Proposed Plan - North Sanitary Landfill (Valleycrest) Site
Dayton, Ohio
Montgomery County
July 2012

United States Environmental Protection Agency
Region 5

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List of Acronyms

AOC	Area of Contamination
ARARs	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
FS	Feasibility Study
GCL	Geosynthetic clay liner
LFG	Landfill gas
Mg/kg	Milligrams per kilogram
Mg/l	Milligrams per liter
NCP	National Contingency Plan
ND	Not Detected
NPV	Net Present Value
ODH	Ohio Department of Health
Ohio EPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
PCB	Polychlorinated Biphenyl
PPB	Parts per Billion
PPM	Parts per Million
PRP	Potentially Responsible Party
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances and Control Act
Ug/l	Microgram per liter
VOC	Volatile Organic Compound

North Sanitary Landfill Site Proposed Plan
Dayton Ohio

A. Introduction

The North Sanitary Landfill Site (Site) is located in the City of Dayton, in Montgomery County, Ohio. Aliases for this Site include Valleycrest Landfill and North Dayton Sanitary Landfill.

Pursuant to Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the U. S. Environmental Protection Agency (EPA), the lead Agency for Site activities, together with the Ohio Environmental Protection Agency (Ohio EPA), the support Agency, hereby issues this proposed plan for public comment. The public comment period runs for 30 days from the date of issuance of this proposed plan, or from August 1, 2012 to August 30, 2012. EPA and Ohio EPA will be holding a public meeting on August 16, 2012.

This proposed plan identifies the preferred alternative for cleaning up the contamination at the Site. This document also provides EPA's rationale for this preference, including a brief discussion of other cleanup alternatives EPA evaluated at the Site.

The proposed plan summarizes Site-specific information such as Site characteristics and the nature and extent of contamination that can be found in greater detail in the Remedial Investigation (RI) Report, the Feasibility Study (FS) Report, the FS Addendum, and other documents contained in the administrative record file for this Site.

EPA relies on public input to ensure that the concerns of the community are considered in selecting the remedy at Superfund Sites. EPA encourages members of the public to review and comment on all of the alternatives presented in this Proposed Plan. EPA also encourages the public to review the documents in the administrative record to gain a more comprehensive understanding of the Site.

After EPA, in consultation with Ohio EPA, reviews and considers information that the public provides during the comment period, including the public meeting, EPA will select a final cleanup plan for the Site. The final cleanup plan, which will be announced in local newspaper notices and presented in an EPA document called the Record of Decision (ROD), may differ from this proposed plan depending on information or comments that EPA receives during the public comment period.

Supporting documents for the Site can be found online at www.epa.gov/region5/cleanup/valleycrest/index.html, or at the following two physical locations:

Ohio Environmental Protection Agency
Southwest District Office
401 E. 5th St.
Dayton, Ohio 45402-2911
937-285-6357
Hours of operation 8:00 to 5:00 EST (Monday-Friday)

United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
7th Floor Record Center
Chicago, Illinois 60604

The three primary supporting documents for this Proposed Plan are: (1) the RI Report, which incorporates a human health and ecological risk assessment completed pursuant to the Risk Assessment Guidance for Superfund (RAGS), (2) the FS Report, and (3) the FS Addendum. The risk assessments studied the potential for impacts to human health and the environment caused by contamination at the Site. The FS and FS Addendum Reports identified, evaluated, and compared different cleanup alternatives to address the potential impacts.

Pursuant to a January 31, 1995 Director's Final Findings & Order issued by Ohio EPA, a PRP group conducted the RI and FS. The RI was conducted from 1995 to 2006 and the RI Report was approved by the Ohio EPA in June 2008. Ohio EPA approved the FS Report in April 2011. EPA issued an FS Addendum Report in July 2012, providing additional clarification on compliance with ARARs.

B. Site Background

The Site is located to the northeast of the City of Dayton, in Montgomery County, Ohio, and is shown on Figure 1.1 and Figure 1.2. The Site is located in a mixed urban, commercial, industrial, and residential area and the Site is bordered on the east, northeast, and north by residential properties.

Further to the north is a former foundry landfill that is currently a construction yard. The Site is bordered on the southeast by commercial and residential properties and Valley Pike; and on the southwest by a railroad right-of-way that contains a buried oil pipeline and then residences beyond. To the west, the Site is bordered by Brandt Pike, several industrial facilities and a single residence (formerly a dry cleaning facility).

The Great Miami River is located approximately 3,500 feet northwest of the Site and the Mad River is located approximately 4,000 feet south of the Site. The City of Dayton provides water to over 400,000 people from production wells in two well fields located along these rivers.

Approximately 410 people live within 0.25 miles of the Site. The Site is located on a relatively flat parcel of land that has experienced considerable excavation, grading, and filling associated with historical gravel mining and landfilling operations. The surface topography of the Site is variable, but in broad description, is bowl-shaped.

The Site was operated as a sand and gravel quarry between approximately late 1935 and the 1970s. Industrial and municipal waste was deposited in the eastern section and the eastern portion of the western part of the Site from about 1966 to 1975. Foundry sand and fly ash was largely deposited in the disposal areas located in the extreme west of the Site from 1977 to 1989. The Site is zoned industrial but is currently inactive. The Site is located in an area of mixed urban, commercial, industrial, and residential development. The current zoning for the off-Site area affected by past Site operations is commercial/residential. The nearest residential property is located adjacent to the northeast boundary of the Site.

The eastern two-thirds of the Site (referred to as the Eastern Two Thirds or Area of Contamination #1, (AOC #1)), including Disposal Areas 1, 2, and 5, received mixed household refuse/municipal and industrial wastes.

The western third of the Site (referred to as the Western Third or AOC #2), including Disposal Areas 3 and 4, received foundry sand, fly ash, baghouse dust, industrial waste, and plaster casting cores.

Figure 1.3 shows the disposal areas and the waste boundary delineation information generated during the RI. Each of the disposal areas is described in more detail below.

Disposal Area 1

Landfilling in Disposal Area 1 reportedly commenced in approximately 1966 and progressed from southeast to northwest until approximately 1973. Mixed household refuse/municipal and industrial wastes were reportedly disposed in Disposal Area 1, in the excavation that remained from previous sand and gravel quarrying. The presence of these types of waste was confirmed during the RI as well as cover material, ranging in thickness from 0 to 0.75 foot.

Disposal Areas 2 and 5

Landfilling in Disposal Areas 2 and 5 reportedly commenced in 1970 and continued until approximately 1975. Mixed household refuse/municipal and industrial wastes were reportedly disposed in Disposal Areas 2 and 5. The presence of these types of waste ,and the presence of cover material ranging in thickness from 0 to 4 feet, were confirmed during the RI

Disposal Areas 3 and 4

Landfilling in Disposal Areas 3 and 4 reportedly commenced in the early 1970s and continued until 1991. Foundry sand, fly ash, baghouse dust, and plaster casting cores were reportedly disposed in Disposal Areas 3 and 4. The presence of these types of waste was confirmed during the RI. The northern portion of Disposal Area 3 was also found to contain mixed municipal and/or industrial waste. The RI also confirmed cover material, ranging in thickness from 0 to 3 feet.

Completed Removal Actions

In 1998, an Administrative Order on Consent was entered into with EPA and the Site PRP group to address landfill gas (LFG) migration and removal of buried containers. LFG migration was controlled by constructing a perimeter LFG collection system. The existing system consists of gas wells and header piping that is routed to an enclosed flare, where the gas is burned.

Under the terms of the Administrative Order on Consent, the PRP group removed buried containers within Disposal Areas 1 and 5 where geophysical anomalies were identified. The buried container removal action in Disposal Area 5 began in November 1998 and was completed in July 2001. During that time, 26,986 container carcasses were removed and disposed off-Site. Impacted waste and soil encountered during the work was stockpiled on-Site and eventually treated by ex-situ vapor extraction. Following treatment, material that did not exhibit the toxicity characteristic for RCRA hazardous waste, based on the Toxicity Characteristic Leaching Procedure (TCLP) standards (40 C.F.R. Part 261.24) was backfilled on-Site. Material exhibiting the toxicity characteristic for RCRA hazardous waste was

disposed off-Site.

The buried container removal action in Disposal Area 1 began in February 2002 and was completed in December 2002. During this time, 15,622 container carcasses were removed and disposed off-Site. Unlike work at Disposal Area 5, in Disposal Area 1, impacted waste and soil encountered during the work was left in the excavated areas and successfully treated in place with in-situ vapor extraction (ISVE) technology to meet the TCLP standards. This work was completed in October 2005.. In total, 42,608 buried containers were removed from the Site and more than 65,000 cubic yards (cy) of impacted soil and waste material was successfully treated or disposed off-Site.

C. Site Characteristics

The Site property is approximately 100 acres in size. As stated above, the surface topography of the Site is variable due to past excavation, grading, and filling associated with historical gravel mining and landfilling operations. Several acres of isolated wetlands exist at the Site. The drainage study conducted during the RI concluded that surface water does not flow off-Site. The design of any future grading and/or covering of the Site will consider future landfill settlement.

The Site sits atop the Great Miami Buried Valley Aquifer, a federally designated sole source drinking water aquifer. The two main hydrogeologic units at the Site consist of the Upper Aquifer and Main Aquifer. The Upper Aquifer (i.e., the upper sand and gravel stratigraphic unit) consists of the saturated glaciofluvial soils above the low permeability till-rich zone. The till-rich zone, where present, separates the Upper Aquifer from the Main Aquifer. Groundwater in the Upper Aquifer flows across the Site from east to west. In some areas of the Site, Upper Aquifer groundwater is in direct hydraulic contact with saturated waste materials and some leachate mounding does occur, although it does not have a major effect on the overall groundwater flow direction.

The Main Aquifer consists of the portion of the glaciofluvial sand and gravel stratigraphic unit deposited beneath the till-rich zone and the entire saturated thickness of the sand and gravel stratigraphic unit where the till-rich zone is absent. The Main Aquifer contains numerous thin discontinuous till horizons and silty units. The till-rich zone is absent in the southwest portion of the Site and the Upper Aquifer is directly connected to the Main Aquifer in that area. Groundwater in the Main Aquifer flows across the Site from east to northwest towards the Great Miami River. Groundwater elevations in the Main Aquifer are typically lower than in the Upper Aquifer.

D. Nature and Extent of Contamination

The Site consists of four contaminant sources (waste, leachate, landfill gas, and non-aqueous phase liquid (NAPL)) and three affected media (groundwater, ambient air, and soil).

Waste

The estimated volume of waste at the Site is approximately 2.5 million cubic yards. Waste area and volume information is shown on Figure 3.1. Waste sampling conducted during the remedial investigation (RI) identified 16 locations in AOC 1 with contamination exhibiting the toxicity characteristic of RCRA hazardous waste. Eleven of these locations exceeded the TCLP standard for trichloroethylene (TCE) and are below the water table in native till beneath the Disposal Area 5 removal action area. The other five locations had TCE concentrations exceeding the toxicity characteristic standards for RCRA hazardous waste based on the application of the 20 times rule.

These five locations, shown on Figure 1 of the FS Addendum, are within disposal area 1, and located above the water table. Sampling results are available in Appendix A of the RI report.

Waste sampling results at former disposal areas 3 and 4 (AOC 2) indicate that these areas may contain RCRA characteristic waste. The waste sampling locations are shown in Figure 4.9 of the RI report. The contaminant concentrations that were detected at these locations are provided in Appendix A of the RI report.

RI waste sampling indicates six locations in AOC 1 that contain PCBs at concentrations above 50 parts per million (ppm) as shown on Figure 2 of the FS Addendum. Four of these locations are above the water table and two are located at depths near or below the water table.

Chemicals detected in waste material during the RI are listed below along with maximum concentrations found in sampling results:

Contaminants Detected in Waste Material

Organic Contaminants		**Inorganic Contaminants**	
Contaminant	**Maximum Concentration** (ppb)	**Contaminant**	**Maximum Concentration** (ppm)
1,2,4-Trimethylbenzene	76,000	Aluminum	27,000
1,3,5-Trimethylbenzene	18,000	Arsenic	37.8
1,4-Dichlorobenzene	3,300	Barium	11,400
2-Methylnaphthalene	42,000	Beryllium	27.8
4-Methylphenol	16,000	Cadmium	75.3
Acetophenone	630	Copper	4,770
Aroclor-1242 (PCB-1242)	950,000	Iron	240,000
Aroclor-1248 (PCB-1248)	69,000	Lead	12,000
Aroclor-1254 (PCB-1254)	190,000	Manganese	5,930
Aroclor-1260 (PCB-1260)	78,000	Mercury	6.2
Benzene	41,000	Nickel	485
Benzo(a)anthracene	290,000	Silver	201
Benzo(a)pyrene	230,000	Thallium	10
Benzo(b)fluoranthene	260,000	Vanadium	78.4
Benzo(g,h,i)perylene	110,000	Zinc	27,600
Benzo(k)fluoranthene	120,000		
bis(2-Ethylhexyl)phthalate	170,000,000		
Butyl benzylphthalate	660,000		
Carbazole	110,000		
Chlorobenzene	61,000		
Chloroform	44		
Chrysene	260,000		

cis-1,2-Dichloroethene	1,000,000		
Cyclohexane	5,200		
Dibenz(a,h)anthracene	31,000		
Dibenzofuran	140,000		
Dieldrin	60		
Ethylbenzene	3,700,000		
Fluoranthene	870,000		
Indeno(1,2,3-cd)pyrene	110,000		
Methylene chloride	28,000		
Naphthalene	110,000		
N-Nitrosodiphenylamine	19,000		
Phenanthrene	1,000,000		
Pyrene	660,000		
Tetrachloroethene	45,000		
Toluene	2,200,000		
Trichloroethene	900,000		
Vinyl chloride	170,000		
Xylene (total)	14,000,000		

Leachate

Leachate is present in all disposal areas except Disposal Area 4. The total volume of leachate at the Site is estimated to be 45 million gallons. Leachate area and volume information is shown on Figure 3.1. Chemicals, and the maximum concentrations detected in leachate at the Site, are listed below :

Organic Contaminants Detected in Leachate

Contaminant	**Maximum Concentration (ppb)**	**Contaminant**	**Maximum Concentration (ppb)**
1,1-Dichloroethane	6.8	Trichloroethene	210
1,2,4-Trimethylbenzene	250	4-Methylphenol	170
1,3,5-Trimethylbenzene	40	Acetophenone	3.9
1,4-Dichlorobenzene	15	Benzo(a)anthracene	24
2-Butanone	640	Benzo(a)pyrene	21
4-Methyl-2-Pentanone	1,600	Benzo(b)fluoranthene	26
Acetone	540	Benzo(g,h,i)perylene	10
Benzene	120	Benzo(k)fluoranthene	10
Chlorobenzene	180	bis(2-Ethylhexyl)phthalate	500
Chloroethane	520	Carbazole	12
cis-1,2-Dichloroethene	3,700	Chrysene	100
Ethylbenzene	1,100	Dibenzofuran	41

Methylene chloride	11	Fluorene	140
Tetrachloroethene	5.8	Indeno(1,2,3-cd) pyrene	9.8
Toluene	1,800	Naphthalene	170
trans-1,2-Dichloroethene	13	N-Nitrosodiphenylamine	27
Vinyl chloride	1,200	Phenanthrene	240
Xylene (total)	4,400	Pyrene	64
2-Methylnaphthalene	100	Aroclor-1232	12
Aroclor-1242	210	Aroclor-1248	3.8
Aroclor-1254	300	Aroclor-1260	1.2
4,4'-DDE	7.1	4,4'-DDT	24
beta-BHC	0.45	delta-BHC	0.8
Endrin aldehyde	5.9	Heptachlor epoxide	4.8
Toxaphene	200	Pentachlorophenol	1.8

Landfill Gas

The RI included monitoring of landfill gas for methane, carbon dioxide, oxygen, and VOCs. In all disposal areas, except former disposal area 4, methane was detected at concentrations above the lower explosive limit. The migration of landfill gas is presently controlled by the perimeter landfill gas collection system.

VOCs were detected in landfill gas in all disposal areas, with the highest concentrations observed in Disposal Areas 1 and 5. There were nineteen VOCs detected above Site-specific preliminary remediation goals (SSPRGs), as established in the FS Report, in subsurface gas at the property boundary or at off-property locations. However, the VOCs drop below SSPRGs within a relatively short distance from the Site. The potential for vapor intrusion into nearby structures was investigated during the RI and found to not pose any unacceptable risk to residents.

A summary of the landfill gas VOC detections is provided in Figure 4.3. The primary VOCs detected in landfill gas are listed below along with the maximum concentrations found in the sampling results:

Organic Contaminants Detected in Landfill Gas

Contaminant	Maximum Concentration (ppb)
1,1-Dichloroethane	10,908
1,2,4-Trimethylbenzene	3,639
1,3,5-Trimethylbenzene	1,917
Benzene	5,179
Chlorobenzene	2,487
cis-1,2-Dichloroethene	3,924,722
Ethylbenzene	46,485
Methylene chloride	10,908
Tetrachloroethene	21

Toluene	303,784
Trichloroethene	1,015,331
Trichlorofluoromethane (CFC-11)	69,116
Vinyl chloride	839,992
Xylene (total)	159,435

Non-Aqueous Phase Liquid

Non-aqueous phase liquid (NAPL) was found in six wells during the RI but was only detected consistently at two locations, the southeastern part of Disposal Area 1 (at leachate well NSL-55L) and in the eastern part of Disposal Area 5 (at leachate well NSL-54L). The total volume of NAPL in these areas is estimated to be 4,400 gallons. NAPL location and volume information is shown on Figure 3.1. The RI hot spot investigation concluded that the NAPL is a principal threat waste (highly toxic and/or mobile) that is contributing significantly to overall Site risk. The chemicals detected in the NAPL are listed below along with the maximum concentrations found in sampling results:

Organic Contaminants Detected in NAPL

Contaminant	**Maximum Concentration** (ppb)
1,1-Dichloroethane	13,160
1,2,4-Trimethylbenzene	18,000
1,3,5-Trimethylbenzene	6,030
4-Methyl-2-Pentanone (MIBK)	29,140
Acetone	48,880
Benzene	24,440
Chlorobenzene	3,572
Cyclohexane	2,790
cis-1,2-Dichloroethene	53,580
Ethylbenzene	1,222,000
Methyl cyclohexane	9,900
Toluene	799,000
Vinyl chloride	18,800
Xylene	4,794,000
2-Methylnaphthalene	187,000
Trichloroethene	639
bis(2-Ethylhexyl)phthalate	441,800
Chrysene	150,400
Fluorene	319,000
Naphthalene	188,000
Phenanthrene	333,000
Aroclor-1242	171,000
Aroclor-1248	488,800
Aroclor-1254	488,800
Aroclor-1260	263,200
4,4'-DDE	8,648
Dieldrin	1,170
Endosulfan sulfate	4,230
Endrin aldehyde	9,024

Methoxychlor	4,418

Groundwater
The RI identified Site-related contaminants in groundwater at concentrations above Maximum Contaminant Levels (MCLs). Figures 3.2 and 3.3 show exceedances of MCLs at and beyond the Site boundary in the Upper Aquifer and Main Aquifer, respectively. Contaminants detected in the Upper Aquifer include vinyl chloride, TCE, arsenic, iron, nitrate, benzene, chloroethane, 4,4-DDT, beta-BHC, barium and iron, with the highest detections being TCE at 100 ppb, vinyl chloride at 52 ppb, benzene at 34 ppb, and arsenic at 75 ppb. Contaminant concentrations are lower in the Main Aquifer and include detections of arsenic, barium, benzene, vinyl chloride, nitrate and manganese.

In general, exceedances of MCLs in the Upper Aquifer and Main Aquifer are localized and do not extend beyond approximately 400 feet of the property boundary. There are no potable-use wells within the areas of groundwater contamination.

Soil
The RI determined that arsenic concentrations are above background in soil in the unfilled portion west of Disposal Area 5 and in one area west of Disposal Area 4. Soil in one on-Site area north of Disposal Area 4 is above the soil SSPRG for benzo(a)pyrene. There are no soil sampling results for the off-property buried waste area (OPBWA). However, the OPBWA is assumed to have the same degree of surface soil contamination as the Eastern Two Thirds and, thus, requires remedial action. The area of contaminated soil in the OPBWA is assumed to be the same size as the OPBWA itself, which is 1,950 ft^2 (0.04 acre) as shown on Figure 3.1.

Ohio EPA and the Ohio Department of Health (ODH) performed a radiation screening survey and assessment at the Site. The screening survey identified an area in the northwest part of Disposal Area 3 where above-background radiation levels occurred. Soil samples were collected in this area and analyzed for Radium-226. The ODH concluded that the radioactive material at the Site does not present a threat to the health and safety of the public under present conditions. However, all of the remedial alternatives being considered for the Site include capping to contain the radioactive materials in Disposal Area 3 and to prevent future exposure.

Sediment samples collected within the limits of Disposal Areas 1, 2, and 5 had concentrations of various compounds above soil SSPRGs and background. Exceedances were observed in one or more samples for benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, butyl benzylphthalate, bis(2-ethylhexyl)phthalate, carbazole, dibenz(a,h)anthracene, naphthalene, Aroclor-1242, Aroclor-1254, Aroclor-1260, dieldrin, chromium, and manganese.

E. Scope and Role of Response Action

The major reduction in the toxicity, mobility and volume (TMV) of principal threat waste disposed of at the Site occurred during the removal actions undertaken between 1998 and 2004. A total of 42,608 buried container carcasses were removed for off-Site treatment and disposal and 65,000 cubic yards of impacted soil and waste material was either successfully treated on-Site so that it no longer exhibited characteristics of RCRA hazardous waste or disposed of off-Site.

The proposed remedy provides for: (1) NAPL extraction and off-Site disposal, (2) a perimeter leachate

extraction system that allows for on-Site pretreatment as necessary, (3) the identification and off-Site treatment or disposal of RCRA hazardous waste material, and (4) the collection and treatment of landfill gas, and (5) a solid waste landfill cap that will reduce infiltration of precipitation. The proposed remedy also provides for the excavation and off-Site disposal of waste material above the water table having TCLP concentrations above regulatory standards or with PCB concentrations in excess of 50 ppm. Any waste that will remain on-Site without treatment is considered low level threat waste for which containment is appropriate.

F. Summary of Site Risks

Contaminants of Concern
Four contaminants pose the greatest risk to human health at the Site:

Tricholorethylene (TCE): TCE was detected in waste at concentrations up to 900 ppm, in landfill gas at concentrations up to 1,000 ppm volume, in leachate up to 210 ppb, and in groundwater up to 100 ppb. TCE is a halogenated organic compound historically used as a solvent and degreaser. Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions, and urinary tract disorders. Based on laboratory studies, TCE is considered a probable human carcinogen.

Vinyl Chloride: Vinyl chloride was detected in waste at concentrations up to 170 ppm, in landfill gas at concentrations up to 840 ppm volume, in leachate up to 1,200 ppb, and in groundwater up to 52 ppb. Vinyl chloride is used in the manufacture of numerous products and can also form during the natural chemical breakdown of TCE. Based on laboratory studies, vinyl chloride is considered a probable human carcinogen.

Cis-1,2-Dichloroethene (DCE): DCE was detected in waste at concentrations up to 1,000 ppm, in landfill gas at concentrations up to 3,900 ppm volume, and in leachate up to 3,700 ppb. DCE is used to produce solvents and in chemical mixtures. DCE can also form during the natural chemical breakdown of TCE. Long term exposure to DCE can cause liver, circulatory and nervous system damage.

Benzene: Benzene was detected in landfill gas at concentrations up to 5 ppm volume, in leachate at concentrations up to 120 ppb, and in groundwater at concentrations up to 34 ppb. Benzene can be found in gasoline and in products such as synthetic rubber, plastics, nylon, insecticides, paints, dyes, resins-glues, furniture wax, detergents and cosmetics. Long-term exposure to benzene can affect the kidney, liver and blood systems and cause leukemia. Benzene has been determined to be carcinogenic to humans.

Human Health Risk Assessment

A baseline human health risk assessment evaluated risks and hazards to human health from exposure to contaminants at the Site, in present and future conditions, in the context of four different areas at or near the Site. The four areas include:

- The eastern two-thirds of the Site (which includes Disposal Areas 1, 2, and 5) as defined in the City's Valleycrest Reuse Framework (referred to as Eastern Two Thirds)
- The western third of the Site (which includes Disposal Areas 3 and 4) as defined in the City's

Site reuse plan (referred to as Western Third)
- Outside of the Site property (referred to as off-Site)
- A small area of buried waste that extends off the Site property to the east onto Lots 79198 and 74637 [off-property buried waste area (OPBWA)]

For each of these areas, the HHRA evaluated potential risks and hazards during present or reasonably anticipated future conditions that may be affected by Site contaminants. Eight human receptors were evaluated: on-Site trespasser (current), off-Site resident (current/future), utility worker (future), construction worker (future), park worker (future), recreational user (future), maintenance worker (future), and commercial worker (future). The potential future receptors were based on land uses outlined in the city of Dayton's Valleycrest Reuse Framework, which include future recreation and commercial uses. The results of the risk and hazard evaluations that were conducted for each receptor and exposure scenario were compared to conservative limits established by EPA for protection of human health.

The HHRA identified exceedances of the risk-based limits for certain media/pathway/receptor scenarios. Based on the Reasonable Maximum Exposure results of the HHRA, it was concluded that waste, leachate, landfill gas, NAPL, surface soil, and groundwater at the Site pose unacceptable risks to human health. The following receptors/exposures exceed a cumulative risk of 1E-04 (1 in 10,000 cancer risk) and/or a hazard index of 1:

- Current trespasser exposure to landfill gas via inhalation of ambient air.
- Current off-Site resident exposure to landfill gas via inhalation of ambient air.
- Current resident exposure to surface waste and surface soil in Off Property Buried Waste Area via ingestion and direct contact.
- Future utility worker exposure to waste via inhalation of ambient air.
- Future utility worker exposure to leachate via direct contact.
- Future utility worker exposure to NAPL via ingestion and inhalation.
- Future construction worker exposure to waste via inhalation of ambient air.
- Future resident exposure to surface waste and surface soil in Off Property Buried Waste Area via ingestion and direct contact.
- Future off-Site resident exposure to groundwater (household use) via ingestion, inhalation, and direct contact.

A summary of the receptors, pathways, and media which exceed the cumulative risk and hazard index criteria, including the cumulative risk and hazard index values and major contributing parameters and pathways, is presented in Table 1. These cancer risks and hazard levels indicate that there is significant potential risk to children and adults from exposure to contaminated media at the Site. These risk estimates are based on current and future scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure to the contaminated media, as well as the toxicity of the various Site contaminants.

Ecological Risks

A baseline ecological risk assessment was also conducted which concluded that no unacceptable ecological exposures exist due to the previous landfilling operations. It is expected that final grading and installation of an appropriate cover system will adequately protect ecological receptors from contaminated media at the Site.

G. Remedial Action Objectives

Remedial action objectives are specific goals to protect human health and the environment and as such, provide the basis for developing cleanup options that will be protective of human health and the environment. The RAOs are based on the information gathered during the RI, EPA guidance, applicable, relevant and appropriate requirements (ARARs) for the Site, and the conclusions of the BRA, including human health and ecological risks.

The RAOs address Site-related receptor and pathway risks and hazards exceedances based on the results of the HHRA. The RAOs are listed below for each of the four contaminant sources (waste, NAPL, leachate, and LFG) and three affected media (OPBWA soil, groundwater, and ambient air).

Waste

- Prevent inhalation (via ambient air) of Eastern Two Thirds waste COCs by a future utility worker at concentrations greater than the Risk-Based Preliminary Remediation Goals (RBPRGs)
- Prevent ingestion, direct contact, and inhalation (via ambient air) of Eastern Two Thirds surface waste COCs by a future park worker, future recreational user, and current/future off-Site and OPBWA resident at concentrations greater than the RBPRGs
- Prevent ingestion of Western Third waste COCs by a future construction worker at concentrations greater than the RBPRGs
- Prevent ingestion, direct contact, and exposure to radioactive materials in Disposal Area 3
- Prevent migration of Site-related contaminants to groundwater that would result in exceedances beyond the POC (See Figure 4.5) of the groundwater MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1
- Reduce infiltration and formation of leachate

NAPL

- Prevent ingestion and inhalation (via ambient air) of Eastern Two Thirds NAPL COCs by a future utility worker at concentrations greater than the RBPRGs
- Prevent migration of Site-related contaminants to groundwater that would result in exceedances beyond the point of compliance (POC) of the groundwater MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1
- Reduce infiltration and formation of leachate

Leachate

- Prevent direct contact with Eastern Two Thirds leachate COCs by a future utility worker at concentrations greater than the RBPRGs
- Prevent migration of Site-related contaminants to groundwater that would result in exceedances beyond the POC of the groundwater MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1

Landfill Gas

- Prevent inhalation (via ambient air) of Eastern Two Thirds LFG COCs by a future park worker, future recreational user, current trespasser, and current/future off-Site and OPBWA resident at concentrations greater than the RBPRGs
- Prevent inhalation (via ambient air) of Western Third LFG COCs by a future commercial worker, future maintenance/park worker, and current/future off-Site resident at concentrations greater than the RBPRGs
- Prevent accumulation of explosive concentrations of LFG within structures
- Prevent migration of LFG having methane above the LEL beyond the property boundary
- Prevent inhalation of vapors in excess of risk-based levels in on-Site and off-Site indoor air
- Prevent inhalation of radon from radioactive materials in Disposal Area 3
  - in excess of risk-based levels in on-Site indoor air

OPBWA Soil

- Prevent ingestion and direct contact of Eastern Two Thirds surface soil COCs by a future OPBWA resident at concentrations greater than the RBPRGs
- Prevent migration of Site-related contaminants to groundwater that would result in exceedances beyond the POC of the groundwater MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1

Groundwater

- Prevent ingestion, direct contact, and inhalation (via ambient air) of contaminants in groundwater beyond the POC by a future resident at concentrations greater than the MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1

- Restore contaminated groundwater to its beneficial use at and beyond the POC within a reasonable timeframe, consistent with the MCLs (or Site-specific background where higher) or a cumulative carcinogenic risk of 10-5 or a hazard index of 1

Ambient Air

- Prevent inhalation of vapors or dust in excess of risk-based levels in ambient air

H. Summary of Remedial Alternatives

CERCLA Section 121(b)(1), 42 U.S.C. Section 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost effective, comply with ARARs, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable.

The five remedial alternatives, which were evaluated in the FS report, are as follows:

Common Elements

All of the alternatives, with the exception of the "No Action" alternative (Alternative 1) contain common components. These common elements include:

- Disposal Area 4 relocation to Disposal Areas 1,2,3, and 5
- OPBWA waste and soil consolidation
- NAPL monitoring/removal/off-Site disposal at monitoring wells NSL-54L and NSL-55L
- Excavation and off-Site disposal of waste exceeding TCLP standards above the water table in Disposal Area 1, as identified in the FS Addendum
- Excavation and off-Site disposal of waste exceeding TCLP standards above the water table in Disposal Area 3, or the installation of a Subtitle C cap over Disposal Area 3, if excavation of these wastes is not cost effective or implementable
- Excavation and off-Site disposal of waste containing PCB concentrations greater than 50 ppm above the water table in Disposal Areas 1 and 2, as identified in the FS Addendum
- Leachate extraction
- Landfill gas collection/flaring/monitoring
- On-Site management of stormwater by retention/infiltration in the existing borrow area
- Groundwater monitoring
- Institutional Controls, including restrictive covenants

Alternative 1 – No Action

EPA includes a "No-Action" alternative as a basis for comparison to the other cleanup alternatives. The no action alternative does not include any physical remedial measures beyond the removal actions that have already been taken at the Site. Because this alternative would result in contaminants remaining on-Site, the Site would be reviewed every five years. Since no action would be taken, this option would not protect human health and the environment from either current or future risk.

Capital Cost: $0
Estimated O&M Cost: $0

Alternative 2A – Solid Waste Cap with Leachate Control at Site Perimeter

Alternative 2A includes capping of Disposal Areas 1, 2, 3, and 5 using a Solid Waste cap in accordance with OAC 3745-27-08 and OAC 3745-27-11, but requiring a variance from the minimum grade requirement of 5 percent due to surface conditions at the Site. Waste material within Disposal Area 4, which is mainly comprised of foundry sand, would be relocated and used as grading fill, and a portion screened, as may be needed, for use as engineered sub base or bedding material for Disposal Areas 1, 2, 3, and 5. It is expected that the estimated 153,708 cubic yards (cy) of waste and cover material in Disposal Area 4 would produce an approximately 3 percent minimum grade. The total area to be capped is 69.35 acres, which will cover an estimated 2,464,997 cy of waste.

A Solid Waste cap does not comply with the ARARs for this Site unless RCRA hazardous waste is identified, treated, or disposed of off-Site.

The Solid Waste cap design would consist of (from top layer to bottom, as shown on Figure 4.2):

- 6-inch vegetated layer
- 6-inch cap protection layer (common fill)
- 18-inch soil drainage layer (granular material having minimum permeability of 10^{-3} centimeter per sec [cm/sec])
- Liner cushion layer
- Flexible membrane liner (FML, minimum 40-mil high-density polyethylene (HDPE))
- Geosynthetic clay liner (GCL) that must "be negligibly permeable to fluid migration" [(OAC 3745-27-08 (D)(9)(a)
- 12-inch engineered sub base (granular material)

The performance of the Solid Waste cap was evaluated using the Hydrologic Evaluation of Landfill Performance (HELP) Model. The Solid Waste cap is expected to be 99.99 percent effective in reducing infiltration of precipitation (i.e., it allows infiltration of 0.00483 inches per year versus precipitation of 39.82 inches per year). Over the 69.35 acre area to be capped, that rate of infiltration equates to 9,095 gallons per year.

Alternative 2A includes a perimeter leachate extraction system. The system, shown on Figure 4.3, includes ten leachate extraction wells pumping a combined leachate flow of 31 gpm (16,293,600 gallons/year). Extraction wells would be screened across the entire saturated thickness of waste. Restoration of contaminated groundwater, which has migrated beyond the POC, is estimated to take 3 years. The exact number and locations of extraction wells and the appropriate pumping rates would be determined during remedial design.

Management of extracted leachate would include on-Site pretreatment (if needed) and discharge to the City of Dayton's sanitary sewer for treatment and disposal. Such a discharge would need to comply with the City's Code of Ordinances Chapter 52 (Sewer Construction and Use; Wastewater Discharges). If the City sewer disposal option is not available, contingent disposal options, as outlined in the FS report, may include on-Site pretreatment and discharge to an on-Site infiltration impoundment or infiltration gallery, or transportation to an off-Site commercial facility for treatment and disposal.

The proposed LFG collection system, shown on Figure 4.4, includes a network of up to 28 LFG extraction wells installed within waste, including potentially 14 locations in Disposal Area 1, three locations in Disposal Area 2, two locations in Disposal Area 3, and nine locations in Disposal Area 5. This collection system would replace the existing perimeter LFG system in its entirety.

Estimated Capital Cost: $ 26.6 million
Estimated O&M Cost: $10 million
Total Present Worth Cost: $36.8 million
Estimated Construction Time: 2 years

Alternative 2B – Solid Waste Cap with leachate control and groundwater extraction at Site perimeter

Alternative 2B includes all of the components of Alternative 2A along with targeted groundwater extraction. The groundwater extraction system would be installed within select portions of the Upper Aquifer. The Site-specific groundwater flow model was used to determine the optimal placement of

groundwater extraction wells that would effectively meet groundwater clean-up goals in the existing areas of non-compliance. The model estimated that a network of ten groundwater extraction wells pumping at 2 to 5 gpm each may be needed south of the landfill, for a total groundwater pumping rate of approximately 41 gpm (see Figure 4.5). The goal and designed purpose of the proposed groundwater extraction system is to contain impacted groundwater that may exist in the Upper Aquifer inside the POC. The estimated 31 gpm leachate extraction system would address contamination in the Upper Aquifer at the northwest corner of the Site. In total, the modeled leachate/groundwater extraction system includes ten leachate extraction wells and ten groundwater extraction wells pumping a combined leachate/groundwater flow of 72 gpm (37,843,200 gallons/year). Restoration of contaminated groundwater which has migrated beyond the POC is estimated to take 2.9 years.

Extracted groundwater would be combined with the extracted leachate for management in the same manner as Alternative 2A, but would involve a much larger quantity of liquid to dispose.

Capital Cost: $ 28.0 million
Total O&M cost: $13.2 million
Total Present Worth Cost - $41.5 million
Total Construction Time: 2 years

Alternative 3A – Alternate Cap (non ARAR compliant) with leachate control at Site interior and perimeter

Alternative 3A includes all of the components of Alternative 2A, but employs an Alternate cap that does not meet State RCRA Subtitle C or D capping requirements and has increased leachate extraction.

The Alternate cap would be used over Disposal Areas 1, 2, 3, and 5 and would consist of (from top layer to bottom, see Figure 4.2):

- 6-inch vegetated layer
- 12-inch cap protection layer (common fill)
- 6-inch soil drainage layer (granular material having minimum permeability of 10-2 cm/sec)
- FML (minimum 40-mil HDPE)
- 6-inch bedding layer (granular material)

The HELP Model was used to evaluate the performance of the Alternate cap, compared to ARAR compliant capping alternatives. The Alternate cap is expected to be 95.39 percent effective in reducing infiltration of precipitation (i.e., it allows infiltration of 1.83460 inches per year versus precipitation of 39.82 inches per year). Over the 69.35-acre area to be capped, that rate of infiltration equates to 3,454,573 gallons per year.

Alternative 3A includes interior leachate extraction to pump the additional leachate generated by infiltration of precipitation through the Alternate cap, and perimeter leachate extraction to create an inward hydraulic gradient at the POC in the vicinity of the two existing areas of off-Site groundwater exceedances in the Upper Aquifer. The leachate extraction system includes 28 interior dual-phase (i.e., leachate and LFG) extraction wells that pump a combined rate of 6.6 gpm and nine perimeter extraction wells pumping at a combined rate of 31 gpm, for a total leachate extraction of 37.6 gpm. Restoration of contaminated groundwater, which has migrated beyond the POC, is estimated to take 3.3

years.

Management of extracted leachate would be the same as for Alternative 2A, but would involve a larger quantity of leachate to dispose (i.e., an additional 3.4 million gallons per year).

Capital Cost: $ 19.3 million
Total O&M Cost: $10.4 million
Total Present Worth Cost - $ 29.9 million
Total Construction Time: 1.5 years

Alternative 3B – Alternate Cap (non-ARAR compliant) with leachate and groundwater control (interior and perimeter)

Alternative 3B includes all of the components of Alternative 3A along with targeted groundwater extraction. The groundwater extraction system would be installed within select portions of the Upper Aquifer to remediate zones of non-compliance. The Site-specific groundwater flow model was used to estimate the optimal placement of groundwater extraction wells that would effectively meet groundwater clean-up goals in the existing areas of non-compliance. The model estimated that a network of ten groundwater extraction wells pumping at 2 to 5 gpm each may be needed south of the landfill, for a total groundwater pumping rate of approximately 41 gpm (see Figure 4.7). The goal and designed purpose of the proposed groundwater extraction system is to contain impacted groundwater that may exist in the Upper Aquifer inside the POC, such that the flux of contaminants from the shallow zone to the deeper zone is controlled. The 37.6 gpm leachate extraction system would address contamination in the Upper Aquifer at the northwest corner of the Site. In total, the modeled leachate/groundwater extraction system includes 37 leachate extraction wells and ten groundwater extraction wells pumping a combined leachate/groundwater flow of 78.6 gpm (41,312,160 gallons/year). Restoration of contaminated groundwater which has migrated beyond the POC is estimated to take 2.9 years.

Extracted groundwater would be combined with the extracted leachate for management in the same manner as Alternative 2B, but would involve a larger quantity of leachate to dispose.

Capital Cost: $ 20.7 million
Total O&M Cost: $13.6 million
Total Present Worth Cost - $34.6 million
Total Construction time: 1.5 years

I. Detailed Evaluation of Alternatives

EPA uses nine criteria as required by Superfund law, to evaluate and compare cleanup alternatives. This section of the Proposed Plan profiles and compares the relative performance of each alternative against the nine criteria. The "Detailed Analysis of Alternatives" can be found in the FS.

Overall Protection of Human Health and the Environment
This evaluation criterion assesses whether each remedial alternative protects human health and the environment. This assessment focuses on how an alternative achieves protection over time and indicates how each source of contamination would be minimized, reduced, or controlled through treatment, engineering, or institutional controls. The evaluation of the degree of overall protection

associated with each alternative is based largely on the exposure pathways and scenarios set forth in the baseline human health risk assessment.

Alternative 1 (No Action) is not protective because it does not address identified exposure pathways. Alternatives 2A, 2B, 3A, 3B address RAOs for identified exposure pathways in the same manner, but with varying degrees of effectiveness. Only the 2-series alternatives achieve protection at the completion of construction and with implementation of the institutional controls as they are in full compliance with ARARs. The B-series alternatives (2B, 3B) achieve groundwater RAOs beyond the groundwater POC less than 6 months sooner than the A-series alternatives (2A, 3A). There is a higher level of protection inherent in the 2-series alternatives (2A, 2B) with respect to preventing ingestion, direct contact, and inhalation (particulate) of waste due to the greater thickness of the SW cap (3.5 to 4.0 feet thick depending on whether GCL or compacted clay is used for the clay barrier layer). The 3-series Alternate cap is 2.5 feet thick.

All of the alternatives (except No Action) employ LFG collection to prevent migration of LFG having methane above the LEL beyond the property boundary. The 2-series Solid Waste cap is more effective in reducing the generation of leachate due to infiltration because it includes two low permeability layers (FML and GCL) whereas the 3-series Alternate cap includes one low permeability layer (FML).

The 3-series alternatives include additional interior extraction wells to compensate for the increased rate of infiltration and leachate generation. The interior leachate extraction system adds 6.6 gpm to the volume of extracted leachate/groundwater requiring management, a consideration in terms of publicly owned treatment works (POTW) acceptance related to sewer capacity. The 2-series SW cap is more reliable than the Alternate cap as it includes a 1.0-foot thick engineered sub base layer beneath the GCL clay barrier layer to protect both the GCL and the FML barrier layers from tears and punctures during installation and settling over time. If 1.5 feet of compacted clay is used in place of the GCL as the clay barrier layer, the compacted clay provides tear and puncture protection for the FML barrier layer immediately above it. The Alternate cap design provides a 0.5-foot bedding layer of granular material, which is less protective of the FML barrier layer immediately above it than the 1.0-foot engineered sub base or 1.5 feet of compacted clay of the SW cap. The GCL/compacted clay barrier layer of the SW cap is considered "self healing" with respect to punctures and tears while the FML layer is not.

The timeframe for achieving groundwater restoration RAOs beyond the groundwater POC is expected to be less than 4 years for all of the alternatives (except No Action). The A-series alternatives take less than 6 months longer to achieve groundwater RAOs than the B-series alternatives, but the B-series generate an additional 41 gpm of extracted leachate and groundwater requiring management which is a consideration with respect to POTW acceptance based on existing sewer capacity. Higher volumes of extracted water may pose a capacity issue with the POTW, which would potentially impact short and long term effectiveness. Any extraction system reduction or shutdown resulting from sewer incapacity may be of short duration (i.e., on the order of a few days) and therefore would not reduce the effectiveness of the remedial systems in the short-term. However, if it is shown that frequent reductions or shutdowns reduce effectiveness of the remedial systems and discharge to the POTW is no longer available, then it is likely on-Site storage capacity will need to be provided to allow extracted leachate and groundwater to accumulate for off-Site disposal.

Compliance with ARARs

This evaluation criterion addresses whether alternatives would meet applicable or relevant and appropriate Federal and State requirements.

The landfill design and closure scenarios provided in Alternatives 2A and 2B comply with ARARs, provided that: 1) the RCRA hazardous waste identified during the remedial design phase is treated or removed and disposed of off-Site; 2) the TSCA PCB-waste, as discussed and identified in the FS Addendum, is removed and disposed of off-Site; 3) the a stability analysis is performed during the remedial design in accordance with Ohio EPA's "Geotechnical and Stability Analyses for Ohio Waste Containment Facilities"(September 14, 2004) to demonstrate that the cap could be designed and constructed such that positive drainage is achieved and maintained; and 4) Ohio EPA approves the final cap design demonstration. Assuming substantive requirements for a grade variance are met during remedial design, Alternatives 2A and 2B comply with ARARs.

The Alternate cap of the 3-series alternatives does not comply with State or Federal landfill design or closure requirements. Alternative 1 (no action) would not meet ARARs. Assuming substantive requirements for obtaining a grade variance are met during remedial design, Alternatives 3A and 3B would still require three NCP waivers to implement the Alternate cap design.

Long-Term Effectiveness and Permanence

The evaluation of alternatives under this criterion addresses the results of a remedial action in terms of the risk remaining at the Site after response objectives have been met.

Alternative 1 (No Action) has the lowest degree of long-term effectiveness and permanence as no additional remedial action is taken. The long-term effectiveness and permanence of all of the other alternatives is dependent on the effective design, operation, maintenance, and monitoring of the waste containment systems and compliance with the institutional controls. The magnitude of residual risk associated with the untreated waste to be contained on-Site is the same for all of these alternatives, and failure of the containment systems could result in unacceptable human health and ecological exposures.

The SW cap employed by Alternatives 2A and 2B is more effective in reducing the generation of leachate due to infiltration because it includes two low-permeability layers (FML and GCL) whereas the Alternate cap includes one low permeability layer (FML). The SW cap is more reliable in terms of preventing direct contact with waste as it is at least 1 foot thicker than the Alternate cap. Additionally, the Alternate cap employs a 6-inch "bedding layer" beneath the FML in place of the 12-inch engineered sub-base required by the SW cap. The 12-inch engineered sub-base is required when the SW cap elects to use a GCL in place of the otherwise required 18-inch of compacted clay for the barrier layer. One of the purposes of the 12-inch engineered sub base is protection of the GCL from punctures and tears during installation and subsequent settling. If 18-inch of compacted clay is used in place of the GCL for the barrier layer of the SW cap, the compacted clay provides puncture and tear protection for the FML layer immediately above it. Omission of the clay barrier layer in the Alternate cap makes it all the more important that the single barrier FML layer be protected from punctures and tears. The 6-inch bedding layer beneath the FML barrier layer of the Alternate cap does not provide the same level of protection from punctures and tears as the 12-inch engineered barrier layer required for use with the GCL (or the 18-inch recompacted clay if not substituting GCL) of the SW cap.

The 3-series alternatives include increased leachate pumping to compensate for the higher permeability of the Alternate cap. The 3-series alternatives are less effective than the 2-series in the long term due to the higher volume of leachate to be managed and disposed, and the potential for the local POTW to restrict disposal of the extracted leachate. In the event that a permit cannot be obtained or restrictions are imposed by the local POTW and no other disposal option is available, under the 3-series

alternatives a higher quantity of leachate would have to be transported by truck to an off-Site disposal facility.

The long-term effectiveness of the containment and treatment components of all of the alternatives is easily monitored. Evaluations of remedy performance should be included in periodic reports, the frequency and content of which will be established during remedial design. As waste will remain on-Site, all of the alternatives will require 5-year reviews to determine if the selected alternative is functioning as intended and continues to provide adequate protection.

The timeframe for groundwater restoration beyond the groundwater POC is expected to be less than 4 years under any of the alternatives (except No Action). The B-series alternatives (2B, 3B) reduce groundwater restoration time frames by less than 6 months, yet they more than double the volume of extracted leachate and groundwater requiring management.

Reduction of Toxicity, Mobility, or Volume Through Treatment
This evaluation criterion addresses the statutory requirement for selecting remedial actions that employ treatment technologies that reduce the toxicity, volume, or mobility of the hazardous constituents present in the impacted media.

The major reduction in the toxicity, mobility, and volume (TMV) of principal threat waste disposed of at the Valleycrest Landfill Site occurred during the removal actions undertaken between 1998 and 2004. A total of 42,608 buried container carcasses were removed for off-Site treatment and disposal and 65,000 cy of impacted soil and waste material was successfully treated on-Site to render it non-hazardous or disposed off-Site. With the exception of the NAPL and the sample locations above the water table to be excavated, as identified above and in the FS Addendum, remaining waste on-Site is considered low-level threat waste for which containment is appropriate and treatment impracticable.

All of the alternatives (except No Action) remove the principal threat NAPL for off-Site treatment and disposal. All of the alternatives (except No Action) treat the contaminants in the waste stream generated by the LFG extraction system. The use of the Alternate cap for Alternatives 3A and 3B increases the volume of leachate requiring management due to the increased leachate pumping needed to compensate for higher permeability of the Alternate cap. All of the alternatives (except No Action) include an extraction system to collect landfill leachate and draw back contaminated groundwater which has migrated beyond the groundwater POC. The 2-series and 3-series leachate extraction systems are scoped at 31 gpm and 37.6 gpm, respectively. The B-series alternatives include an additional 41 gpm of groundwater extraction to accelerate the restoration of contaminated groundwater at the south-central portion of the Site. On-Site pretreatment of extracted leachate and groundwater will be provided (if needed) prior to discharge to a POTW. Thus, all alternatives provide hydraulic containment and employ treatment to reduce the toxicity, mobility, and volume of the contaminants present in the extracted leachate and groundwater.

Each of the alternatives also includes excavation and off-Site disposal of waste above the water table exceeding TCLP standards in Disposal Area 1; excavation and off-Site disposal of waste above the water table containing PCB concentrations greater than 50 ppm in Disposal Areas 1 and 2; and excavation and off-Site disposal of waste above the water table exceeding TCLP standards in Disposal Area 3, or the installation of a Subtitle C cap over Disposal Areas 3 and 4, if excavation of these wastes is not cost effective or implementable.

Alternative 1 (No Action) would not reduce the TMV of contaminated media through treatment.

Short-Term Effectiveness
This evaluation criterion addresses the effects of the alternatives during the construction and implementation phases (i.e., remediation risks) until the remedial action objectives are met.

All of the alternatives (except No Action) pose some risks to the community associated with the screening and consolidation of the Disposal Area 4 waste, relocation of the OPBWA waste, and cap construction (e.g., dust, noise, transportation, emissions associated with excavation of waste). These risks can be readily mitigated through dust control, restricted work hours, engineering controls, compliance with United States Department of Transportation (USDOT) regulations, and air monitoring.

All of the alternatives (except No Action) pose risks to workers associated with construction (e.g., exposure to contaminated media, occupational hazards) that can be reduced through a health and safety plan and personal protective equipment. A worker health and safety plan and personal protective equipment would be used because construction workers would be exposed to contaminated media during waste and OPBWA soil relocation, contouring of the waste in Disposal Areas 1, 2, 3, and 5 for drainage, keying-in of the cap at its perimeter, re-installation of NSL-54L and NSL-55L, and installation of leachate/LFG extraction wells and headers. It is anticipated that these activities would occur during an overall construction period of approximately 2 years (2-series alternatives) or 1.5 years (3-series alternatives); therefore, the timeframe for achieving protection (construction completion, implementation of institutional controls) is approximately 2 years for the 2-series alternatives and 1.5 years for the 3-series alternatives.

The timeframe for achieving groundwater restoration RAOs is expected to be less than 4 years for all of the alternatives (except No Action). The A-series alternatives (2A, 3A) take less than 6 months longer to achieve groundwater RAOs than the B-series alternatives (2B, 3B).

Alternative 1 (No Action) poses no additional short-term risks to the community, workers, or the environment; however, it is not effective.

Implementability
This evaluation criterion considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Alternative 1 (no action) is the easiest to implement because it requires no action. None of the alternatives pose any unacceptable short-term or cross-media impacts which cannot be readily mitigated through restricted work hours, engineering controls, and compliance with transportation regulations, health and safety plans, and air monitoring. None of the alternatives require special techniques, materials, or labor to relocate waste and OPBWA soil, to construct the caps, to install the leachate and LFG extraction systems, to install the LFG flaring and monitoring system, or to expand the groundwater monitoring network as may be needed. Because these construction components are common to many remediation projects, major technical difficulties and unknowns are not expected. It is not expected that technical problems associated with implementation would lead to significant schedule delays. Manufactured materials needed for construction of the alternatives are readily available. The availability of soil materials for capping will depend on development activity in the area at the time of cap construction.

The interior leachate extraction system used by the 3-series alternatives (3A, 3B) adds 6.6 gpm to the volume of extracted leachate and groundwater requiring management. The B-series alternatives (2B, 3B) add another 41 gpm to the volume of extracted leachate and groundwater requiring management. Any extraction system reduction or shutdown resulting from sewer incapacity is expected to be of short duration (i.e., on the order of a few days) and therefore would not reduce the effectiveness of the remedial systems. However, if it is shown that reductions or shutdowns reduce effectiveness of the remedial systems, then it is likely that on-Site storage capacity will need to be provided to allow accumulation of extracted leachate and groundwater during periods when discharge to the sanitary sewer may be restricted due to capacity. The potential for the local POTW to put restrictions on leachate and groundwater disposal due to sewer capacity could affect the implementability of all alternatives, particularly the B-series alternatives which employ additional groundwater extraction and have larger discharge volumes. In the event that a permit cannot be obtained or restrictions are imposed by the local POTW and no other disposal option is available, a higher quantity of leachate would have to be transported by truck to an off-Site disposal facility under the 3-series alternatives. Caps for all of the alternatives would need to meet the substantive requirements identified pursuant to OAC 3745-27-03 "Exemptions and Variances" in order to vary from the 5 percent grade required by paragraph (C) (4) (c) of OAC 3745-27-08 "Sanitary Landfill Construction."

Alternatives 3A and 3B (Alternate cap) are less implementable than Alternatives 2A and 2B (SW cap) as they require three (and possibly four) NCP waivers of applicable cap construction ARARs. If Ohio EPA is not supportive of the Alternate cap design, it is unlikely to entertain a variance to allow an alternate grade, thus necessitating a fourth NCP waiver. NCP equivalency waivers for the drainage layer and the frost protection layer of the Alternate cap are relatively straight-forward as the Alternate cap design essentially provides equivalent performance with respect to drainage and omission of the compacted clay barrier layer essentially negates the need for 30 inches of frost protection. However, obtaining an NCP equivalency waiver for omitting the compacted clay barrier layer may prove difficult to obtain given the HELP model demonstrates that the Alternate cap does not provide equivalent performance in terms of preventing infiltration and subsequent generation of leachate. The Alternate cap design has not been used previously at similar sites in Ohio.

Cost

The estimated capital, net present value (NPV) operation and maintenance (O&M), and NPV periodic costs for the remedial alternatives are as follows, using a 7% discount rate:

Remedy Costs

	Alternative 2A Solid Waste Cap	**Alternative 2B Solid Waste Cap with Groundwater Extraction**	**Alternative 3A Alternative Solid Waste Cap**	**Alternative 3B Alternative Solid Waste Cap with Groundwater Extraction**
Capital Cost	$26,565,254.00	$28,023,700.00	$19,298,240.00	$20,706,686.00
O&M Costs -NPV	$9,996,724.00	$13,248,885.00	$10,383,886.00	$13,636,047.00
Periodic Costs-NPV	$215,400.00	$241,017.00	$217,108.00	$242,725.00
Total Present Worth Cost	$36,827,378.00	$41,513,602.00	$29,899,234.00	$34,585,458.00

The cap construction component is less costly for the 3-series alternatives (employing the Alternate cap) than for the 2-series alternatives (employing the SW cap) because the Alternate cap has no second low-permeability layer and uses less material. The B-series alternatives that employ additional leachate and groundwater extraction are more costly because of the additional cost associated with construction and operation of the additional perimeter leachate and groundwater extraction wells and the need to expand the capacity of the pretreatment system.

In the unlikely event that a permit cannot be obtained from the City to discharge extracted leachate and groundwater (pretreated if necessary) to the sanitary sewer, then contingent disposal options may include on-Site pretreatment and discharge to an on-Site infiltration impoundment or infiltration gallery (with agency approval), or transportation to an off-Site commercial facility for treatment and disposal, etc as defined in the FS Report.

State/Support Agency Acceptance
The State of Ohio supports the preferred alternative.

Community Acceptance
Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the Site.

J. Summary of the Preferred Alternative

The preferred alternative for cleaning up the North Sanitary Landfill Site is alternative 2A (Solid Waste Cap with leachate control at Site perimeter). This alternative also includes the common elements that are described above, including

- Disposal Area 4 relocation to Disposal Areas 1,2,3, and 5
- OPBWA waste and soil consolidation within the Site property boundaries
- NAPL monitoring/recovery/off-site disposal at NSL-54L and NSL-55L
- Excavation and off-Site disposal of waste exceeding TCLP standards above the water table in Disposal Area 1, as identified in the FS Addendum
- Excavation and off-Site disposal of waste containing PCB concentrations greater than 50 ppm above the water table in Disposal Areas 1 and 2, as identified in the FS Addendum
- Excavation and off-Site disposal of waste exceeding TCLP standards above the water table in Area 3, or installation of a Subtitle C cap over Disposal Area 3, if excavation of these wastes is not cost effective or implementable.
- Leachate extraction
- Landfill gas collection/flaring/monitoring
- On-Site management of stormwater by retention/infiltration in the existing borrow area
- Groundwater monitoring
- Institutional controls, including restrictive covenants

The preferred alternative provides the best balance of EPA's nine evaluation criteria and was selected over the other alternatives because it is expected to achieve substantial and long term risk reduction through treatment of collected leachate and removal and off-Site disposal of NAPL and RCRA characteristic waste, it is expected to prevent future exposure to contaminated soils and groundwater

through the installation of an ARAR compliant cap, and generates significantly lower quantities of leachate and groundwater to discharge than the non ARAR compliant alternatives, which is a potentially significant issue with respect to treatment plant capacity.

The preferred alternative also reduces risk within a reasonable timeframe and provides for long term reliability of the selected remedy.

Based on the information available at this time, EPA and the Ohio EPA believe that the preferred alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Because it would treat or remove principal threats and RCRA characteristic waste, the remedy would meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The preferred alternative can change in response to public comment or new information.

K. Community Participation

EPA and Ohio EPA provide information to the public regarding the investigation and cleanup of the Valleycrest Landfill Site through public meetings, the Administrative Record file for the Site, the information repository located at the Ohio EPA Southwest District Office in Dayton, and announcements published in the Dayton Daily News. EPA and Ohio EPA encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site. The date for the public comment period, and the date, time and location of the public meeting will published in a separate proposed plan fact sheet and in a local newspaper.

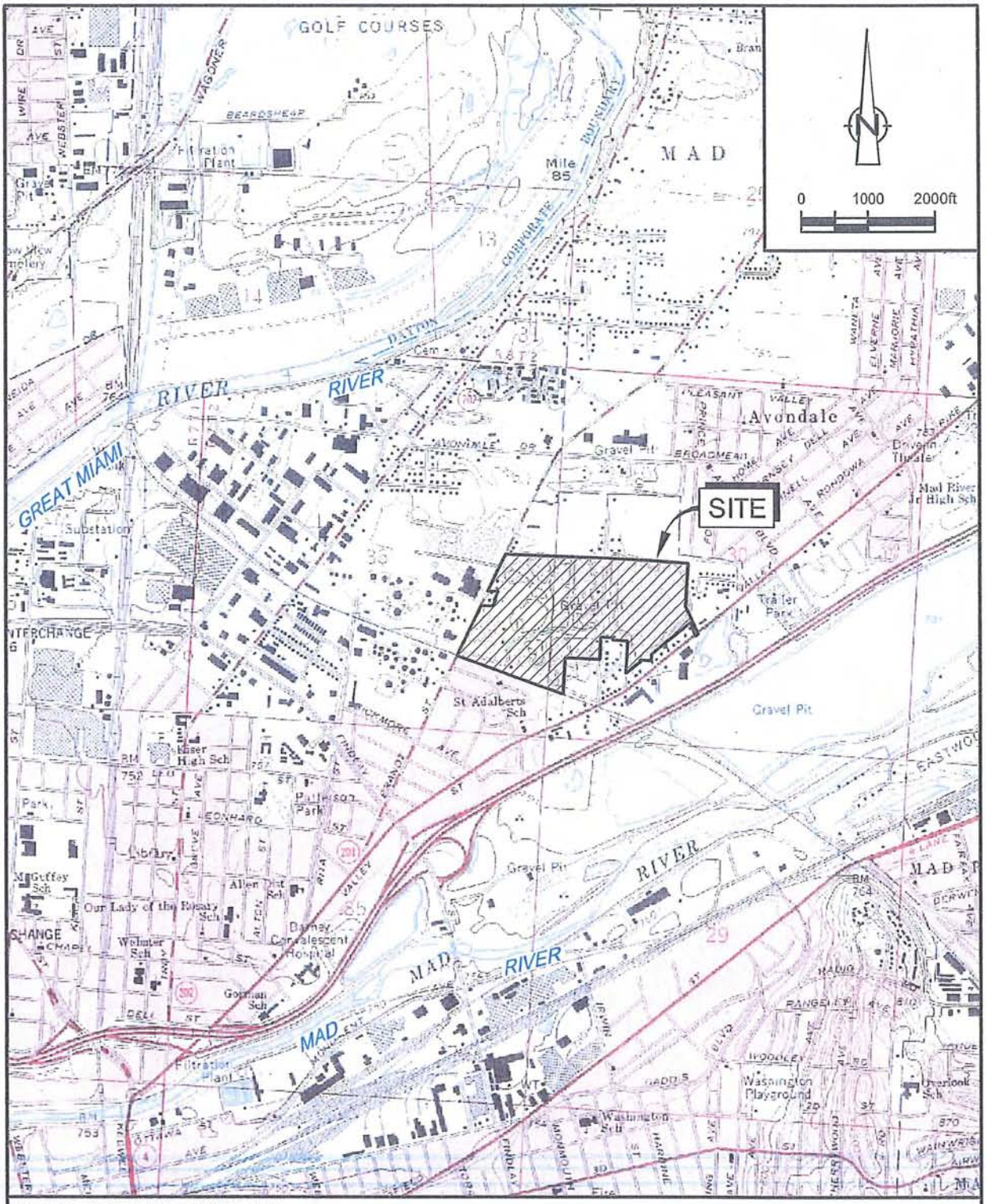
Tables

Table 1. Summary of Cumulative Cancer Risks and Hazard Index Exceedances

Receptor	Medium	Major contributing chemical	Exposure pathway	Cumulative Carcinogenic Risk
Trespasser (current)	Landfill gas	Trichloroethene vinyl chloride	Inhalation	2.4×10^{-3}
Recreational user (future)	Landfill gas Surface Waste	Vinyl chloride Trichloroethene	Inhalation Ingestion	1.5×10^{-2}
Park Worker (future)	Landfill gas Surface Waste	Trichloroethene Vinyl Chloride Benzene	Inhalation Ingestion	3.6×10^{-2}
Utility Worker (future)	Waste NAPL	Trichloroethene Benzene PCBs	Inhalation Ingestion	1.4×10^{-4}
Off-Site resident (current)	Landfill gas Indoor air	Vinyl chloride Trichloroethene	Inhalation	1.9×10^{-2}
Off-Site resident (future)	Landfill gas Groundwater	Vinyl chloride Trichloroethene	Inhalation Ingestion	1.9×10^{-2}
OPBWA resident (current)	Landfill gas Surface waste	Vinyl chloride Trichloroethene	Inhalation Ingestion	3.2×10^{-3}

Figures

FIGURE 1.1



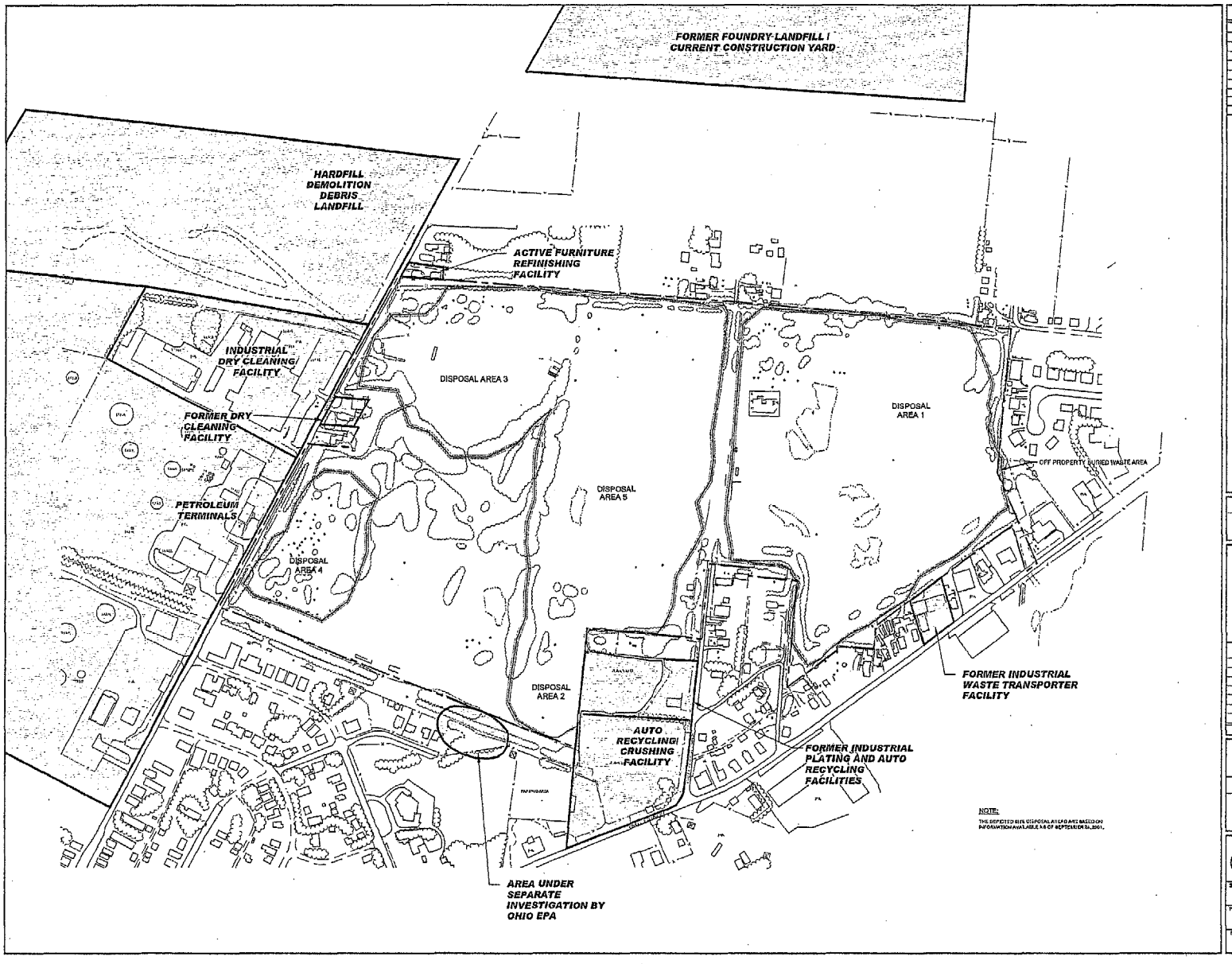
SOURCE: USGS QUADRANGLE MAP;
DAYTON NORTH, OHIO

figure 1.1

SITE LOCATION
NORTH SANITARY LANDFILL
Dayton, Ohio

16816-05(028)GN-WA001 AUG 24/2009

FIGURE 1.2



No	Revision	Date	Initial

LEGEND
PROPERTY BOUNDARY
TREE LINE
TREE
SITE DISPOSAL AREAS (LIMIT OF WASTE)
POTENTIAL OFF-SITE SOURCE AREAS

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

NORTH SANITARY LANDFILL
DAYTON, OHIO

SITE LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASS-ABRAMS AERIAL SURVEY CORPORATION, LANSING, MICHIGAN
BASED ON PHOTOGRAPHY DATED APRIL 6, 1995 AND MARCH 26, 2000

Project Manager	Reviewed By	Date
MR	JB	MAY 2010

Scale	Project No.	Report No.	Drawing No.
1"=200'	16816-05	028	figure 1.2

16816-05(028)GN-WA002 MAR 18/2011

FIGURE 1.3

No	Revision	Date	Initial

0 50 100ft

LEGEND

- PROPERTY BOUNDARY
- TREE LINE
- TREE
- FENCE LINE
- SITE DISPOSAL AREAS (LIMIT OF WASTE)
- TEST PIT LOCATION (NOVEMBER 1999 & AUGUST 2006)
- TEST PIT LOCATION (MARCH 1993)
- TEST TRENCH LOCATION (MARCH 1993)

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

NORTH SANITARY LANDFILL
DAYTON, OHIO

WASTE BOUNDARY
DELINEATION INFORMATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: ABRAMS AERIAL SURVEY CORPORATION LANSING, MICHIGAN PHOTOGRAPH DATED JANUARY 7, 2006

Project Manager:	Reviewed By:	Date:
DKR	JS	MAY 2010

Scale:	Project No.:	Report No.:	Drawing No.:
1"=50'	16816-05	028	figure 1.3

16816-05(028)GN-WA003 APR 23/2010

FIGURE 3.1

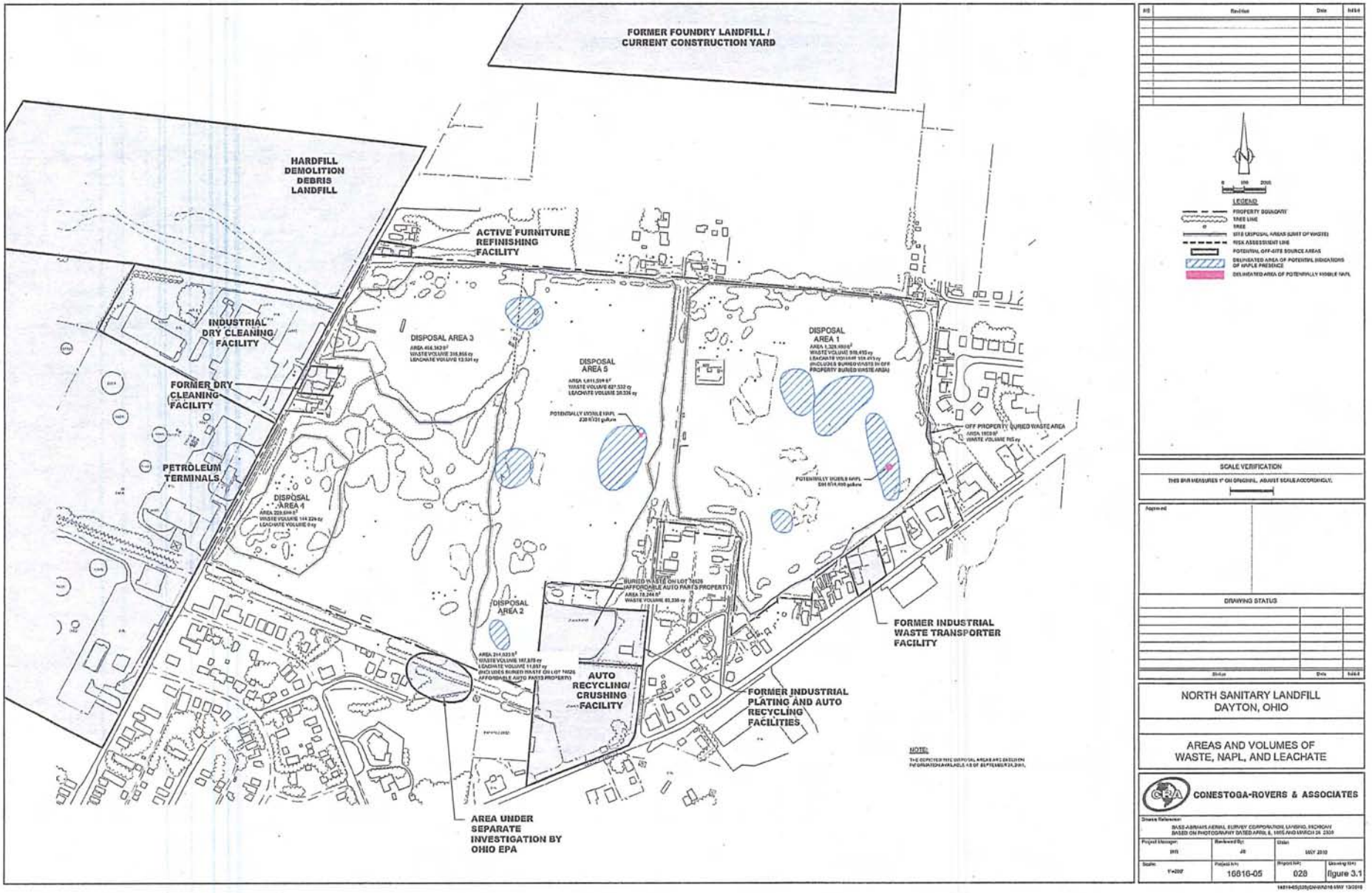
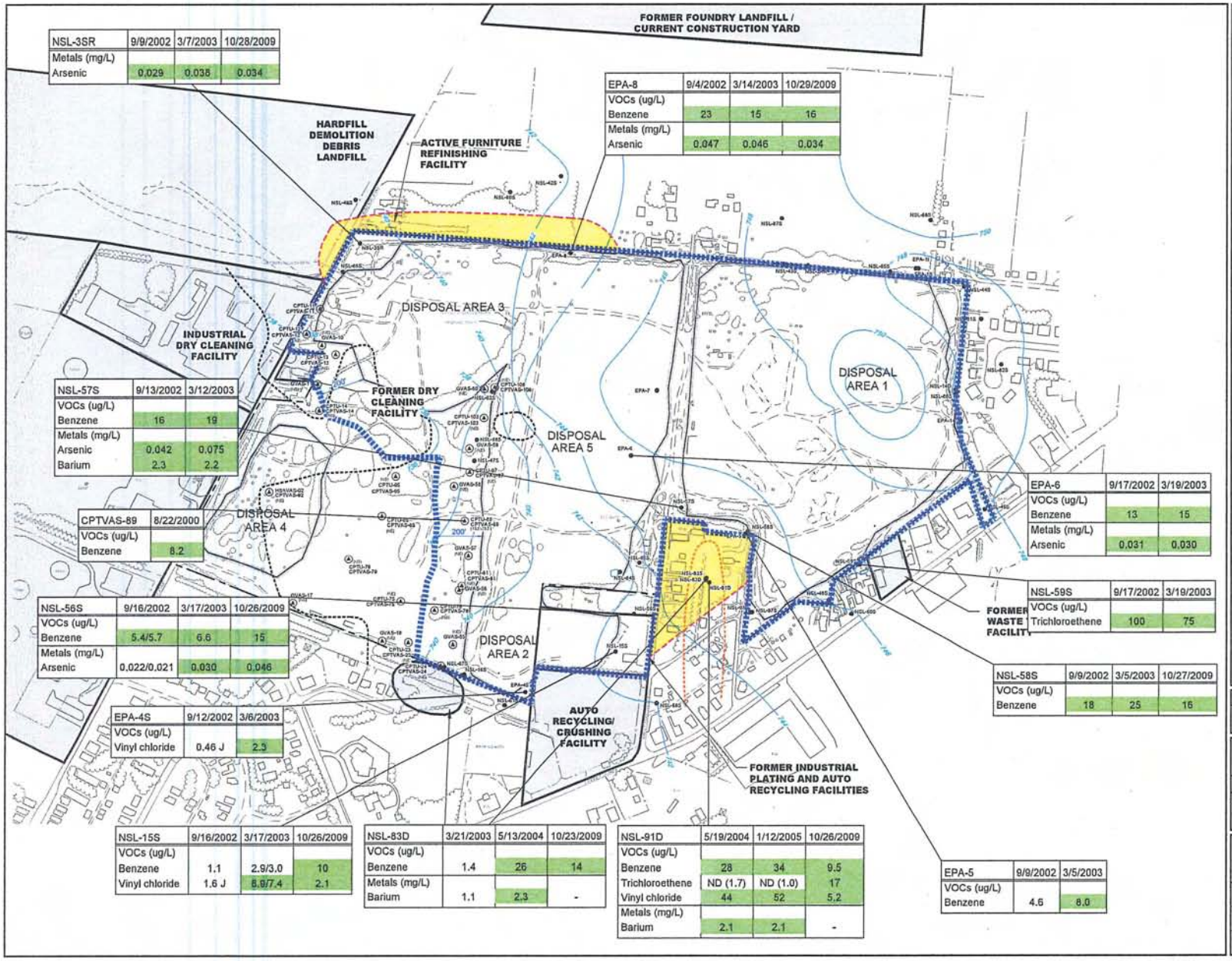

FORMER FOUNDRY LANDFILL / CURRENT CONSTRUCTION YARD
HARDFILL DEMOLITION DEBRIS LANDFILL
ACTIVE FURNITURE REFINISHING FACILITY
INDUSTRIAL DRY CLEANING FACILITY
FORMER DRY CLEANING FACILITY
PETROLEUM TERMINALS
DISPOSAL AREA 3
DISPOSAL AREA 5
DISPOSAL AREA 1
DISPOSAL AREA 4
DISPOSAL AREA 2
POTENTIALLY VISIBLE NAPL
OFF PROPERTY BURIED WASTE AREA
BURIED WASTE ON LOT 76626 (AFFORDABLE AUTO PARTS PROPERTY)
AUTO RECYCLING/ CRUSHING FACILITY
FORMER INDUSTRIAL WASTE TRANSPORTER FACILITY
FORMER INDUSTRIAL PLATING AND AUTO RECYCLING FACILITIES
AREA UNDER SEPARATE INVESTIGATION BY OHIO EPA
NOTE:
LEGEND
PROPERTY BOUNDARY
TREE LINE
TREE
SITE DISPOSAL AREAS (LIMIT OF WASTE)
RISK ASSESSMENT LINE
POTENTIAL OFF-SITE SOURCE AREAS
DELINEATED AREA OF POTENTIAL INDICATIONS OF NAPLS PRESENCE
DELINEATED AREA OF POTENTIALLY VISIBLE NAPL
SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.
Approved
DRAWING STATUS
NORTH SANITARY LANDFILL
DAYTON, OHIO
AREAS AND VOLUMES OF WASTE, NAPL, AND LEACHATE
CONESTOGA-ROVERS & ASSOCIATES
16616-05
028
figure 3.1

FIGURE 3.2



NSL-3SR	9/9/2002	3/7/2003	10/28/2009
Metals (mg/L)			
Arsenic	0.029	0.038	0.034

EPA-8	9/4/2002	3/14/2003	10/29/2009
VOCs (ug/L)			
Benzene	23	15	16
Metals (mg/L)			
Arsenic	0.047	0.046	0.034

NSL-57S	9/13/2002	3/12/2003
VOCs (ug/L)		
Benzene	16	19
Metals (mg/L)		
Arsenic	0.042	0.075
Barium	2.3	2.2

CPTVAS-89	8/22/2000
VOCs (ug/L)	
Benzene	8.2

NSL-56S	9/16/2002	3/17/2003	10/26/2009
VOCs (ug/L)			
Benzene	5.4/5.7	6.6	15
Metals (mg/L)			
Arsenic	0.022/0.021	0.030	0.046

EPA-4S	9/12/2002	3/6/2003
VOCs (ug/L)		
Vinyl chloride	0.46 J	2.3

NSL-15S	9/16/2002	3/17/2003	10/26/2009
VOCs (ug/L)			
Benzene	1.1	2.9/3.0	10
Vinyl chloride	1.6 J	8.9/7.4	2.1

NSL-83D	3/21/2003	5/13/2004	10/23/2009
VOCs (ug/L)			
Benzene	1.4	26	14
Metals (mg/L)			
Barium	1.1	2.3	-

NSL-91D	5/19/2004	1/12/2005	10/26/2009
VOCs (ug/L)			
Benzene	28	34	9.5
Trichloroethene	ND (1.7)	ND (1.0)	17
Vinyl chloride	44	52	5.2
Metals (mg/L)			
Barium	2.1	2.1	-

EPA-5	9/9/2002	3/5/2003
VOCs (ug/L)		
Benzene	4.6	8.0

EPA-6	9/17/2002	3/19/2003
VOCs (ug/L)		
Benzene	13	15
Metals (mg/L)		
Arsenic	0.031	0.030

NSL-59S	9/17/2002	3/19/2003
VOCs (ug/L)		
Trichloroethene	100	75

NSL-58S	9/9/2002	3/5/2003	10/27/2009
VOCs (ug/L)			
Benzene	18	25	16

LEGEND

- PROPERTY BOUNDARY
- TREE LINE
- TREE
- FENCE LINE
- SITE DISPOSAL AREAS (LIMIT OF WASTE)
- POTENTIAL OFF-SITE SOURCE AREAS
- NSL-42S — MONITORING WELL SCREENED WITHIN THE LOCAL NORTHEAST AQUIFER OR THE UPPER AQUIFER
- SELECTED PRELIMINARY BAYESTRATUM UPPER AQUIFER VERTICAL AQUIFER SAMPLING LOCATION IN WESTERN PORTION OF SITE
- GROUNDWATER ELEVATION CONTOUR (FEBRUARY 2006)
- APPROXIMATE LIMIT OF TILL-RICH ZONE
- APPROXIMATE LIMIT OF TILL-RICH ZONE EXISTING AT DEEPER DEPTH
- PROPOSED GROUNDWATER POINT OF COMPLIANCE
- EXTENT OF MCL/BACKGROUND EXCEEDANCE BEYOND PROPOSED GROUNDWATER POINT OF COMPLIANCE

NSL-59S	9/17/2002
VOCs (ug/L)	
Trichloroethene	100

- SAMPLE LOCATION
- SAMPLE DATE
- RESULT
- PARAMETER

- EXCEEDANCE OF MCL/BACKGROUND
- ND( ) — NOT DETECTED AT ASSOCIATED QUANTITATION LIMIT.
- J — ESTIMATED VALUE.
- NE — NO EXCEEDANCES OF PI DELINEATION CRITERIA.
- NS — SAMPLE COULD NOT BE COLLECTED BECAUSE LIQUID WAS NOT PRESENT IN THE BORING.

Chemical	Criteria	Criteria Source
VOCs (ug/L)		
Benzene	5	MCL
Trichloroethene	5	MCL
Vinyl chloride	2	MCL
Metals (mg/L)		
Arsenic	0.028	Background UR
Barium	2	MCL

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

NORTH SANITARY LANDFILL
DAYTON, OHIO

COMPARISON TO GROUNDWATER COMPLIANCE CRITERIA IN THE LOCAL NORTHEAST AQUIFER AND THE UPPER AQUIFER

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: ABRAMS AERIAL SURVEY CORPORATION LANSING, MICHIGAN PHOTOGRAPHY DATED JANUARY 7, 2008

Project Manager:	Reviewed By:	Date:
JKR	JS	MAY 2010
Scale: 1"=200'	Project No.: 16816-11	Report No.: PRES060
		Drawing No.: figure 3.2

16816-11(PRES060)GH-WA001 JUL 31/012

FIGURE 3.3

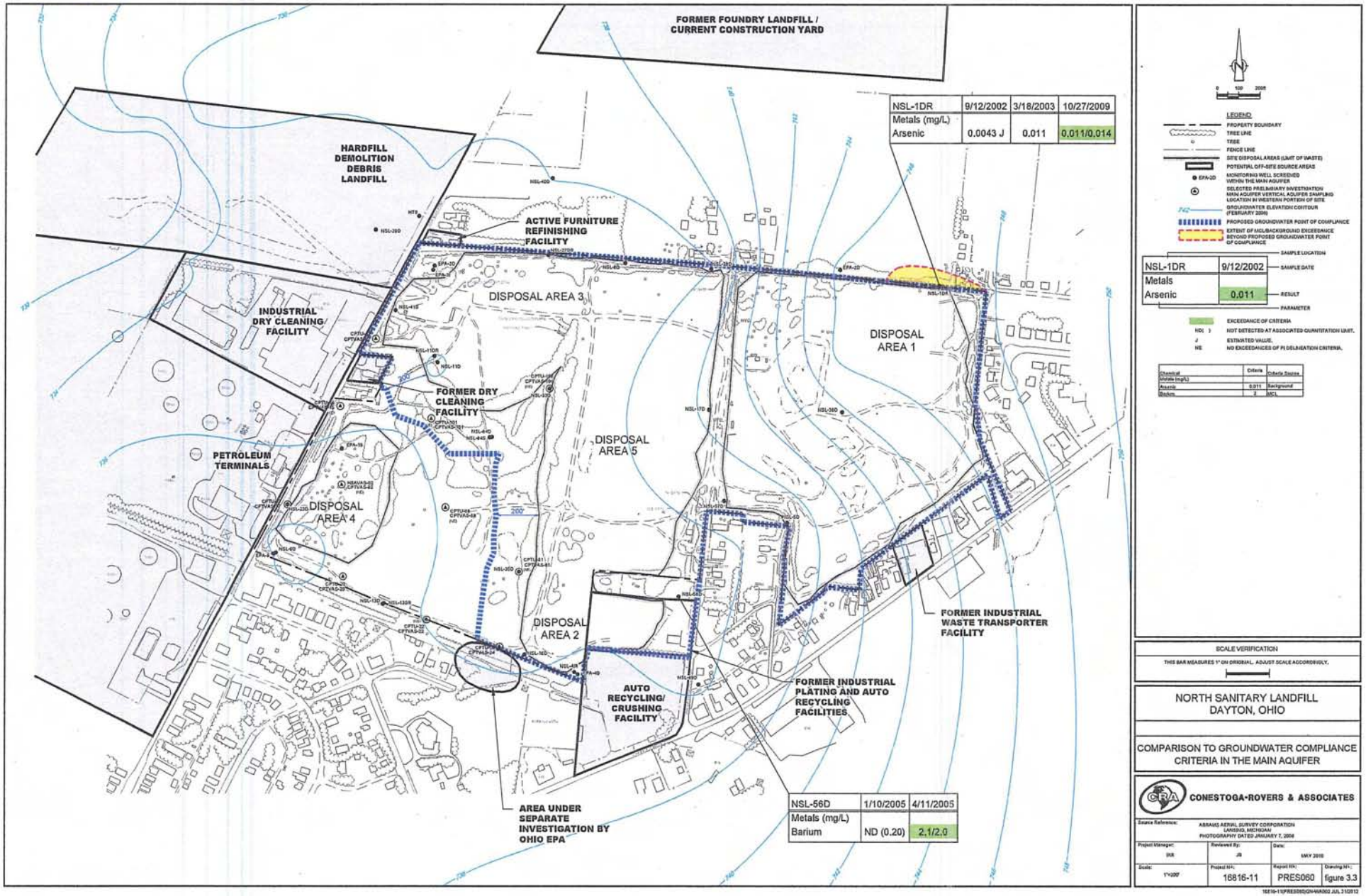

FORMER FOUNDRY LANDFILL / CURRENT CONSTRUCTION YARD
HARDFILL DEMOLITION DEBRIS LANDFILL
ACTIVE FURNITURE REFINISHING FACILITY
INDUSTRIAL DRY CLEANING FACILITY
FORMER DRY CLEANING FACILITY
PETROLEUM TERMINALS
DISPOSAL AREA 3
DISPOSAL AREA 1
DISPOSAL AREA 5
DISPOSAL AREA 4
DISPOSAL AREA 2
AUTO RECYCLING/ CRUSHING FACILITY
FORMER INDUSTRIAL PLATING AND AUTO RECYCLING FACILITIES
FORMER INDUSTRIAL WASTE TRANSPORTER FACILITY
AREA UNDER SEPARATE INVESTIGATION BY OHIO EPA
NSL-1DR | 9/12/2002 | 3/18/2003 | 10/27/2009
Metals (mg/L)
Arsenic | 0.0043 J | 0.011 | 0.011/0.014
NSL-56D | 1/10/2005 | 4/11/2005
Metals (mg/L)
Barium | ND (0.20) | 2.1/2.0
LEGEND
PROPERTY BOUNDARY
TREE LINE
TREE
FENCE LINE
SITE DISPOSAL AREAS (UNIT OF WASTE)
POTENTIAL OFF-SITE SOURCE AREAS
MONITORING WELL SCREENED WITHIN THE MAIN AQUIFER
SELECTED PRELIMINARY INVESTIGATION MAIN AQUIFER VERTICAL AQUIFER SAMPLING LOCATION IN WESTERN PORTION OF SITE
GROUNDWATER ELEVATION CONTOUR (FEBRUARY 2006)
PROPOSED GROUNDWATER POINT OF COMPLIANCE
EXTENT OF MCL/BACKGROUND EXCEEDANCE BEYOND PROPOSED GROUNDWATER POINT OF COMPLIANCE
SAMPLE LOCATION
NSL-1DR | 9/12/2002
Metals
Arsenic | 0.011
SAMPLE DATE
RESULT
PARAMETER
EXCEEDANCE OF CRITERIA
ND( ) NOT DETECTED AT ASSOCIATED QUANTITATION LIMIT.
J ESTIMATED VALUE.
NE NO EXCEEDANCES OF PI DELINEATION CRITERIA.
Chemical | Criteria | Criteria Source
Metals (mg/L)
Arsenic | 0.011 | Background
Barium | 2 | MCL
SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.
NORTH SANITARY LANDFILL
DAYTON, OHIO
COMPARISON TO GROUNDWATER COMPLIANCE CRITERIA IN THE MAIN AQUIFER
CONESTOGA-ROVERS & ASSOCIATES
Source Reference: ABRAMS AERIAL SURVEY CORPORATION LANSING, MICHIGAN PHOTOGRAPHY DATED JANUARY 7, 2006
Project Manager: BKR
Reviewed By: JB
Date: MAY 2010
Scale: 1"=200'
Project No.: 16816-11
Report No.: PRES060
Drawing No.: figure 3.3
16816-11\PRES060\GIS\WA002 JUL 31/2012

FIGURE 4.2

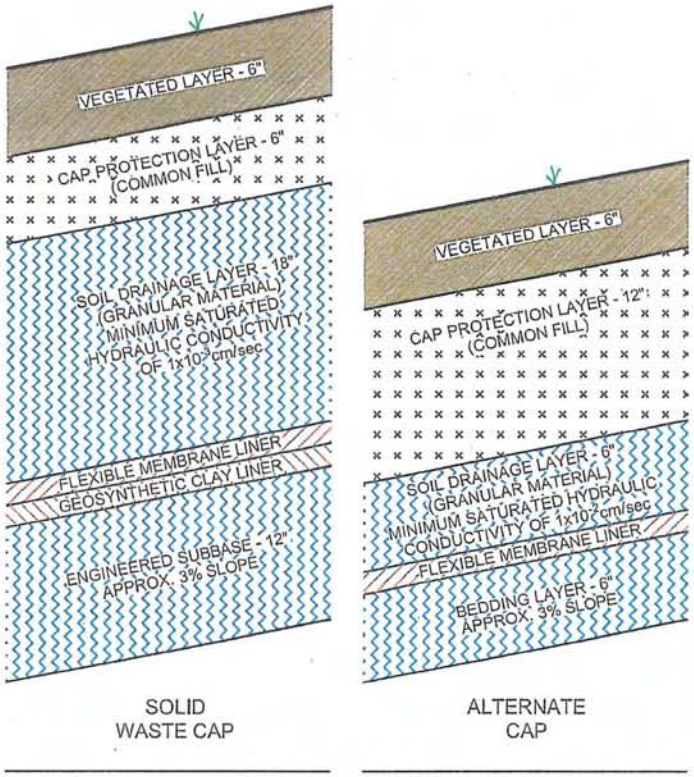


figure 4.2

CAP DESIGN OPTIONS
NORTH SANITARY LANDFILL
Dayton, Ohio

NOTES:
1. FLEXIBLE MEMBRANE LINER (FML) MUST BE A MINIMUM 40-mil HDPE. A LINER CUSHION LAYER SHALL BE PLACED ABOVE THE FML TO PROTECT AGAINST DAMAGE FROM CONSTRUCTION MATERIALS AND ACTIVITIES.
2. THE GEOSYNTHETIC CLAY LINER MUST "BE NEGLIGIBLY PERMEABLE TO FLUID MIGRATION" (OAC 3745-27-08(D)(9)(a).
3. THE SOIL DRAINAGE LAYER MUST HAVE A MINIMUM PERMEABILITY OF $1X10^{-3}$ cm/second.

16816-05(028)GN-WA019 MAR 16/2011

FIGURE 4.3

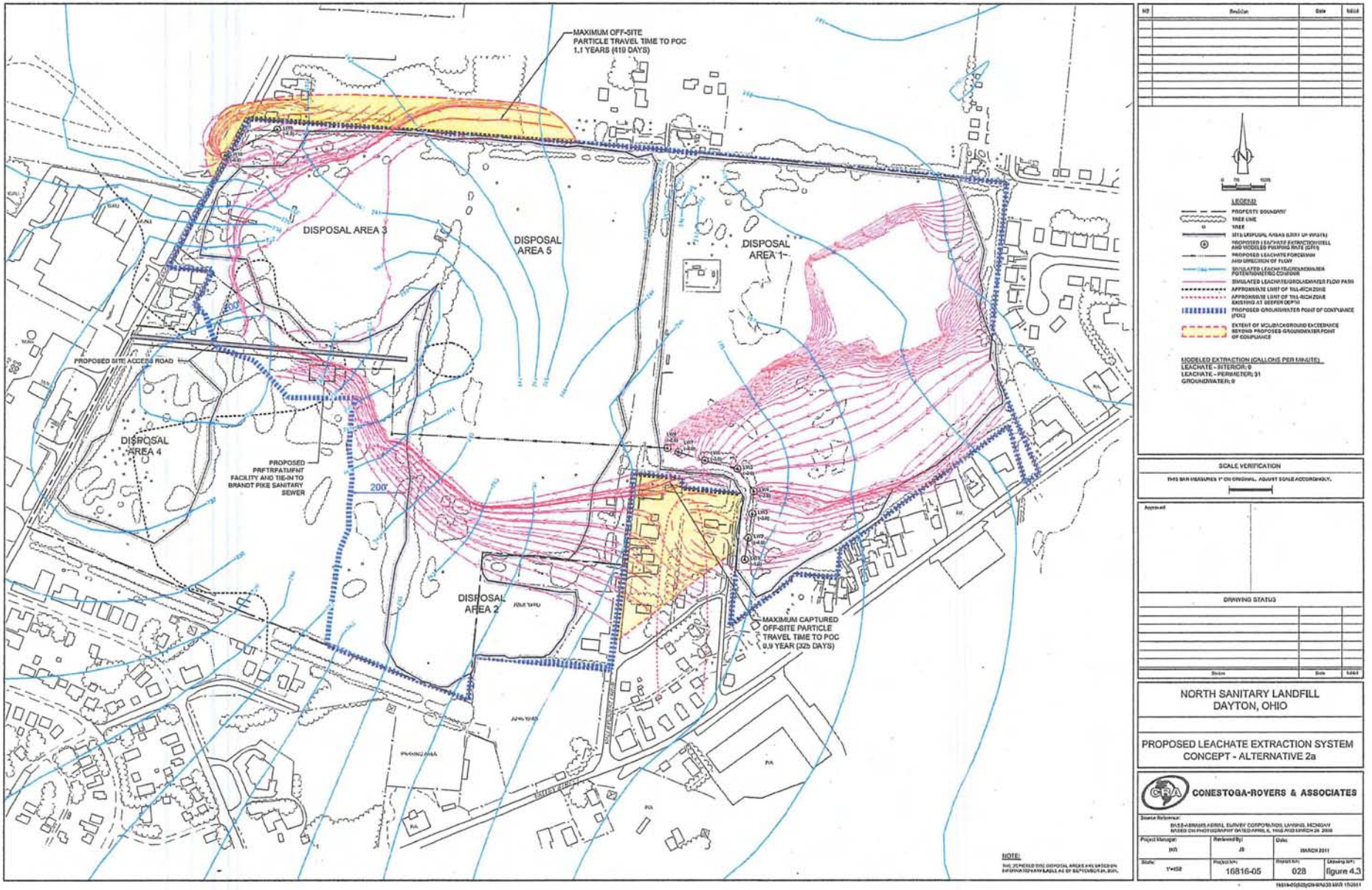
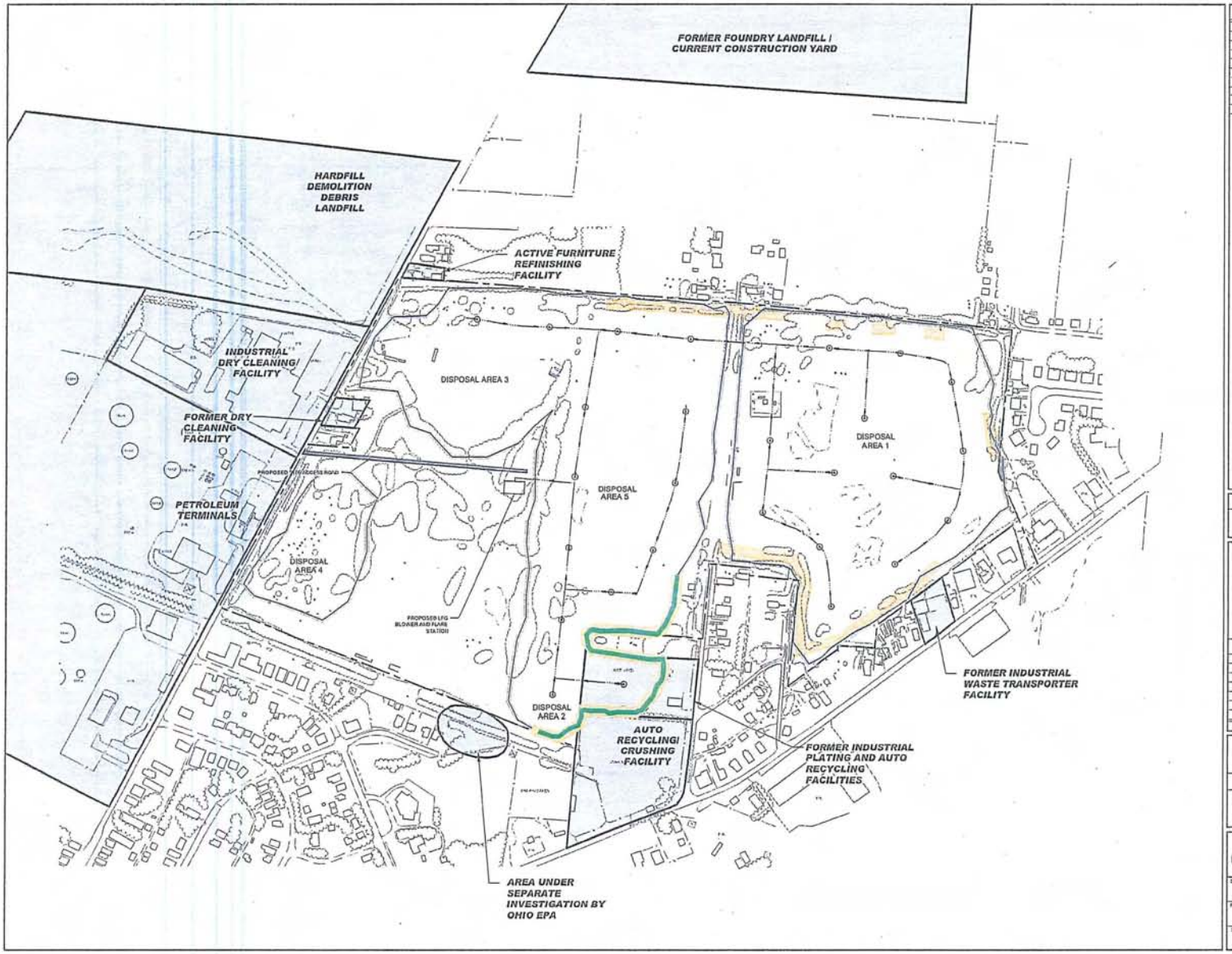

MAXIMUM OFF-SITE PARTICLE TRAVEL TIME TO POC 1.1 YEARS (419 DAYS)
DISPOSAL AREA 3
DISPOSAL AREA 5
DISPOSAL AREA 1
DISPOSAL AREA 4
DISPOSAL AREA 2
PROPOSED SITE ACCESS ROAD
PROPOSED PRETREATMENT FACILITY AND TIE-IN TO BRANDT PIKE SANITARY SEWER
200'
MAXIMUM CAPTURED OFF-SITE PARTICLE TRAVEL TIME TO POC 0.9 YEAR (325 DAYS)
NOTE:
LEGEND
PROPERTY BOUNDARY
TREE LINE
TREE
SITE DISPOSAL AREAS (BIRD'S EYE VIEW)
PROPOSED LEACHATE EXTRACTION WELL AND MODELED PUMPING RATE (GPM)
PROPOSED LEACHATE FORCEMAIN AND DIRECTION OF FLOW
SIMULATED LEACHATE/GROUNDWATER POTENTIOMETRIC CONTOUR
SIMULATED LEACHATE/GROUNDWATER FLOW PATH
APPROXIMATE LIMIT OF TILL-RICH ZONE
APPROXIMATE LIMIT OF TILL-RICH ZONE EXISTING AT DEEPER DEPTH
PROPOSED GROUNDWATER POINT OF COMPLIANCE (POC)
EXTENT OF MOLIBDENUM EXCEEDANCE BEYOND PROPOSED GROUNDWATER POINT OF COMPLIANCE
MODELED EXTRACTION (GALLONS PER MINUTE)
LEACHATE - INTERIOR: 0
LEACHATE - PERIMETER: 31
GROUNDWATER: 0
SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.
DRAWING STATUS
NORTH SANITARY LANDFILL
DAYTON, OHIO
PROPOSED LEACHATE EXTRACTION SYSTEM
CONCEPT - ALTERNATIVE 2a
CONESTOGA-ROVERS & ASSOCIATES
16816-05
028
figure 4.3

FIGURE 4.4



No	Revision	Date	Initial

LEGEND
PROPERTY BOUNDARY
TREE LINE
TREE
FENCE LINE
SITE DISPOSAL AREAS (LIMIT OF WASTE)
EXISTING LANDFILL GAS PHYSICAL BARRIER
POTENTIAL OFF-SITE SOURCE AREAS
EXTENT OF EXISTING GAS SYSTEM
PROPOSED LFG OR LEACHATE/LFG WELL*
PROPOSED LEACHATE FORCEMAIN AND LFG HEADER AND DIRECTION OF FLOW

NOTE:
* THE LFG SYSTEM FOR THE 2-SERIES ALTERNATIVES WILL CONSIST OF LFG EXTRACTION WELLS, AND THE LFG SYSTEM FOR THE 3-SERIES ALTERNATIVES WILL CONSIST OF DUAL-PHASE (LEACHATE/LFG) EXTRACTION WELLS.

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

NORTH SANITARY LANDFILL
DAYTON, OHIO

PROPOSED LANDFILL GAS COLLECTION SYSTEM CONCEPT

CONESTOGA-ROVERS & ASSOCIATES

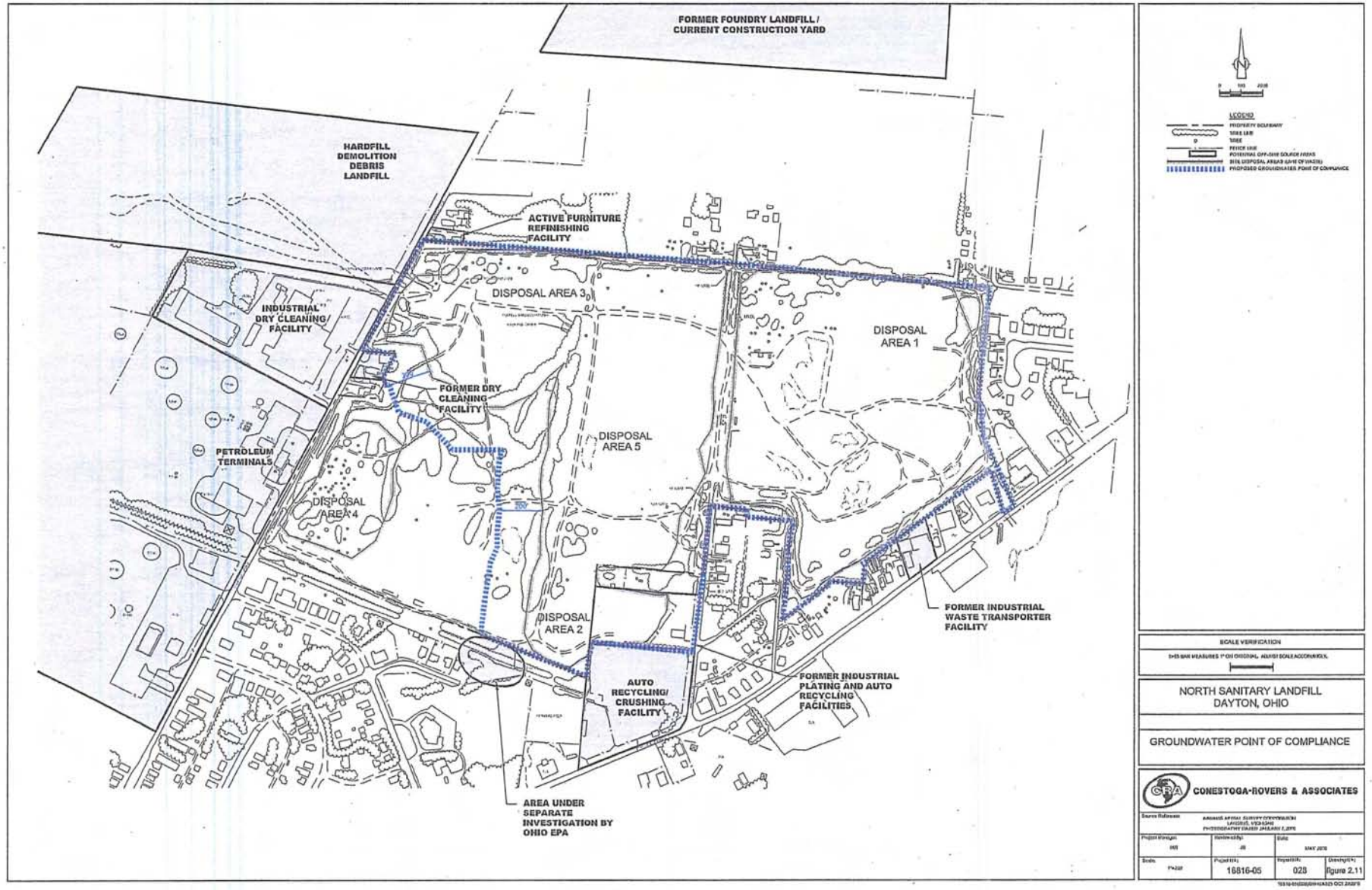
Source Reference: ABRAMS AERIAL SURVEY CORPORATION LANSING, MICHIGAN PHOTOGRAPHY DATED JANUARY 7, 2005

Project Manager	Reviewed By	Date
BKR	JB	MARCH 2011

Scale	Project No.	Report No.	Drawing No.
1"=800'	16816-05	028	figure 4.4

16816-05(028)GN-07027 MAR 17/2011

FIGURE 4.5


FORMER FOUNDRY LANDFILL / CURRENT CONSTRUCTION YARD
HARDFILL DEMOLITION DEBRIS LANDFILL
ACTIVE FURNITURE REFINISHING FACILITY
DISPOSAL AREA 3
INDUSTRIAL DRY CLEANING FACILITY
DISPOSAL AREA 1
FORMER DRY CLEANING FACILITY
DISPOSAL AREA 5
PETROLEUM TERMINALS
DISPOSAL AREA 4
DISPOSAL AREA 2
FORMER INDUSTRIAL WASTE TRANSPORTER FACILITY
AUTO RECYCLING/ CRUSHING FACILITY
FORMER INDUSTRIAL PLATING AND AUTO RECYCLING FACILITIES
AREA UNDER SEPARATE INVESTIGATION BY OHIO EPA
LEGEND
PROPOSED GROUNDWATER POINT OF COMPLIANCE
SCALE VERIFICATION
NORTH SANITARY LANDFILL
DAYTON, OHIO
GROUNDWATER POINT OF COMPLIANCE
CONESTOGA-ROVERS & ASSOCIATES
16816-05
028
figure 2.11