representative of leachate collected from the proposed leachate collection system; whether the contaminant levels will be higher or lower in leachate from the expanded system is not known. Further analysis of leachate and information to support leachate collection system construction and leachate management will be conducted as necessary during remedial design.

Off-site leachate disposal costs:
The Agency regrets the lack of clarity in the Preferred Plan on leachate management during the period of wetland establishment and demonstration of meeting chemical-specific discharge standards. During this period, leachate will be collected and disposed off-site if necessary. This has been clarified in the Decision Document. Please note that, as stated in the Preferred Plan, discharge standards and associated permits are under the regulatory authority of Ohio EPA's Division of Surface Water.

While leachate disposal costs could be significant if the leachate cannot meet applicable discharge standards, examples are provided in the FS Report of other sites to support the functionality of wetland treatment systems. BFI and its consultants have expressed confidence that the proposed remedy will be effective. Any remedy modifications will be evaluated, as necessary, during remedy implementation.

Next steps and GE nexus:
Ohio EPA anticipates that once the current leachate system is abandoned and an expanded functional leachate collection system is in place, the work respondents who sign the remedial design/ remedial action order will be responsible for leachate collection and management. However discussion will be necessary between signatories to the 1990 order and the remedial design/remedial order work respondents to ensure a smooth transition, and Ohio EPA strongly encourages all parties to communicate. The Ohio EPA is open to discussing

mechanisms for termination of the 1990 orders, once the obligations of the parties involved are completed.

Mahoning County District Board of Health comments:
The Mahoning County District Board of Health has reviewed the Ohio Environmental Protection Agency's document titled, "Preferred Plan for the Remediation of the Hilltop Landfill Site" located in Ellsworth Township, Mahoning County, Ohio. This letter serves as public record of our comments and concerns about the proposed remediation proposal and the presentation made at the public meeting held on May 29, 2014. As proposed, all plans are required to align with current regulatory standards. Our comments focus on the phyto-remediation concepts proposed in preferred alternative #4 for leachate management and compliance with the phyto-remediation in comparison to current regulatory requirements, and the long term monitoring of the subsurface wetlands and leachate generation.

Preferred Plan Alternative Four (#4) Leachate Management with Phyto-Remediation
The Preferred Plan Table 4: Summary of Site Remedial Alternatives Part L4, indicates that the preferred leachate management option is, "abandonment of the current leachate collection system; expanded leachate collection system supplements by a phytocap; on- site treatment via an engineered wetland, the goal of a permitted discharge to the creek". The phytocap proposes planting poplar and other trees to absorb water (rain and snow melt) to reduce the amount of leachate entering the engineered sub-surface wetlands.

Board of Health Concern with the Proposed Phyto-Remediation
The Board of Health does not believe that the phytocap proposal aligns with current solid waste regulatory requirements or best available technology for landfill closure activities and cap construction and maintenance. Please see Ohio Administrative Code (OAC) 3745-27-14 concerning post closure care. Phyto-remediation will compromise the integrity and effectiveness of the cap system as required under 14(A)(2). We believe that trees, and in particular fast growing, short-lived popular trees, will comprimise the integrity of the 76 cap (two foot of soil cover) by damaging the soil, creating voids, and impacting the cover integrity.

Leachate Generation and Long-term Sampling
The preferred plan proposes expanding the leachate collection trench and the addition of a subsurface wetlands which will increase the leachate generation during construction (at a minimum one-year). It is noted that OEPA anticipates a minimum of one-year of sampling before having documentation sufficient to determine whether the new system is effective according the presentation made at the public meeting on May 29, 2014. Therefore, the initial cost appears to increase for a two year period pending the successful treatment by the subsurface wetlands.

Board of Health Concern with Long-term Leachate Management
The Board of Health believes that this is not a viable long-term plan for leachate management. The first year of construction will automatically increase leachate generation and cost. Subsequently, if the engineered wetland does not work, the long- term off-site treatment could be cost prohibitive. We recommend that the initial expenditure focus on enhancing and revising the cap system to minimize surface water (rain and snow melt) infiltration and reduce leachate production.

Ohio EPA response (to MCDBH):

Phytocap and regulatory concerns:

Ohio EPA acknowledges the technical concerns raised by MCDBH related to the phytocap proposal and cover integrity, and had previously identified many of the same issues in comments on the feasibility study (FS) report. The Agency anticipates that a performance-based operation and maintenance (O&M) plan to address concerns related to cover integrity will be part of the remedy. Specifically, any issues related to trees on the landfill area compromising the integrity of the cover will be addressed through a long-term O&M plan. Further, the phytocap is only one sub-component of the proposed remedy; the Agency anticipates that the entire remedy proposed will address the outstanding issues at the site, once all the remedy components are constructed and are functional.

With respect to the regulatory issues raised, Hilltop Landfill operated under a license from MCDBH from 1969 until it closed prior to July 1976. The landfill is beyond the post-closure care period; further the regulations in force at the time required only "adequate cover" and associated guidance only recommended two (2) feet of well-compacted cover. The Agency has chosen a remedy that we anticipate will protect human health and the environment in the long-term and comport with applicable regulations.

Leachate management costs:
The Agency concurs that leachate treatment costs will probably increase at least initially due to additional leachate collected by the expanded leachate collection system, and costs associated with any leachate sampling required by Ohio EPA's Division of Surface Water in connection with permitting requirements. The period during which costs will increase is not known, and will depend on when the remedy is functional, so the period may be greater or less than two years. Funds have been factored into the cost of the wetland remedy in the FS for costs associated with additional monitoring to document that the treated leachate meets standards. However, any additional disposal costs have not been factored into the remedy, and this will be clarified in the Decision Document.

The Agency agrees that if the wetland treatment system does not meet performance standards, costs for off-site disposal and treatment will be significant. However, BFI and its consultants have expressed confidence in the wetland treatment system functionality based on their experience at other sites (as documented in the FS Report, Appendix A, Attachment C). The Agency recognizes that an alternate remedy (on-site treatment or off-site discharge via a force main, if permission is provided by the Mahoning County Sanitary Engineer) will need to be considered if the preferred remedy does not function as expected.

In summary, given the current contaminant concentrations in the leachate, the Agency has chosen a remedy that best comports with the evaluation criteria; the remedy is performance-based and there is no cap on the costs that will be expended by potentially responsible parties for a functional remedy.

Table 3.1.1: Comparison of Leachate Contaminants of Concern to Remedial Goals

Parameter	*Site-Specific Surface Water Quality Criteria*		*South Tank Jan 18/10*	*North Tank Jan 18/10*
TCL Volatile Organics				
Methylene Chloride	1900	ug/L	4.3 J	ND 5.0
Methylcyclohexane	-	ug/L	4.9 JB	ND 10
Acetone	-	ug/L	ND 50	12 J B
2-Butanone	22000	ug/L	ND 50	ND 20
4-Methyl-2-pentanone	-	ug/L	ND 50	ND 20
Toluene	62	ug/L	18	0.69 J
Chlorobenzene	47	ug/L	12	7.6
Ethylbenzene	61	ug/L	*690*	*110*
Xylenes, Total	27	ug/L	*1900*	*730*
1,1-Dichloroethane	-	ug/L	ND 12	ND 5.0
1,2-Dichloroethene, Total	970	ug/L	NA	NA
Trichloroethene	220	ug/L	ND 12	ND 5.0
Tetrachloroethene	53	ug/L	ND 12	ND 5.0
Benzene	160	ug/L	6.5 J	3.1 J
Isopropyl Benzene	4.8	ug/L	*5.5 J*	*6.9*
TCL Semivolatile Organics				
Diethylphthalate	220	ug/L	5.8 J	5.4 J
4-Methylphenol	53	ug/L	ND 40	ND 10
Phenol	400	ug/L	ND 40	ND 10
Isophorone	920	ug/L	ND 40	ND 10
Caprolactam	-	ug/L	6.9 J	ND 10
Biphenyl	6.5	ug/L	ND 40	ND 10
2-Methylnaphthalene	-	ug/L	1.6 J	2.8 J
2-Methylphenol	67	ug/L	ND 40	ND 10
Napthalene	21	ug/L	8.0 J	10
1,4-Dichlorobenzene	9.4	ug/L	ND 40	2.2 J
2,4-Dimethylphenol	15	ug/L	10 J	5.1 J
N-Nitrosodiphenylamine	160	ug/L	1.9 J	2.8 J
Organochlorine Pesticides				
delta-BHC	-	ug/L	0.021 J	ND 0.050
4,4'-DDE	0.0059	ug/L	*0.031 J*	ND 0.050
beta-BHC	0.46	ug/L	0.11 PG	0.023 J
Endosulfan I	240	ug/L	ND 0.050	ND 0.050
Endosulfan II	240	ug/L	ND 0.050	ND 0.050
Endrin Ketone	-	ug/L	ND 0.050	ND 0.050
gamma-BHC (lindane)	0.057	ug/L	0.0074 J	ND 0.050
Heptachlor	0.0021	ug/L	ND 0.050	ND 0.050
General Chemistry				
Total Dissolved Solids	1500	mg/L	604	620
Ammonia	1.1 - 5.6	mg/L	*25*	*20*

Table 3.1.1: Comparison of Leachate Contaminants of Concern to Remedial Goals

Parameter	*Site-Specific Surface Water Quality Criteria*		*South Tank Jan 18/10*	*North Tank Jan 18/10*
pH (s.u.)	6.5 - 9.0	none	6.7	6.8
Total TAL Metals				
Aluminum	-	mg/L	ND 0.2	0.139 B
Antimony	0.19	mg/L	0.0028 JB	0.0026 JB
Arsenic	0.15	mg/L	0.0117	ND 0.01
Barium	0.22	mg/L	0.103 B	0.0863 B
Cadmium	0.0073	mg/L	ND 0.002	ND 0.002
Calcium	-	mg/L	96.3	109
Chromium	0.27	mg/L	ND 0.005	ND 0.005
Cobalt	0.024	mg/L	ND 0.007	ND 0.007
Copper	0.03	mg/L	ND 0.025	ND 0.025
Iron	-	mg/L	18.4	21.1
Lead	0.037	mg/L	0.0058	0.0028 B
Magnesium	-	mg/L	46.4	47.1
Manganese	-	mg/L	0.112 J	0.272 J
Mercury	0.000012	mg/L	ND 0.0002	*0.00026*
Nickel	0.17	mg/L	0.0061 B	0.0079 B
Potassium	-	mg/L	26	19.7
Sodium	-	mg/L	58.2	55.9
Thallium	0.0063	mg/L	*0.0069 JB*	ND 0.01
Zinc	0.39	mg/L	0.0088 B	0.0145 B

Notes:

Metals included as the WQC need to be met for discharge to the creek, even if the metals are not site-related.

The WQC are the lower of the Ohio River Basin OMZA and the Human Health Nondrink criteria.
Ammonia range from Ohio EPA WQC Table 7.5 (Warmwater Habitat) for 7.7 pH , and a temperature range of 0 to 30°C.

For metals, WQC is dependent on water hardness: water hardness of the receiving stream is 430 mg/L as $CaCO_3$, which defaults to the maximum.

Qualifiers/Abbreviations:

B	Contained concentrations of target analyte at a reportable level in the method blank.
J	Lab qualification. Estimated value, below quantitation limit.
NA	Not Analyzed.
ND 0.02	Not detected at the indicated value.
TAL	Target Analyte List.
TCL	Target Compound List.
mg/L	Milligrams per Liter.
ug/L	Micrograms per Liter.

TABLE 3.1.2: GROUND WATER CONTAMINANTS OF CONCERN - COMPARISON TO REMEDIAL GOALS

Well ID: / *(Well Type)*			*MW-1 (Bedrock)*	*MW-3 (Bedrock)*	*MW-4 (Bedrock)*	*MW-5 (Overburden)*	*MW-6 (Bedrock)*	*MW-7 (Bedrock)*	*MW-8 (Overburden)*	*MW-9 (Bedrock)*	*MW-10 (Bedrock)*	*MW-11 (Bedrock)*	*MW-12 (Bedrock)*	*MW-15 (Overburden)*	*MW-16 (Bedrock)*	*MW-17 (Overburden)*	*MW-18 (Bedrock)*	*MW-19 (Overburden)*	*MW-20 (Overburden)*	*MW-21 (Overburden)*	*MW-22 (Overburden)*	*MW-23 (Bedrock)*	*MW-24 (Overburden)*	*MW-25 (Bedrock)*
Sample Date:	*Maximum Contaminant Levels (MCLs)*	*U.S.EPA Regional Screening Levels(Adjusted to the DERR Single Chemical Risk Goal*	*Oct 25, 2010*	*Oct 25, 2010*	*Oct 26, 2026*	*April/May 1996*	*Oct 20, 2010*	*Oct 25, 2010*	*Oct 25, 2010*	*Oct 25, 2010*	*Oct 26, 2010*	*Oct 26, 2010*	*Oct 26, 2010*	*Oct 21, 2010*	*Oct 22, 2010*	*Oct 26, 2010*	*Oct 26, 2010*	*Jun-07*	*Jun-07*	*Oct 22, 2010*	*Oct 21, 2010*	*Oct 21, 2010*	*Oct 25, 2010*	*Oct, 22, 2010*
Volatile Organic Compounds (ug/L)																								
1,1-Dichloroethane	-	24	ND (0.05)	ND (0.05)	ND (0.05)	ND (1.0)	ND (0.05)	ND (0.05)	0.16	ND (0.05)	ND (0.05)	ND (0.05)	1.89	0.22	ND (0.05)	2.57	0.18	0.203	0.402	0.42	ND (0.05)	ND (0.05)	0.06	0.05
1,2-Dichloroethene	7	260	ND (0.05)	ND (0.05)	ND (0.05)	ND	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.04 J	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.08	ND (0.05)
1,1,1-Trichloroethane	200		ND (0.05)	ND (0.05)	ND (0.05)	1.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2,4-Trimethylbenzene	-	15	ND (0.05)	0.03 J	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	0.11	ND (0.05)	ND (0.05)	ND (0.05)	0.04 J	0.04 J	0.03 J	0.04 J	ND(0.05)	ND(0.05)	ND (0.05)	0.06	0.05	0.07	ND (0.05)
1,2-Dichlorobenzene	5		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.07	ND (0.05)	ND (0.05)	0.31	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichloroethene (total)	-		-	-	-	ND (1.0)	--	--	--	--	--	--	--	--	-	-	--	--	--	--	--	--	--	--
1,2-Dichloropropane	5		ND (0.05)	ND (0.05)	ND (0.05)	ND (1.0)	ND (0.05)	ND (0.05)	ND (0.05)	0.03 J	0.02 J	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.07	ND (0.05)	0.31	ND (0.05)	ND(0.05)	NDJ (0.05)	ND (0.05)	0.07	0.05
1,3,5-Trimethylbenzene	-	87	ND (0.05)	ND (0.05)	ND (0.05)	ND	ND (0.05)	ND (0.05)	ND (0.05)	0.02 J	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.02 J	ND(0.05)	ND (0.05)	ND (0.05)	0.02 J	0.03 J	ND (0.05)
2-Butanone (Methyl ethyl ketone) (MEK	-	4900	ND (5.0)	ND (5.0)	ND (5.0)	ND (10)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	1.60	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND(5.0)	ND(5.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
2-Hexanone	-	34	ND (5.0)	ND (5.0)	ND (5.0)	ND	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	0.91 J	ND(5.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Acetone	-	12000	ND (5.0)	ND (5.0)	ND (5.0)	ND (10)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5)	ND (5)	ND (5)	ND (6)	ND (9)	ND (40)	ND (5)	9.63	9.37	ND (5)	ND (5)	ND (5)	ND (5)	ND (50)
Benzene	5		ND (0.05)	ND (0.05)	ND (0.05)	ND (1.0)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.52	1.1	ND (0.05)	ND (0.05)	1.4	0.12	0.0453	0.154	0.14	ND (0.05)	ND (0.05)	0.11	ND (0.05)	
Carbon disulphide	-	720	ND (0.1)	ND (0.1)	ND (0.1)	--	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.25)	ND (0.1)	ND (0.1)	ND (0.2)	ND (0.16)	ND (0.16)	0.789	0.873	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Chlorobenzene	100		ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	0.04 J	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chloroethane (Ethyl Chloride)	-	21000	ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.54	0.48	ND (0.05)	ND (0.05)	0.06	ND (0.2)	0.211	0.103	ND (0.5)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.37
Chloromethane (Methyl Chloride)	-	190	ND (0.27)	ND (0.1)	ND (0.1)	--	ND (0.1)	ND (0.15)	ND (2)	ND (0.5)	ND (0.7)	ND (2)	ND (5)	ND (3)	ND (0.9)	ND (3)	ND (3)	0.118	0.118	ND (0.4)	ND (0.4)	ND (0.1)	ND (2)	ND (2.5)
cis-1,2-Dichloroethene	70		ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	0.21	ND (0.05)	ND (0.05)	ND (0.05)	0.45	0.1	ND (0.05)	22	0.04 J	0.123	1.33	0.18	ND (0.05)	ND (0.05)	ND (0.05)	0.04 J
Cymene (p-Isopropyltoluene)	-		0.01 J	ND (0.05)	ND (0.05)	--	ND (0.05)	0.01 J	0.01 J	0.01 J	ND (0.05)	ND (0.05)	0.02 J	0.08	0.01 J	0.01 J	0.09	0.0272	ND(0.05)	ND (0.05)	0.01 J	0.01 J	?	0.01 J
Dichlorodifluoromethane	-	190	ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0814	0.0459	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Ethylbenzene	700		ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.11	ND(0.05)	0.034	ND (0.05)	ND (0.05)	0.13	ND (0.05)	ND (0.05)
Fluorotrichloromethane	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	-	390	ND (0.05)	ND (0.05)	ND (0.05)	--	ND (0.05)	ND (0.05)	ND (0.05)	0.01 J	0.01 J	ND (0.05)	0.02 J	0.41	ND (0.05)	0.22	0.04 J	ND(0.05)	0.0726	0.03 J	0.01 J	0.02 J	0.01 J	ND (0.05)
m&p-Xylenes	-	190	0.02 J	0.02 J	0.05 J	ND	0.02 J	0.02 J	0.02 J	0.15	ND (0.1)	0.02 J	0.03 J	0.03 J	0.02 J	0.08 J	0.31	ND(1.0)	ND(0.10)	0.04 J	0.05 J	0.16	0.06 J	0.02 J
Methylene Chloride	5		ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.5 J	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (1)	ND (0.79)	ND(1.0)	ND(1.0)	ND (1)	ND (1)	ND (1)	ND (1)
o-Xylene	-	190	ND (0.05)	ND (0.05)	ND (0.05)	ND	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.22)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.11)	ND (0.05)	ND (0.19)	ND (0.05)	ND (0.05)
Xylenes (total)	10000		0.02 J	-	-	ND (1.0)	--	--	--	--	--	--	--	--	--	--	--	--	ND(0.10)	--	--	--	--	--
Tetrachloroethene	5		ND (0.05)	ND (0.05)	ND (0.05)	ND (1.0)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND(0.05)	ND(0.05)	ND (0.062)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	1000		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.13)	ND (0.05)	ND (0.05)	ND (0.05)	0.01	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.08)	ND (0.05)	ND (0.05)	0.0496	0.0383	ND (0.05)	ND (0.05)	ND (0.14)	ND (0.13)	ND (0.05)
trans-1,2-Dichloroethene	100		ND (0.05)	ND (0.05)	0.02 J	--	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.08	ND (0.05)	ND (0.05)	ND (0.05)	1.35	0.03 J	ND(0.05)	0.0801	0.03 J	ND (0.05)	ND (0.05)	ND (0.05)
Trichloroethene	5		ND (0.05)	ND (0.05)	ND (0.05)	ND (1.0)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.09)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	3	ND (0.93)	ND(0.05)	0.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	2		ND (0.25)	ND (0.25)	ND (0.25)	ND (1.0)	ND (0.25)	ND (0.25)	0.11 J	ND (0.25)	0.06 J	ND (0.25)	ND (0.25)	ND (0.25)	0.04 J	2.43	ND (0.6)	ND(0.250)	ND(0.250)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	0.03 J
Semivolatile Organic Compounds (ug/L)	-	-	--	-	-	ND	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (5)	ND (5)	9	ND (5)
Mek-Methylphenol																								
o-Methylphenol	-	--	--	-	-	ND (10)	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	-	1500	--	-	-	ND	-	-	--	--	--	--	--	--	--	--	--	--	--	--	ND (5)	ND (5)	0.02 J	ND (5)
Benzoic Acid	-	58000	--	-	-	ND (10)	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis (2-Ethylhexyl) phthalate	6		--	-	-	ND (10)	-	-	--	--	--	--	--	--	--	--	--	--	--	--	ND (5)	ND (5)	ND (5)	ND (5)
Cresols	-	1400	--	-	-	ND	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	-	11000	--	-	-	ND	-	-	--	--	--	--	--	--	--	--	--	--	--	--	ND (5)	ND (5)	0.03 J	ND (5)
Naphthalene	-	0.14	--	-	-	ND	-	-	--	--	--	--	--	--	--	--	--	--	--	--	ND (2)	0.02 J	ND (2)	ND (2)
Phenol	-	4500	--	-	-	ND (10)	-	-	--	--	--	--	--	--	--	--	--	--	--	--	ND (5)	ND (5)	0.08 J	ND (5)

Per current DERR policy, RSLs are only provided for the contaminants lacking MCLs. The November 2013 RSLs are provided as the most current. The RSLs are single-chemical standards and, if detected, will need to be updated and adjusted so that the ground water meets the cumulative risk goal.

Notes:

EPA	Environmental Protection Agency.
ND (0.01)	Not detected above the indicated detection limit.
-	No RG available.
--	Not analyzed.
ug/L	Micrograms per liter.
0.013	Exceeds MCLs

Modified from RI Report, CRA, March 2012

Table 5.1 LEACHATE CONTROL ALTERNATIVES: COMPARISON TO EVALUATION CRITERIA

Evaluation Criteria	Remedial Alternative 1: No Action	2: Off-Site Transportation and Disposal	3: Off-Site Discharge via Pipeline	4: On-Site Treatment plus Engineered Wetland and Phytoremediation/Phytodemonstration	5: On-Site Treatment Plant via Treatment Plant and Phytoremediation/Phytodemonstration
Overall protection of HH & E					
Human Health Processes	Increasing potentials over time	Will reduce human exposure to leachate except during transit Environmentally protective, except during transit	Will reduce human exposure to leachate except during transit Environmentally protective, except during transit	Will reduce human exposure to leachate by collection and treatment Will achieve environmental protectiveness in treatment prior to discharge	Will reduce human exposure to leachate by collection and treatment Will achieve environmental protectiveness in treatment prior to discharge
Environmental Processes	Increasing potentials over time				
Compliance with ARARs					
Federal discharge to creek	Does not meet ARAR	Cover and leachate collection system improvements will prevent leachate discharge to creek	Cover and leachate collection system improvements will prevent leachate discharge to creek	Treatment plus plant uptake with cover and leachate collection system and additional cover improvements will prevent leachate discharge to creek	Treatment plus plant uptake with cover and leachate collection system and additional cover improvements will prevent direct discharge
Public health protection (health impacts)	Does not meet ARAR	Public health is protected with the exception of some risk while transporting leachate	Public health is protected with the exception of limited risk along off-site pipeline	Will reduce human exposure to leachate by collection and treatment	Will reduce human exposure to leachate by collection and treatment
Time for cover remediated over years	Does not meet ARAR	Achieved through cover improvements	Achieved through cover improvements	Achieved through cover improvements	Achieved through cover improvements
Long-term effectiveness and permanence					
Magnitude of residual risk	No active treatment, risk increases over time as leachate cover is not managed	Limited risk while transporting leachate	Limited risk associated with leachate flow in off-site piping	Low	Low
Adequacy and reliability of controls	No maintenance or reliability	Significant O&M necessary to maintain transportation reliable control	Moderate O&M, reliable control	Low O&M once established, required to demonstrate compliance with NPDES and obtain a FTI, reliable control	Substantial O&M and monitoring to operate system and demonstrate compliance with NPDES permit, reliable control, energy during downtime
Reduction of mobility, mobility, or volume					
Reduction of leachate toxicity	No reduction	No on-Site reduction	No on-Site reduction	Effective reduction through physical, chemical, and biological treatment	Effective reduction through physical, chemical, and biological treatment
Reduction of leachate mobility	No reduction	Some reduction through cover improvements	Some reduction through cover improvements	Some reduction through cover improvements and plant uptake	Some reduction through cover improvements and plant uptake
Reduction of leachate volume	No reduction	Effective reduction through collection and disposal	Effective reduction through collection and disposal	Effective reduction through collection, treatment and on-Site discharge	Effective reduction through collection, treatment, and on-Site discharge
Short-term effectiveness					
Public protection during remedial actions	No remedial actions	Negligible risk to public during leachate collection system construction	Negligible risk to public during leachate collection system construction	Negligible risk to public during construction	Negligible risk to public during construction
Worker protection during remedial actions	No remedial actions	Some risk to leachate exposure during excavation of collection trench	Some risk to workers during excavation and roadside construction	Moderate risk to leachate exposure during excavation of collection trench and wetland system	Some risk to leachate exposure during excavation of collection trench
Environmental impacts	Impacts associated with lack of leachate controls	Disturbance to ground surface during leachate collection trench excavation and long-term maintenance impacts	Significant disturbance to ground surface and along public roadway during construction	Moderate disturbance to ground surface during leachate collection cavity wetland system excavation. Disturbance to cap when placing new	Disturbance to ground surface during leachate collection trench excavation and disturbance to cap when placing new

Table 5-1. LEACHATE CONTROL ALTERNATIVES: COMPARISON TO EVALUATION CRITERIA

Evaluation Criteria	Remedial Alternative				
	1. No Action	2. Off-Site Transportation and Disposal	3. Off-Site Discharge via Sewerage	4. On-Site Treatment via an Engineered Wetland and Phytoremediation/Phytotreatment	5. On-Site Treatment Plant via Treatment Plant and Phytoremediation/Phytotreatment
Implementability					
Technical feasibility	Technically feasible	Requires frequent hauling of leachate for an unknown period of time (estimated 30 years)	Requires major construction along public road and pumping of leachate for an unknown period of time (estimated 30 years)	After demonstration of performance this option requires minimal O&M and monitoring	Requires on-site plant operator for long term O&M, significant construction grading, and periodic effluent monitoring
Administrative feasibility	In violation of DSFO, RAOs, and ARARs	Easily implemented; achieves RAOs	May not be administratively feasible, requires multiple state and permits and local government approvals via numerous possible variances, achieves RAOs	Requires compliance with permits; achieves RAOs	Requires compliance with permits; achieves RAOs
Availability of services and materials	Not applicable	Readily available	Readily available	Readily available	Requires the ordering of specialized equipment, but availability is acceptable
Cost	$0	$22,373,000	$3,294,000	$1,773,000	$8,208,000
Sustainability	Not sustainable	Long term emissions produced as a result of hauling, consumes WWTF capacity, low sustainability	Some energy usage to power the pump, consumes WWTF capacity, moderately sustainable	Green technologies, sustainable	Long term energy usage to power the treatment works, disposal of carbon and sludge, but moderately sustainable

Notes:

DSFO - 2010 Director's Final Findings and Order.

ARAR - Applicable or relevant and appropriate requirements.

HH & E - Human health and the environment.

NPDES - National Pollutant Discharge Elimination System.

O&M - Operations and Maintenance.

RAO - Remedial Action Objective.

WWTF - Waste Water Treatment Plant.

FIGURES

FIGURE 1: SITE LOCATION MAP

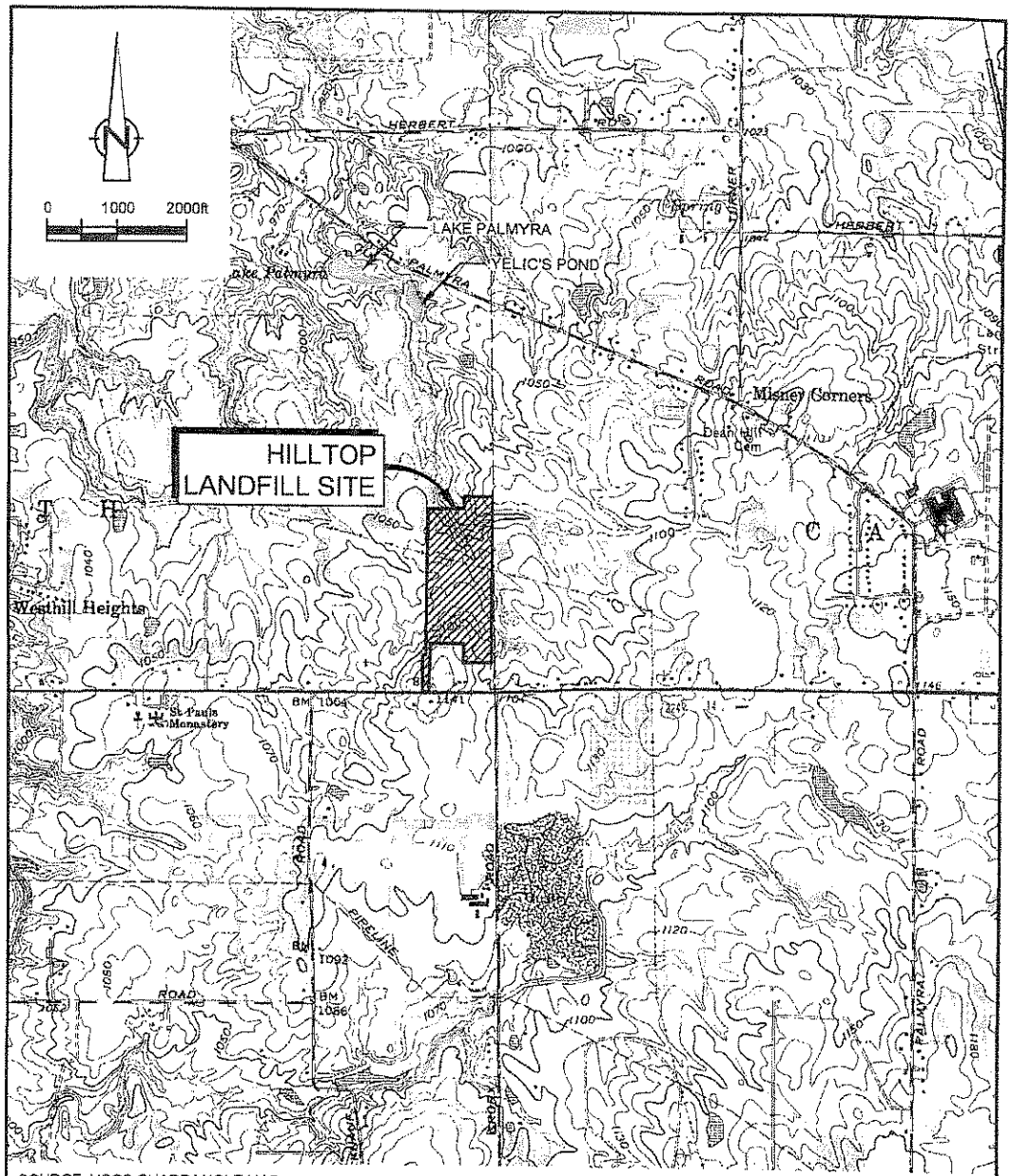

FIGURE COURTESY OF CRA

FIGURE 2: SITE FEATURES MAP

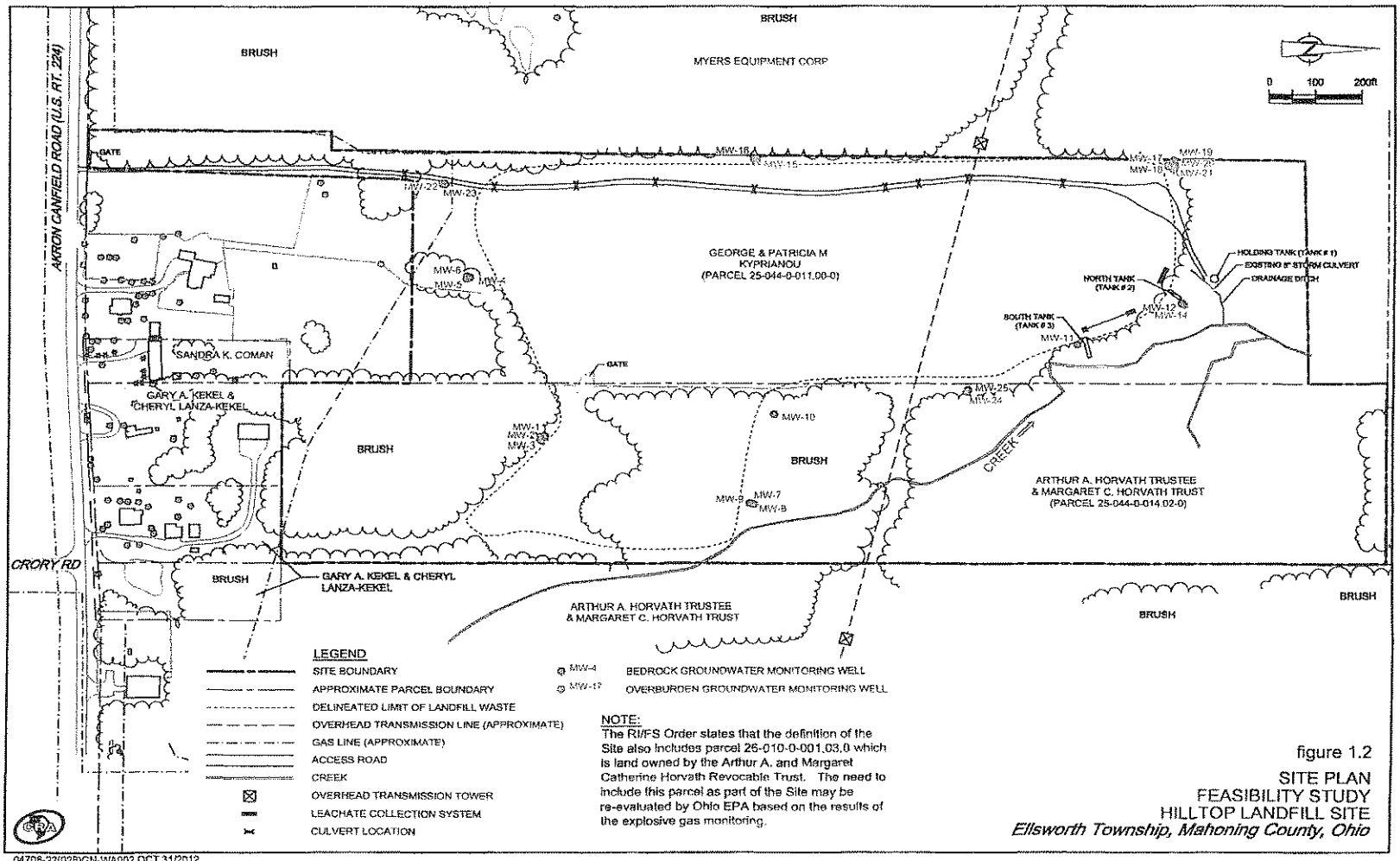

FIGURE COURTESY OF CRA

FIGURE 3: LANDFILL COVER IMPROVEMENT AREAS

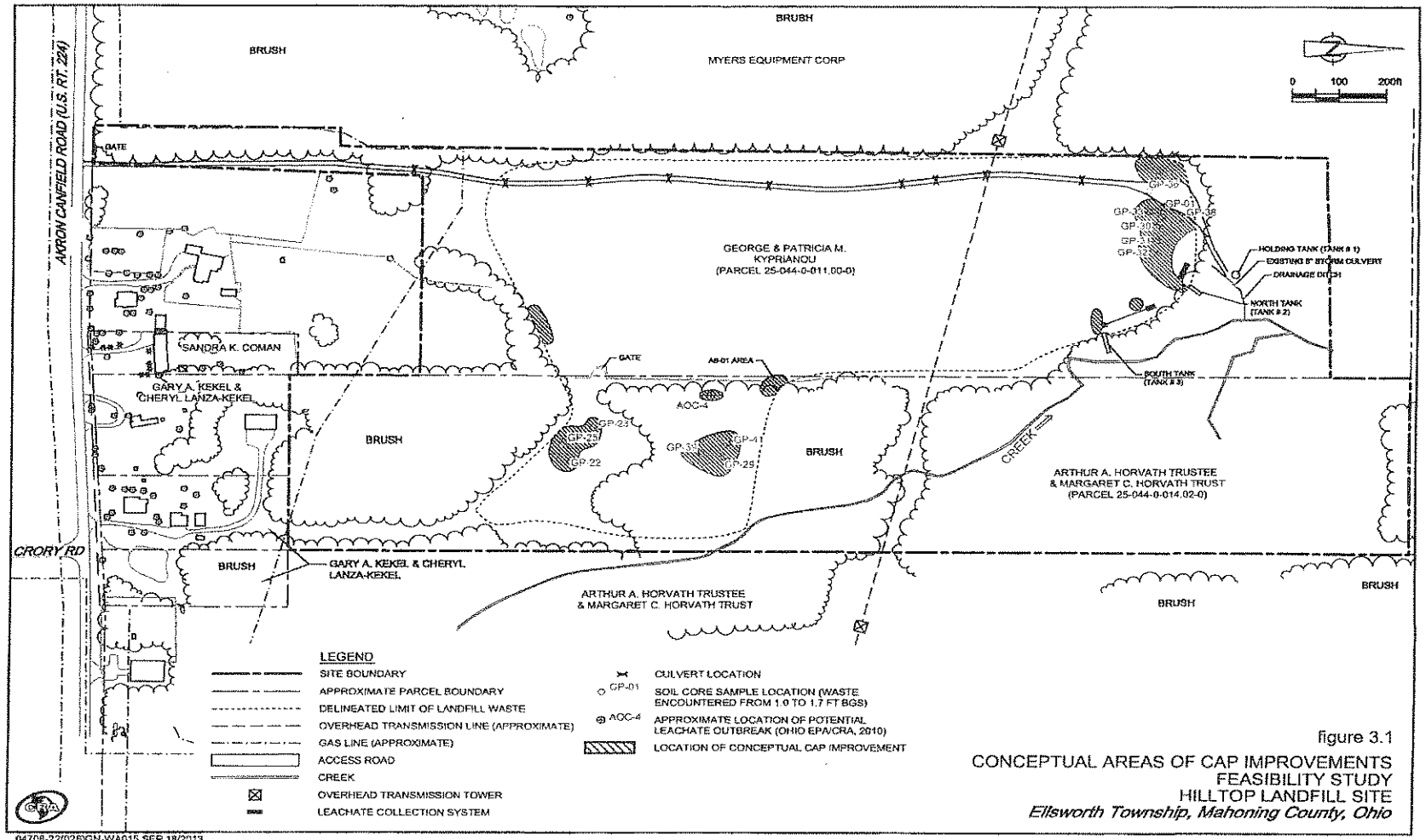

FIGURE COURTESY OF CRA

NOTE: SEEP AREAS (PRIMARILY) WEST OF THE ACCESS ROAD THAT NEED TO BE ADDRESSED ARE NOT SHOWN IN THE FIGURE.

HILLTOP DECISION DOCUMENT
APPENDICES

Appendix A: Glossary of Terms

Administrative Record: All documents that Ohio EPA considered or relied on in selecting a remedial action for a site.
Aquifer: An underground geological formation capable of holding and yielding water. Aquifers may be present in the unconsolidated material and/or in bedrock.
Applicable or Relevant and Appropriate Requirements (ARARs): Those statutes and rules that 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 in the absence of any remedial action, which also determines the extent of cleanup needed to reduce potential risk levels to within acceptable ranges.
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 that 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 ORC Section 5301.82.
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 can be selected.
Final Cleanup Levels: Final cleanup levels identified in the Decision Document along with the RAOs and performance standards.
Ground Water: Water found below the surface of the land, usually in porous rock formations, which supplies wells and springs.
Hazardous Substance: A chemical that may cause harm to humans or the environment.
Hazardous Waste: A waste product listed or defined by RCRA that may cause harm to humans or the environment.
Human Receptor: A person/population exposed to chemicals released at a site.
Leachate: Water that collects contaminants as it migrates through wastes, pesticides or fertilizers. Leaching may occur in farming areas and landfills, and may result in hazardous substances entering surface water, ground water, soil or sediment.

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.
Monitoring Well: A well installed to collect ground water samples for the purpose of physical, chemical, or biological analyses to determine the amounts, types, and distribution of contaminants in ground water beneath a site.
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.
Operation and maintenance (O&M): 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.
Performance Standard: Measures by which Ohio EPA determines if RAOs are being 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 RGs at this point in time). They are also used during the analysis of remedial alternatives in the RI/FS.
Present Worth Cost: Estimated current cost, or value, of the future remedial costs to be expended, typically discounted at the current market rate. Provides a solid basis for comparing costs of each of the remedial alternatives.
Project Action Level: A concentration for a COC 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).
Remedial Action Objectives: Specific remedial goals 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 the comments.
Sediment: Topsoil, sand and minerals washed from the land into water, usually after rain or snow melt.
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 OAC Chapter 3745-1.

Appendix B: Primary Contaminants of Concern

A total of 7 primary contaminants of concern (COCs) have been identified that currently pose risk above acceptable levels to human health and the environment at this Site. Additional details on each primary COC (from the Agency for Toxic Substances and Disease Registry (ATSDR Toxicological Profiles) are provided below.

Ammonia

Ammonia occurs naturally in the environment but is also produced by human activity. Exposure to high levels of ammonia can cause irritation and serious burns on the skin and in the mouth, throat, lungs, and eyes. At very high levels, ammonia can even cause death. No health effects have been found in humans exposed to typical environmental concentrations of ammonia. Exposure to high levels of ammonia in air may be irritating to your skin, eyes, throat, and lungs and cause coughing and burns. Lung damage and death may occur after exposure to very high concentrations of ammonia. Some people with asthma may be more sensitive to breathing ammonia than others. There is no evidence that ammonia causes cancer.

Benzene

Benzene is a widely used chemical formed from both natural processes and human activities; for example, it is a natural part of crude oil and gasoline. It evaporates quickly, dissolves lightly in water, and is highly flammable. It is within the top 20 chemicals for production volume in the U.S. It is used to help make plastics, resins, nylon, rubber, lubricants, dyes, detergents, drugs and pesticides. While high levels can cause drowsiness, dizziness, headaches, tremors, and unconsciousness, breathing extremely high levels can result in death. Ingestion of high levels can cause vomiting, dizziness, convulsions, rapid heart rate and death. The major effect of benzene from long term exposure is on the blood. It causes harmful effects on bone marrow, and can cause a decrease in red blood cells leading to anemia and immune system issues. Benzene is a known human carcinogen.

4,4'-DDE

4,4-DDE (dichlorodiphenyldichloroethylene) is a pesticide similar to DDT (dichlorodiphenyltrichloroethane). DDE has no commercial use but occurs as a contaminant in commercial DDT preparations. DDT is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. It was banned in the U.S. in 1972 because of damage to wildlife, but is still used in some countries. Studies have shown that women with high amounts of DDE in breast milk have an increased chance of having premature babies. Studies in rats have shown that DDT and DDE can mimic the action of natural hormones and in this way affect the development of the reproductive and nervous systems. DDE is a probable human carcinogen.

Ethylbenzene

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is naturally found in coal tar and petroleum and is also found in manufactured products such as ink, pesticides and paints. It is used primarily to make another chemical, styrene, though it is also used as a solvent and in fuels. Exposure to high levels in air for short periods of time can cause eye and throat irritation, while higher levels of exposure can cause dizziness. Irreversible damage to the inner ear and hearing has been observed in animals exposed to relatively low levels for several days to weeks, while similar exposure for several months or years has caused kidney damage in animals. The International Agency for Research on Cancer has determined that ethylbenzene is a possible human carcinogen.

Isopropylbenzene (Cumene)

Isopropylbenzene (Cumene) is a compound found in petroleum hydrocarbons. Petroleum hydrocarbons are complex mixtures of chemicals that originally come from crude oil. There is limited toxicological information on the specific effects of Isopropylbenzene but inhalation exposure is known to have neurological and respiratory irritant effects. It has not been classified as to carcinogenicity.

Vinyl Chloride

Vinyl chloride is a colorless gas that burns easily and is not stable at high temperatures. It is a manufactured substance that does not occur naturally. It can be formed when other substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC), which is used to make a variety of plastic products including pipes, wire and cable coatings, and packaging materials. Breathing very high levels can cause unconsciousness, while extremely high levels can cause death. Studies in workers who have breathed vinyl chloride over many years showed an increased risk of liver, brain and lung cancer, and some cancers of the blood. The U.S. Department of Health and Human Services has determined that vinyl chloride is a known human carcinogen.

Xylene

Xylene is a colorless, sweet-smelling liquid that is readily flammable. It occurs naturally in petroleum and coal tar. Chemical industries produce xylene from petroleum. Xylene is one of the top 30 chemicals produced in the U.S. by volume. It is used as a solvent and in the printing, rubber and leather industries. It is also used as a cleaning agent, as paint thinner, and in paints and varnishes. High levels of exposure for short or long periods of time can cause headaches, lack of muscle coordination, dizziness, confusion, and loss of balance. Exposure to high levels for short periods of time can cause irritation of the skin, eyes, nose and throat, breathing difficulties and lung problems, delayed reaction time, memory difficulties, and at very high levels, even death. U.S. EPA has found that there is insufficient information to determine whether xylene is carcinogenic.

APPENDIX C
PUBLIC COMMENTS ON THE PREFERRED PLAN

May 21, 2014

Ms. Sheila Abraham
Project Coordinator/Risk Management Specialist
Ohio Environmental Protection Agency
Division of Environmental Response and Revitalization
Northeast District Office
2110 East Aurora Road
Twinsburg, OH 44087-1969

Re: Hilltop Landfill Site
Ellsworth Township, Mahoning County, Ohio
Comments on Ohio EPA April 14, 2014 Preferred Plan and Path Forward

Dear Ms. Abraham:

Browning-Ferris Industries of Ohio, Inc. (BFI) and our consultant, Conestoga-Rovers & Associates, Inc. (CRA), have reviewed the April 14, 2014 Preferred Plan for the Hilltop Landfill (Site). The Preferred Plan is based on the RI/FS work completed by BFI under the 2010 Orders, previous site investigations, and previous and on-going actions implemented by General Motors and General Electric under the 1990 Orders. It presents Ohio EPA's recommendations for completing the remaining remedial measures at the Site. The Ohio EPA is seeking comments on the Preferred Plan for consideration in developing the Decision Document which will detail the selected remedial measures. This letter provides BFI's general comments on the Preferred Plan and on the path forward.

Preferred Plan

BFI agrees with Ohio EPA's preferred alternative for completing the remediation. Our only significant comment regarding the preferred alternative is that the FS discussed it may be feasible to use the trees/vegetation of the phytocap in an engineered system to assist in the leachate treatment or to consume leachate. BFI has successfully implemented such systems at other landfills and can provide basic information to Ohio EPA on this technology. Language needs to be added to the Decision Document to allow flexibility to evaluate this possibility during the Remedial Design, along with the noted engineered wetlands.

BFI believes some of the background information on Site conditions may be misunderstood by the public that conditions are worse than actual conditions. We ask that Ohio EPA consider the following examples and information in preparing its presentation for the public meeting and in future documents:

- Ohio EPA's use of "numerous" to describe the number of leachate seeps/outbreaks entering the northern area of the unnamed creek or emanating from the landfill cap appears to overstate conditions. We believe the number of seeps has been relatively small, most of the seeps have been intermittent, and some were observed only during a period of record rainfall in 2011 and have not been observed historically. BFI also believes there are very few locations (perhaps only one) where seeps with demonstrated leachate constituents exist actually entering the creek. The

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flow at the one previously sampled seep is very slow and may be considered de minimis with respect to environmental harm. Although leachate seeps have occurred at other areas of the Site over the past 20+ years, most have been have been addressed promptly and effectively by the various Order respondents. It also should be noted that some of the areas assumed to represent leachate seeps due to rust-colored staining may actually be due to the effects of historic coal mining at the Site.

- Ohio EPA identifies in tables many chemicals as Contaminants of Concern (COCs) that have only a few estimated (J-value) detections and/or concentrations below risk levels. This may give the public the impression that conditions are worse than the data and risk assessment show. It is our experience that COCs should be those chemicals detected above standards, not all chemicals detected. It should be remembered that some of the detection limits used for analyses were very low.
- There is also some inconsistency and confusion in Ohio EPA's listing of contaminants of concern (COCs). The public notice lists SVOCs and ammonia but the Executive Summary does not. The text lists VOCs and pesticides as COCs. We believe pesticides are not significant at the Site. 4,4-DDE is the only pesticide listed in Table 3.3.1 with a result above a risk value, the concentration was a very low, estimated J-value, and may have been false positives. It should also be clarified that there are limited VOCs present in Site media. The only VOC listed in Table 3.1.2 with a result for groundwater above risk levels is vinyl chloride. The RI has shown vinyl chloride is limited to a very small area of the site, has not migrated, and there are no current or expected future exposures to impacted groundwater. Ammonia has not been detected above protective levels in samples from the creek with the exception of one sample from 2002.
- BFI also suggests Ohio EPA's discussion of COCs should focus on current conditions. For example, since 1992, the quality of leachate has been monitored periodically. Organic concentrations in the leachate have substantially decreased over time, including a greater than 85% reduction in total volatile organic compound (VOC) levels and greater than 90% reduction in total semi-volatile organic compound (SVOC) levels. Based on BFI's and CRA's experience with other landfills in Ohio, the Site leachate is relatively dilute.
- Additional examples in the text where Ohio EPA uses descriptive words that may overstate the condition of the Site include "numerous problems with the landfill" (p. 3), "strong horizontal gradient" (p. 4), and "persistent leachate outbreak" (p. 8).

The RI/FS has demonstrated that current conditions at the Site pose limited to no risk to human health or the environment. The primary focus for the remaining remedial measures is to address the small leachate seeps at the north end of the Site that may discharge into the creek. This focus is not due to a demonstrated risk to the creek but is based more on Ohio EPA policy against such discharges without a permit. In fact, the ecological risk assessment work and healthy flora and fauna in the stream documented by Ohio EPA have demonstrated that minor leachate seeps have not caused an adverse effect. The habitat is actually thriving in the area as noted by the Ohio EPA throughout the RI/FS process and in the Preferred Plan.

Path Forward

Once the Preferred Plan is finalized and the Decision Document is issued, BFI understands the Ohio EPA will seek to negotiate a Remedial Design/Remedial Action (RD/RA) Order. The remaining remedial measures should be implemented in a phased approach. Most importantly, BFI's experience at multiple landfills in Ohio and across the U.S. indicates the landfill cover improvements should be completed as a first phase. This phase will include improving the landfill cover, grading, and surface water run-on/run-

off. It may include vegetation improvements and a phytocap to consume water and reduce infiltration into the landfill. A pilot study and/or monitoring program may be completed as part of a pre-design to gather additional data for design of the expanded leachate collection system and anticipated engineered wetland.

Time should be allowed after completing the first phase to monitor the effects because the improvements should significantly reduce leachate generation, possibly even to the point of eliminating the seeps. Monitoring the first phase may also identify additional design considerations, modifications, or solutions that could improve the overall condition of the Site. This will provide for a focused and practical design for leachate collection system enhancements as the second major phase of the work. BFI's experience indicates some landfills have over-designed leachate collection systems that recover more groundwater than leachate, even inducing subsurface flow from adjacent streams/creeks. This can lead to handling of excessive volumes of water/leachate and could lead to impairing the stream by reducing its base flow.

Regarding the RD/RA Order, as the agency is aware; BFI never owned or operated the landfill but agreed to complete the RI/FS. Other PRPs for the site should be named on the RD/RA Order, just as they have been in the past. We expect to work together with Ohio EPA and other named PRPs to assure work is completed.

In summary, BFI is in agreement with the Ohio EPA's Preferred Plan for the Site. BFI believes that the remedy can be a benchmark for a relatively passive, sustainable, and environmentally conscious solution.

Please contact me with any questions.

Sincerely,

Joseph Montello

Joseph Montello
Hydrogeology Manager, BFIO/Republic Services, Inc.

cc: Mike Eberle, Ohio EPA
Mary Helen Smith and Dave Fetchko, Mahoning County Board of Health
Steve Meier, GE
Ryan Shepherd and Terry Gayman, CRA
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June 6, 2014

Ms. Sheila Abraham
Project Coordinator
Ohio Environmental Protection Agency
Division of Environmental Response and Revitalization
Northeast District Office
2110 East Aurora Road
Twinsburg, OH 44087-1969

Re: Comments on OEPA Preferred Plan, dated April 14, 2014
Hilltop Landfill Site - Ellsworth Township, Mahoning County, Ohio

Dear Ms. Abraham:

The General Electric Company ("GE"), and its environmental consultant, Tetra Tech, have reviewed the Ohio Environmental Protection Agency's (OEPA's) *Preferred Plan For The Remediation Of The Hilltop Landfill Site, Ohio Environmental Protection Agency, April 14, 2014* (Preferred Plan). This letter provides GE's comments on the selected remedy. The comments are focused on landfill cap improvements and leachate management and highlight GE's concerns related to next steps for remedial design and implementation of the selected remedy. This letter also discusses GE's limited nexus to the Hilltop Landfill Site.

Preferred Plan

It is GE's understanding that the Preferred Plan is based on the Remedial Investigation/Feasibility Study ("RI/FS") work completed by Browning Ferris Industries (BFI) under the Director's Final Findings and Orders with Ohio EPA, dated April 15, 2010 (hereinafter, "2010 Orders"), and the preliminary remedial design work completed by General Motors Company in 2007. The OEPA's selected remedial alternative includes:

- Landfill cover: cover improvements, improved signage and fencing along the perimeter of the Site, long-term cover maintenance plan, and restrictions on cover disturbances;
- Leachate: seep packing, cover improvements, expansion of the leachate collection system, on-site treatment of leachate through an engineered wetlands system, supplemented by a phytocap, with the goal of permitted discharge to the unnamed creek;
- Ground water: monitoring and restrictions on ground water use; and
- Soil gas: restrictions on future occupied structures on the landfill unless they meet acceptable levels of risk.

GE's Concerns with Preferred Plan

GE is in general agreement with OEPA's expectations for the selected remedial alternatives noted in the Preferred Plan. GE's most significant concerns relate to the focus of the selected remedial alternatives on expanded leachate collection and treatment rather than on reducing (or possibly eliminating) the volume of leachate and the leachate seeps through landfill cover improvements. Additionally, GE notes the lack of data required to determine if and when the leachate will meet the chemical-specific water quality criteria ("WQC") so that it can be discharged to the creek. GE is also concerned with the significant leachate disposal costs that will be incurred until WQC are met and leachate may be discharged. Other than continuing with off-site leachate disposal, GE notes the apparent absence of any contingency plan in the selected remedy in the event that the engineered wetlands are not successful in treating leachate to the WQC.

Improving Landfill Cover & Reducing Leachate Volumes

First and foremost, GE believes that the remedy should focus on reducing rainwater infiltration through the landfill that is apparently producing leachate and resulting in leachate seeps on the landfill's surface. By reducing rainwater infiltration through landfill cap improvements, the amount of leachate in the landfill and the resultant seeps may be reduced. Furthermore, cap improvements will reduce the need for leachate management and the volume of leachate requiring treatment in the proposed engineered wetlands.

By way of background, over 900 gallons of leachate is currently being collected daily from the leachate collection trench system (comprised of 60 feet of combined trench) located on the down-gradient edge of the Hilltop Landfill Site. The leachate is temporarily stored on-site and periodically transported off-site to the City of Alliance, Ohio wastewater treatment facility at a significant cost. Seep areas are also routinely inspected and packed with low permeability soils to reduce their occurrence. GE is responsible for interim leachate management and seep packing pursuant to an Ohio EPA Director's Final Findings and Orders, dated September 7, 1990 (hereinafter, "1990 Orders").

The selected alternative under the Preferred Plan proposes to reduce the occurrence of leachate seeps partly by increasing the collection trench's length to 700 linear feet (a 12 fold expansion) followed by on-site leachate treatment at an engineered wetlands. Based on the current rate of leachate generation, this expansion would result in the collection of approximately 11,000 gallons of leachate per day or 4-5 million gallons per year (Feasibility Study Report, CRA, 2013).

Additionally, GE notes there are no leachate monitoring wells within the landfill itself to assess leachate levels within the Landfill materials. The shallowest depth to groundwater in monitor wells surrounding the landfill is approximately 8 feet below ground surface (i.e., MW-8, RI Report, Oct 25, 2010). The existing interim leachate collection trenches are approximately two feet deep. The draft 2007 design document (CRA, 2007) shows a depth of 2-4 feet for the proposed collection trench. Based on this limited data, it would appear that the existing (and proposed) leachate collection trench is collecting perched water infiltrating through the soil cover. Figure 3.3 of the RI report compares leachate generation to precipitation and indicates that leachate generation is typically higher during spring wet weather conditions and lower during late summer or early fall dry weather conditions. Thus, there appears to be a relationship between precipitation and leachate levels suggesting that leachate may be due in part to infiltration from perched water.

To fully understand the reason for the large volume of leachate currently being produced and to properly evaluate the need for, and design of a leachate collection trench, GE recommends monitoring leachate head levels from observation wells constructed within the landfill, evaluating groundwater levels beneath and around the landfill, and assessing the current cap conditions (permeability and surface conditions). This information will support the proper design of a leachate management system.

Moreover, the remedial action objective (RAO) for leachate is to prevent exposures to leachate breakouts or leachate seeps on or emanating from the landfill. GE believes this RAO could be substantially, if not fully, met by improvements in the landfill cover that are likely to significantly reduce the infiltration of perched water. GE suggests testing the permeability of the current landfill cover to determine exactly where cover and surface drainage improvements are necessary. After cover improvements have been implemented, a performance evaluation could be conducted over the course of a year to establish if the RAOs for leachate seeps have been met. If so, routine inspections as part of an O&M program could be conducted going forward to confirm that the RAOs are continuing to be met.

Discharge of Leachate to Surface Water in Compliance with WQC

While the selected remedial alternative for leachate management calls for leachate to ultimately be discharged to the creek after treatment in the engineered wetlands, GE notes that the engineered wetlands will take time to construct and effectively treat leachate. In fact, at the public meeting on May 29, 2014, Ohio EPA estimated that it could take up to a year after construction for the engineered wetlands to be able to effectively treat leachate in a manner that would comply with the chemical-specific WQC and allow discharge to surface water.

Historic leachate quality data is limited to leachate collected from the current 60-foot long collection trench. Given the selected remedy's focus on treatment of leachate via the engineered wetlands in order to ensure compliance with chemical-specific WQC and allow ultimate discharge to surface water, GE is concerned that this data may not be representative of the leachate quality that may be collected from the proposed 700-foot long collection trench. As part of remedial design, GE recommends that further analysis of leachate be conducted along the proposed leachate collection trench alignment to determine if and when leachate will meet chemical-specific WQC after treatment via the engineered wetlands.

Potential for Significant Offsite Leachate Disposal Costs

The Preferred Plan does not describe how leachate will be managed during the time period that the engineered wetlands is still being established and the leachate does not yet meet chemical-specific WQC. If Ohio EPA anticipates that leachate will be disposed of offsite during this interim period, these costs could be significant, but were not included in the Preferred Plan. Based on the projected leachate volume of 4-5 million gallons per year, GE estimates that the expansion of the leachate collection system would result in $1.5-2M per year in leachate collection, loading, hauling and offsite disposal costs during the time period that leachate does not yet meet chemical-specific WQC and cannot be discharged to the creek.

Lastly, given the significant costs associated with offsite disposal of the leachate, GE strongly recommends the Ohio EPA consider pilot testing the proposed leachate collection and treatment system or developing a contingency plan other than offsite disposal if the engineered wetlands has not meet performance standards within a certain time period. Additionally, a focused FS may be needed to evaluate contingency options.

Next Steps & GE Nexus

As mentioned previously, GE is currently responsible for conducting interim action activities to ensure proper management of the landfill's leachate pursuant to the 1990 Orders. As a result of GM's bankruptcy in 2009, GE has unilaterally performed these obligations for the past several years. Despite little to no nexus information related to GE's waste disposal activities at the Site, GE has spent well over $2M implementing these interim activities. With this in mind, GE strongly contends that Ohio EPA should pursue potentially responsible parties other than GE for the design and implementation of the final remedy at the Hilltop Landfill Site.

GE has been performing under the 1990 Orders despite a discernable lack of nexus information related to GE's waste disposal activities at the Hilltop Landfill Site. While there is evidence that GE explored the possibility of disposing certain materials at the Hilltop Landfill, there is no documentation indicating that GE actually sent any hazardous waste to the Hilltop Landfill Site. See Ohio EPA's letter, dated December 17, 2008, enclosed for your reference. Moreover, GE's January 26, 2009 letter to Ohio EPA provides waste characterization data to document that the calcium fluoride waste generated at GE's Niles plant and considered for disposal at the Hilltop Landfill Site was RCRA non-hazardous waste. A copy of this letter is enclosed for your reference. Thus, even if GE's waste was disposed of at the Hilltop Landfill, the waste was not a hazardous waste.

Given the uncertainties discussed above regarding expanded leachate collection and treatment via the engineered wetlands, GE believes that the Remedial Design/Remedial Action ("RD/RA") Orders should cover leachate management from Day 1. The final RD/RA Orders should terminate the 1990 Orders and incorporate any further interim leachate management activities during design, construction and start-up of the final remedy. This will incentivize a more efficient remedy design and implementation process.

Lastly, based on GE's interim leachate management efforts under the 1990 Orders despite its lack of nexus to the Hilltop Landfill Site, GE strongly contends that BFI and other potentially responsible parties should be responsible for the final remedy under the RD/RA Orders. Moreover, the proposed remedy was developed by BFI during the RI/FS process. BFI, and its parent, Republic Services, Inc., are clearly experts on landfill remediation projects. They are well suited to design and implement the engineered wetlands and phytoremediation project for the Hilltop Landfill Site that they advanced before Ohio EPA during the RI/FS process.

* * *

In summary, GE has concerns regarding the selected remedial alternative for landfill cap improvements and leachate management under Ohio EPA's Preferred Plan. GE believes that further analysis may be required to understand landfill cap conditions, expected leachate volumes and if and when the leachate will meet chemical-specific WQC and be capable of discharge to the creek. GE also contends that Ohio EPA should consider a contingency plan other than offsite leachate disposal in the event that leachate does not meet WQC. Moreover, GE believes that the new RD/RA Orders should terminate the 1990 Orders and incorporate any interim leachate management obligations during remedial design, construction and implementation.

Please contact me with any questions.

Sincerely,

Steven R. Meier
Senior Project Manager

cc: Colin Bennett, Ohio EPA
Mike Eberle, Ohio EPA
Mary Helen Smith, Mahoning County Board of Health
Dave Fetchko, Mahoning County Board of Health
Jennifer Shea, GE
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June 6, 2014

Ms. Sheila Abraham
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210 East Aurora Road
Twinsburg, Ohio 44087-1969

RE: Preferred Plan for the Remediation of the Hilltop Landfill Site
Ellsworth Township, Mahoning County, Ohio
Remedial Response Plan Public Hearing Comments

Dear Ms. Abraham:

The Mahoning County District Board of Health has reviewed the Ohio Environmental Protection agency's document titled, "Preferred Plan for the Remediation of the Hilltop landfill Site" located in Ellsworth Township, Mahoning County, Ohio. This letter serves as public record of our comments and concerns about the proposed remediation proposal and the presentation made at the public meeting held on May 29, 2014. As proposed, all plans are required to align with current regulatory standards. Our comments focus on the phyto-remediation concepts proposed in preferred alternative #4 for leachate management and compliance with the phyto-remediation in comparison to current regulatory requirements, and the long term monitoring of the subsurface wetlands and leachate generation.

Preferred Plan Alternative Four (#4) Leachate Management with Phyto-Remediation

The Preferred Plan Table 4: Summary of Site Remedial Alternatives Part L4, indicates that the preferred leachate management option is, "abandonment of the current leachate collection system; expanded leachate collection system supplements by a phytocap; on-site treatment via an engineered wetland, the goal of a permitted discharge to the creek". The phytocap proposes planting poplar and other trees to absorb water (rain and snow melt) to reduce the amount of leachate entering the engineered sub-surface wetlands.

Board of Health Concern with the Proposed Phyto-Remediation

The Board of Health does not believe that the phytocap proposal aligns with current solid waste regulatory requirements or best available technology for landfill closure activities and cap construction and maintenance. Please see Ohio Administrative Code (OAC)

3745-27-14 concerning post closure care. Phyto-remediation will compromise the integrity and effectiveness of the cap system as required under 14(A)(2). We believe that trees, and in particular fast growing, short-lived popular trees, will comprise the integrity of the 76 cap (two foot of soil cover) by damaging the soil, creating voids, and impacting the cover integrity.

Leachate Generation and Long-term Sampling

The preferred plan proposes expanding the leachate collection trench and the addition of a subsurface wetlands which will increase the leachate generation during construction (at a minimum one-year). It is noted that OEPA anticipates a minimum of one-year of sampling before having documentation sufficient to determine whether the new system is effective according the presentation made at the public meeting on May 29, 2014. Therefore, the initial cost appears to increase for a two year period pending the successful treatment by the subsurface wetlands.

Board of Health Concern with Long-term Leachate Management

The Board of Health believes that this is not a viable long-term plan for leachate management. The first year of construction will automatically increase leachate generation and cost. Subsequently, if the engineered wetland does not work, the long-term off-site treatment could be cost prohibitive. We recommend that the initial expenditure focus on enhancing and revising the cap system to minimize surface water (rain and snow melt) infiltration and reduce leachate production.

Should you have any questions or concern about these comments, please feel free to contact me or David Fetchko, RS, at the letter head address or by phone at ext. 134 or 135 respectively.

Respectfully,

Mary Helen Smith, MPH, CPH, RS, REHS
Director of environmental health

Cc: File
Ellsworth Township Trustees