



# First Five-Year Review Report

## K&L Avenue Landfill Superfund Site (a/k/a West KL Avenue Landfill) Kalamazoo County, Michigan

May 2009



Prepared by U.S Environmental Protection Agency  
Chicago, Illinois

Approved by:

Richard C. Karl, Director  
Superfund Division  
U.S. Environmental Protection Agency

Date:

5-11-09

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## List of Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CD	Consent Decree
1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
1,4-DD	1,4-Diethylene Dioxide
GRUZ	Groundwater Restriction Use Zone
ICs	Institutional Controls
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MDNR	Michigan Department of Natural Resources
MDEQ	Michigan Department of Environmental Quality
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PPB	Parts per billion
PRP	Potentially Responsible Party
RD/RA	Remedial Design/Remedial Action
RAO	Remedial Action Objectives
ROD	Record of Decision
RI/FS	Remedial Investigation and Feasibility Study
THF	Tetrahydrofuran
EPA	United States Environmental Protection Agency
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compounds

## Executive Summary

### Introduction

The West KL Avenue Landfill (also referred to as the K&L Landfill, KL Landfill and the Kalamazoo Landfill) is located in Kalamazoo County, Michigan. The remedy for the West KL Avenue Landfill Superfund site (West KL) includes capping of the landfill, monitored natural attenuation (MNA) of groundwater, continued long-term groundwater monitoring, and implementation of institutional controls (ICs) at the landfill property and within the groundwater area of concern. Institutional controls include placing deed restrictions on the landfill property to restrict future land and groundwater use and implementation of a countywide groundwater ordinance to prevent private well users from drinking potentially contaminated groundwater within the groundwater area of concern. The remedy also includes connecting all homes within the affected groundwater area to city water or deeper wells, and the abandonment of their private drinking water wells. West KL achieved construction completion with the signing of the Preliminary Close-Out Report on December 20, 2006.

This is the first Five-Year Review for West KL. The triggering action for this statutory review is the actual start of the on-site construction of the remedial action on August 23, 2004. This is the date when residential municipal water service connections began as required by the 2003 Record of Decision Amendment. The United States Environmental Protection Agency (EPA) conducted this first Five-Year Review with the assistance of the Michigan Department of Environmental Quality (MDEQ).

The assessment of this Five-Year Review found that the West KL remedy currently protects human health and the environment in the short-term because the remedy prevents direct contact and exposure to contaminants in the landfill waste and groundwater, through implementation of the following actions: constructing an engineered cover over the landfill wastes that prevents direct contact with contaminants and reduces the releases of contaminants into the environment; connecting over 200 homes within the proposed groundwater use restriction zone (GRUZ) to a potable water supply by providing hook-ups to city water or by constructing a new potable well in the deeper aquifer; installing a fence around the West KL property to restrict access to the landfill and its contaminants; and imposing IC deed restrictions on the landfill property prohibiting land development and groundwater use. Long-term protectiveness of this remedy relies on compliance with ICs. Compliance with ICs requires implementation of ICs and long-term stewardship of monitoring, maintaining and enforcing these landfill and groundwater ICs. This stewardship requires additional IC evaluation activities of the deed restrictions and will require amending the proposed GRUZ and implementing a countywide groundwater use ordinance to effectively prohibit potable groundwater use from two additional homes that may be potentially impacted. As proposed, the ordinance requires all homes within the GRUZ to abandon potable use of existing private drinking water wells and connect to the city water supply. The West KL remedy will protect human health and the environment in the long-term because the landfill

cover will reduce the release of contaminants to the environment while preventing direct contact threats, and the groundwater remedy of MNA will attain long-term protectiveness when groundwater cleanup standards are achieved throughout the plume area. Although the effectiveness of MNA to achieve cleanup standards within a reasonable time-period will be evaluated in 2010, five years after initiating the landfill cap construction, groundwater data collected both prior to and after the landfill cap construction show reductions in many of the groundwater contaminant concentrations. The long-term protectiveness of the remedy relies on the stewardship of implementing, monitoring, maintaining and enforcing the landfill ICs, to prevent the exposure to contaminants from the landfill.

### Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name:</b> West KL Avenue Landfill		
<b>EPA ID:</b> MID980506463		
<b>Region:</b> 5	<b>State:</b> MI	<b>City/County:</b> Kalamazoo County, Kalamazoo
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status:</b> <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<b>Construction completion date:</b> 12/20/2006	
<b>Has site been put into reuse?</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
<b>Author name:</b> Shari Kolak		
<b>Author title:</b> Remedial Project Manager	<b>Author affiliation:</b> EPA Superfund Division	
<b>Review period:</b> 10/29/2008 to 4/11/2009		
<b>Date(s) of site inspection:</b> November 2008 (see Section VI of Five-Year Review Report)		
<b>Type of review:</b> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
<b>Review number:</b> <input checked="" type="checkbox"/> 1 (First) <input type="checkbox"/> 2 (Second) <input type="checkbox"/> 3 (Third) <input type="checkbox"/> Other (specify)		
<b>Triggering action:</b> <input checked="" type="checkbox"/> Actual RA Onsite Construction <input type="checkbox"/> Actual RA Start at OU# <input type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date:</b> 08/23/2004		
<b>Due date:</b> 08/23/2009		



### **Five-Year Review Summary Form (continued)**

#### **Issues:**

1. The Groundwater Restriction Use Zone (GRUZ) needs to be updated to include April 2009 groundwater data;
2. Required countywide groundwater institutional control (IC) ordinance has not been implemented; and
3. Operation and Maintenance (O&M) Plan must be amended to include monitoring, maintaining and enforcing effective ICs.

#### **Recommendations and Follow-up Actions:**

1. Update the GRUZ to include April 2009 groundwater sampling data;
2. Update the application for the County ordinance to include revised GRUZ; Agencies review and EPA endorse application for County ordinance; Submit EPA approved application to Kalamazoo County; and Implement countywide groundwater IC ordinance by January 2010; and
3. Update O&M Plan to require inspection of ICs (deed restrictions) at the landfill property to ensure long-term stewardship, which includes implementing, monitoring, maintaining and enforcing effective ICs; and Develop an IC Plan to further evaluate the deed restrictions and plan for implementation of the groundwater ordinance.

#### **Protectiveness Statement:**

The remedy at West KL currently protects human health and the environment in the short-term because the remedy prevents direct contact and exposure to contaminants in the landfill waste and groundwater, through implementation of the following actions: constructing an engineered cover over the landfill wastes that prevents direct contact with contaminants and reduces the releases of contaminants into the environment; connecting over 200 homes within the proposed GRUZ to a potable water supply by providing hook-ups to city water or by constructing a new potable well in the deeper aquifer; installing a fence around the West KL property to restrict access to the landfill and its contaminants; and imposing IC deed restrictions on the landfill property prohibiting land development and groundwater use. Long-term protectiveness of this remedy relies on compliance with ICs. Compliance with ICs requires implementation of ICs and long-term stewardship of monitoring, maintaining and enforcing these landfill and groundwater ICs. This stewardship requires additional IC evaluation activities of the deed restrictions and will require amending the proposed GRUZ and implementing a countywide groundwater use ordinance to effectively prohibit potable groundwater use from two additional homes that may be potentially impacted. As proposed, the ordinance requires all homes within the GRUZ to abandon potable use of existing private drinking water wells and connect to the city water supply. The West KL remedy

will protect human health and the environment in the long-term because the landfill cover will reduce the release of contaminants to the environment while preventing direct contact threats, and the groundwater remedy of MNA will attain long-term protectiveness when groundwater cleanup standards are achieved throughout the plume area. Although the effectiveness of MNA to achieve cleanup standards within a reasonable time-period will be evaluated in 2010, five years after initiating the landfill cap construction, groundwater data collected both prior to and after the landfill cap construction show reductions in many of the groundwater contaminant concentrations. The long-term protectiveness of the remedy relies on the stewardship of implementing, monitoring, maintaining and enforcing the landfill ICs, to prevent the exposure to contaminants from the landfill.

Date of last Regional review of Human Exposure Indicator: **9/28/2006**

Human Exposure Survey Status: **Current Human Exposure controlled.**

Date of last Regional review of Groundwater Migration Indicator: **12/10/2008**

Groundwater Migration Survey Status: **Contaminated groundwater migration under control.**

Ready for Reuse Determination Status: **Not ready for reuse.**

## **Five-Year Review Report**

### **I. Introduction**

The United States Environmental Protection Agency (EPA) Region 5, in consultation with the Michigan Department of Environmental Quality (MDEQ), has conducted this Five-Year Review for the West KL Avenue Landfill Superfund site (West KL) in Kalamazoo County, Michigan. The EPA conducted this review from October 2008 through April 2009. This report documents the results of the Five-Year Review of the remedy at West KL.

#### **Purpose**

The purpose of Five-Year Reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and provide recommendations to address them.

#### **Authority**

The EPA prepared this Five-Year Review Report pursuant to CERCLA § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP; 40 C.F.R. § 300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

## Triggering Action

A Five-Year Review is applicable to West KL because hazardous substances, pollutants, or contaminants remain on site above levels that allow for unlimited use and unrestricted exposure. Hazardous substances, pollutants, or contaminants were left on-site after the landfill cap construction was completed in December 2006.

This is the first Five-Year Review for West KL. The triggering action for this statutory review is the actual start of the on-site construction of the remedial action on August 23, 2004. Although many homes were connected to municipal water before 2004, the KLA Group, a group representing the potentially responsible parties (PRPs) at West KL, voluntarily performed these connections prior to EPA issuing a Record of Decision (ROD). Since municipal water service connections were part of the remedial action required by the 2003 ROD Amendment, the start of the on-site construction of the RA corresponds to the date when municipal water service connections began post-ROD issuance (August 23, 2004).

The EPA will conduct future Five-Year Reviews at West KL using this trigger date as long as hazardous substances, pollutants, or contaminants remain on site above levels that allow for unlimited use and unrestricted exposure.

## II. Site Chronology

Table 1 summarizes the site's history:

**Table 1: Chronology of Site Events**

<b>Event</b>	<b>Date</b>
West KL Avenue Landfill operated as a private dump	1955 to 1960
Oshtemo Township leased the property for use as a sanitary landfill	1960
Kalamazoo County bought the property to use as a countywide sanitary landfill. Kalamazoo County also purchased land adjacent to the dump to create the present 87-acre site	1968
Kalamazoo County operated the landfill under licenses issued by the MDEQ	1968-1974
Initial discovery of contamination in shallow aquifer residential wells	May 1979

**Table 1: Chronology of Site Events**

<b>Event</b>	<b>Date</b>
Pre-NPL responses - Kalamazoo County placed a 2-foot layer of mixed soil and clay over landfill; installed a water main near the landfill, just off 4 <sup>th</sup> Street, and connected 36 homes in this area to city water; and replaced 11 contaminated private wells with deeper wells.	1980
NPL listing (proposed, final)	December 30, 1982, September 8, 1983
EPA/MDEQ Cooperative Agreement Signed	June 30, 1985
Remedial Investigation/Feasibility Study (start, finish)	1986 – 1990
ROD signature	September 28, 1990
Remedial design starts (landfill)	September 18, 1992 (but later put on hold while pre-design investigations were being completed) 2002 – Remedial design resumes
Consent Decree for Remedial Design/Remedial Action (RD/RA) Signed	July 20, 1992 November 17, 1992 (entered in federal court)
KLA Group voluntarily extends municipal water to 123 homes in Springwood Hills subdivision	August 1999 through January 2000
KLA Group voluntarily begins residential well monitoring program	March 2000
2003 first ROD Amendment Signed	February 27, 2003
Remedial design complete (landfill)	July 22, 2004
Actual remedial action start	August 23, 2004 (municipal water hook-ups under 2003 ROD Amendment)
KLA Group extends municipal water to 89 additional homes in Springwood Hills subdivision and professionally abandons 98 private wells	June 2004 through December 2006
Landfill Cap Construction (start)	September 2005

**Table 1: Chronology of Site Events**

<b>Event</b>	<b>Date</b>
First Amendment to Consent Decree Signed	March 30, 2004 April 15, 2005 (entered in federal court)
2005 second ROD Amendment Signed	September 12, 2005
Landfill Cap Construction (finish)	December 2006
Preliminary Close-out Report Signed	December 20, 2006
Final Landfill Cap Construction Inspection	April 30, 2007
Certification of Landfill Construction Completion	June 19, 2007
Second Amendment to Consent Decree Signed	August 23, 2007 January 17, 2008 (entered in federal court)
Interim Remedial Action Report Signed	September 6, 2007
KLA Group extends water mains and provides municipal water service connections to 13 homes along 1 <sup>st</sup> Street. Residents' private drinking water wells are abandoned and sealed.	October 2, 2008 through December 5, 2008

### **III. Background**

#### **Site Characteristics**

The West KL Avenue Landfill is located approximately three miles west of the city of Kalamazoo, in Oshtemo Township, Kalamazoo County, Michigan. See Figure 1 in Attachment 1 for Site Location Map. The site, which includes the landfill and property adjacent to the landfill, comprises approximately 87 acres. The landfill is approximately 65 acres. West Main Street (M-43) borders the property to the north, West KL Avenue to the south, 1<sup>st</sup> Street to the west, and residential property directly to the east. The area surrounding the site includes a mixture of farms, residences and businesses (see Figure 2 in Attachment 1).

A groundwater plume, containing site-related contaminants, is emanating from the landfill within the uppermost (shallow) aquifer. This groundwater plume has migrated approximately 1.5 miles downgradient of the landfill. There is no indication of site-related contaminants in the deeper aquifer.

## **Land and Resource Use**

West KL is located within a rural/residential area. The closest residents to the landfill are immediately to the southeast and southwest of the landfill. Bonnie Castle Lake is located adjacent to the northeast corner of the landfill and Dustin Lake is located one mile west of West KL. Springwood Lake is located within two miles of West KL (see Figure 2 in Attachment 1). The landfill sits above shallow and deep groundwater aquifers, separated by a thick layer of clay-rich glacial till. Both aquifers supply drinking water for Kalamazoo County. The shallow aquifer flows westerly and northwesterly toward Dustin Lake and Springwood Lake, respectively.

The property is zoned industrial and since the landfill has been capped, the future use of West KL must remain industrial. Dustin and Springwood Lakes are shallow lakes that are used for recreational purposes such as fishing, boating, and swimming.

## **History of Contamination**

The West KL Avenue Landfill operated as a private dump from approximately 1955 to 1960. In 1960, Oshtemo Township leased the property from the owner for use as a sanitary landfill. In 1968, Kalamazoo County bought the property to use as a countywide sanitary landfill. Kalamazoo County also purchased land adjacent to the dump to create the present 87-acre Site. From 1968 to 1974, the County operated the landfill under licenses issued by the MDEQ [then the Michigan Department of Natural Resources (MDNR)]. The landfill continued operation until May 1979, at which time the MDEQ closed the landfill after the discovery of volatile organic compounds (VOCs) in several shallow aquifer residential drinking water wells downgradient of the landfill. An estimated five million cubic yards of refuse and an unknown amount of bulk liquid and drummed chemical wastes were disposed of at the landfill.

The site was finalized on the National Priorities List (NPL) on September 8, 1983.

## **Initial Response Actions**

In 1979, the Kalamazoo County Health Department began monitoring residential wells for the MDEQ near the landfill. After the discovery of VOCs in residential wells, the MDNR ordered the County to provide an alternative water source to affected residents and to place an impermeable cover over the landfill. In response, the County installed a new water main and provided municipal water service connections to 36 homes along West KL Avenue and South 4<sup>th</sup> Street. The 36 homes included homes with contaminated water and homes where water was not contaminated but owners requested municipal water connections since their wells potentially could be contaminated in the future. The County also replaced 11 private wells with new wells drilled into the deeper uncontaminated aquifer. In 1980, Kalamazoo County covered the landfill with a two-foot layer of mixed soil and clay.

The EPA began a remedial investigation and feasibility study at the site in January 1985. A ROD was signed in September 1990. The ROD was amended in February 2003 and again in September 2005.

### **Basis for Taking Action**

Hazardous substances or pollutants that have been released from West KL include, but are not limited to:

Soil: PCBs

Groundwater: benzene, vinyl chloride, dichloroethane, lead, cadmium, zinc

Sediment: PAHs

### Contaminant Exposures

Actual or potential human exposure to contaminants posed by drinking the groundwater is the primary contributor to human health risks due to levels that exceed EPA's risk management criteria (i.e. excess lifetime carcinogenic risk exceeds the risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and/or non-carcinogenic hazards exceed a hazard index (HI) quotient of 1) under reasonable exposure scenarios. At the time the risk assessment was performed, potential carcinogenic risks were high for exposures to benzene, vinyl chloride and dichloroethane in the site groundwater, as these compounds exceed Safe Drinking Water Act maximum contaminant levels (MCLs), maximum contaminant level goals (MCLGs) above zero, or other protective levels. Lead, cadmium and zinc levels are high and create a hazard index greater than 1 for site groundwater. Risks associated with all other exposure pathways were within EPA's risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and/or non-carcinogenic hazards and do not pose a health hazard.

Actual or potential environmental receptor exposures to polychlorinated biphenyls (PCBs) in surface soil of the landfill and to polycyclic aromatic hydrocarbons (PAHs) in sediments of Bonnie Castle and Dustin Lake were low. Concentrations of PCBs in surface soil of the landfill were at concentrations below those associated with phytotoxic effects in some species of plants. When the landfill was uncapped, PCB intake by robins and shrews ingesting PCBs that accumulated in worms in landfill soil exceeded toxicity values for these species; therefore, reproductive effects in some members of the population may have occurred. However, impacts on these species are expected to have been negligible because a small number of robins and shrews were using or inhabiting the landfill and reduced reproduction in a few members of any population will have inconsequential (in an ecological sense) effects on the reproduction of the population as a whole. PAHs in sediment of Bonnie Castle and Dustin Lake are not at concentrations sufficient to impact aquatic life.



Since the risk assessment was performed, the KLA Group conducted a soil gas investigation in 2006 to evaluate the potential for vapor intrusion. The KLA Group's soil gas investigation showed low concentrations of methane and no detections of volatile organic compounds (VOCs) in subsurface soil and concluded that vapor intrusion is not a pathway for residential exposures. The MDEQ also collected subsurface gas data with similar results, low concentrations of methane and no detections of VOCs, which support the conclusion that vapor intrusion is not an exposure pathway of concern at the site.

#### **IV. Remedial Actions**

##### **Remedy Selection**

The EPA signed a ROD for West KL on September 28, 1990. Remedial Action Objectives (RAOs) were developed based on the data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs developed were to: 1) reduce and control potential risks to human health posed by exposure to contaminated groundwater and landfilled waste; and 2) to restore contaminated groundwater to State cleanup standards or Federal drinking water standards, whichever is more stringent. RAOs remain the same in the 2003 and 2005 ROD Amendments discussed below.

The major components of the 1990 ROD include:

- Installation of a perimeter fence to protect the integrity of the landfill cap and restrict public access to the site;
- Construction of a multi-layer hazardous waste landfill cap to prevent exposure to the landfill waste and to reduce the amount of contamination reaching the groundwater;
- Pump and treat for contaminated groundwater until Michigan Act 307-Type B groundwater cleanup standards or federal drinking water standards called MCLs, and MCLGs above zero, are met (this requirement has since been superseded);
- Continued long-term groundwater monitoring;
- Proper abandonment of residential drinking water wells that were replaced in the 1980s; and
- Implementation of deed restrictions to prohibit future development of the landfill and prohibit installation of groundwater drinking water wells at the landfill and at homes within the area bounded by the landfill to the east, 4<sup>th</sup> Street to the west,

to the north by Almena Ave, and to the south by West KL Avenue. See Figure 2a in Attachment 1 for the location of the area subject to deed restrictions under the 1990 ROD.

In October 1998, sampling by Kalamazoo County detected groundwater contamination in several residential drinking water wells in the Springwood Hills subdivision located approximately one-mile downgradient of the landfill. In response, the MDEQ placed several homes on bottled water temporarily. The KLA Group also voluntarily agreed to pay to extend city water mains and provide municipal water service connections (also referred to in this report as “city water” or “city water service connections”) to all homes within the subdivision. The KLA Group also began sampling residential wells on a routine basis to ensure that no residents were drinking contaminated groundwater. As a result of this monitoring, a number of residential wells along West KL Avenue and along 2<sup>nd</sup> Street were found to be contaminated and subsequently, these homes were connected to city water. The KLA Group also performed a limited groundwater investigation (monitoring well installation) in this area to determine the extent of this previously unknown contamination.

Due to the findings of groundwater contamination in the Springwood Hills subdivision, EPA amended the ROD in February 2003. The 2003 ROD Amendment required:

- Supplying municipal water to all homes within the newly created “2003 Municipal Water Supply Area” shown on Figure 3 and abandoning private drinking water wells at each property (unless used for non-potable uses) supplied with city water to prevent exposure to contaminated groundwater;
- Implementation of institutional controls such as a county ordinance to prohibit installation of new drinking water wells within the 2003 Municipal Water Supply Area; and
- Replacement of the Michigan Act 307 type B groundwater cleanup standards in the 1990 ROD with the current residential groundwater cleanup standards established under Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (formerly known as Michigan Act 307).

Based on the results of the pre-design studies conducted under the 1992 Consent Decree (CD), the KLA Group petitioned EPA to amend the groundwater remedy in the 1990 ROD. The proposed amended remedy would rely upon natural attenuation of the groundwater plume instead of an active pump and treatment system. The KLA Group also proposed not to install the clay cap as required by the 1990 ROD, but rather to leave the existing permeable cover in place to aid in the natural degradation of contaminants in the groundwater and in the landfill wastes.

On April 17, 2002, EPA notified the KLA Group that insufficient evidence was presented to warrant amending the 1990 ROD as it relates to the requirement for an impermeable

cap over the landfill waste. However, the Agency allowed the KLA Group an additional two years, not to exceed April 4, 2004, during which the Group could generate and present additional information, including alternative technology studies (e.g., sulfate addition pilot studies) it believed would support a monitored natural attenuation (MNA) groundwater remedy.

In early 2004, the contaminant, 1,4-dichloroethylene (1,4-DCE) was found in both monitoring and residential wells above drinking water criteria. The detection of this compound at the downgradient edge of the buffer zone established in the 2003 ROD Amendment necessitated an expansion of the buffer zone at its downgradient edge to include properties an additional 1,000 feet downgradient.

In September 2005, EPA amended the remedy selected by the 1990 ROD to incorporate the findings of the KLA Group's natural attenuation studies and to address additional areas of groundwater contamination beyond the area established by the 2003 ROD Amendment.

The 2005 ROD Amendment:

- Replaces the 1990 ROD landfill cap design requirement for a two-foot thick clay layer with a geosynthetic clay layer/flexible membrane liner, and the 12-inch drainage layer with a geocomposite drainage layer. The amended cap design also reduces the two-foot thick layer of clean fill to eighteen inches, and slightly reduced the landfill slope requirements;
- Requires the supply of municipal water to all private well users (not currently supplied with city water) within an expanded area called the "2005 expanded Municipal Water Supply area." This also includes the abandonment of private drinking water wells at each property supplied with city water unless used for non-potable uses discussed in the bullet below. See Figure 4 for the location of the 2005 Municipal Water Supply Area;
- Requires implementation of countywide groundwater IC ordinance on private drinking water wells within the 2005 Municipal Water Supply Area to ensure that contaminated groundwater is only used in ways that remain protective of human health. The county ordinance would prohibit the installation of new drinking water wells but would allow existing water wells to be retained if it is used solely for irrigation or other non-potable uses and if approved by Kalamazoo County and MDEQ;
- Requires a minimum one-thousand (1000) foot distance between the downgradient boundary of the buffer zone and the location of any groundwater well with site-related contaminants above groundwater cleanup standards. By linking the width of the buffer zone to the location of site-related contaminants in

groundwater, the 2005 ROD eliminates the need for future ROD amendments should the aerial extent of the groundwater plume change based on future sampling; and

- Replaces the active pump and treat groundwater remedy, selected by the 1990 ROD, with MNA and contingent remedies if MNA is ineffective in remediating the groundwater plume within a reasonable timeframe. The MDEQ did not concur with the 2005 ROD Amendment selecting MNA as the groundwater remedy.

## **Remedy Implementation**

After issuance of the original ROD, EPA signed a remedial action CD with the PRPs in November 1992. One hundred twenty eight parties were signatories to the CD. Six parties, collectively called the KLA Group, assumed the primary responsibility for implementing the remedy under the CD. In accordance with the ROD and CD, the KLA Group installed a site security fence in 1992 and began the remedial design (RD) of the remedy selected in the ROD. However, the RD was put on hold later in 1992 pending further pre-RD groundwater investigations. Early in the process, the scope of these studies expanded, with approval of EPA and MDEQ, to investigate the potential for natural processes to attenuate or degrade the contaminants in the groundwater. The remedial design of the landfill cap resumed in December 2002 and the cap design was completed in July 2004. During this time, pre-RD groundwater investigation studies continued.

Prior to the 2003 ROD Amendment, the KLA Group voluntarily agreed to connect all homes in the Springwood Hills subdivision to city water due to the discovery of groundwater contamination. Between 1999 and 2002, the KLA Group connected 123 homes to city water. After the issuance of the 2003 ROD Amendment, the court entered the first amendment to the CD in 2005, whereby the KLA Group agreed to provide city water to the remaining homes in the Springwood Hills subdivision.

Between June 2004 and December 2006, the KLA Group connected the remaining 89 homes to city water in accordance with the 2005 CD Amendment. During this time, 98 residential drinking water wells were also sealed and properly abandoned. Since 1999, 212 homeowners were connected to city water and 98 private wells professionally abandoned. As of December 2006, two homeowners declined connections to city water and they are using their private water wells for drinking water, despite numerous requests by KLA Group to connect to city water. See Figure 4 in Attachment 1 for the location of the 2005 Municipal Water Supply Area.

After issuance of the 2005 ROD Amendment, the court entered a second amendment to the CD in 2008. Under this CD Amendment, the KLA Group agreed to finish constructing the landfill cap in accordance with the amended cap design in the 2005 ROD; to provide city water connections to additional homes; and implement MNA to

treat contaminated groundwater with pump and treat as a contingent groundwater remedy. In accordance with the 2005 ROD and 2008 CD Amendments, the KLA Group completed the amended landfill cap construction. Cap construction began in September 2005 and was completed in October 2006, with a final inspection occurring in April 2007. The Site reached construction completion with the signing of the Preliminary Closeout Report in December 2006. No problems were encountered during the construction. Contaminants in the groundwater are expected to reach cleanup levels within approximately ten to fifteen years. After groundwater cleanup levels have been met, EPA will issue a Final Closeout Report. Although not required by the 2008 CD Amendment, the KLA Group also voluntarily elected to convert the landfill passive gas system into an active gas collection/destruction system. Part of the active gas collection system consists of a flare to treat the collected landfill gas. Installation of the flare started in October 2007 and was completed in June 2008.

Since issuance of the 2005 ROD Amendment, the boundary of the water supply area was expanded again to include additional homes further downgradient based on groundwater sampling data collected in April/May 2007 and October 2007. The 2007 Municipal Water Supply Area is shown on Figure 5 in Attachment 1. Although a new water supply area was established, a ROD Amendment was not necessary. This is because the 2005 ROD Amendment required a minimum 1,000 foot distance between the downgradient boundary of the buffer zone and the location of any groundwater well with site-related contaminants above groundwater cleanup standards. By linking the width of the buffer zone to the location of site-related contaminants in groundwater, the 2005 ROD Amendment eliminated the need for future ROD amendments should the aerial extent of the groundwater plume change.

Between October and December 2008, the KLA Group connected 14 additional homes along 1<sup>st</sup> Street to city water and abandoned 13 private wells within the 2007 Municipal Water Supply Area. The two remaining homes shown in dark grey on Figure 5, will be connected to city water in spring 2009. Since implementation of the remedy, the KLA Group has installed a total of 226 municipal water connections or drinking water wells.

A detailed summary of other remedial activities conducted under the CD and the 2005 and 2008 CD Amendments are in the KLA Group semi-annual progress reports in the administrative record for West KL.

### **Institutional Controls**

Institutional controls (ICs) are non-engineered instruments, such as administrative and/or legal controls that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for those areas that do not allow for unlimited use or unrestricted exposure (UU/UE).

Figure 6 shows the groundwater plume area exceeding MCLs and Michigan Part 201 Generic Residential Cleanup Criteria. Figure 7 shows the entire area (shown in light grey) in which groundwater use is restricted. The green highlight on the figure represents the area of the landfill property subject to land and groundwater use restrictions. Table 2, below, summarizes institutional controls for these restricted areas.

**Table 2: Institutional Controls Summary**

<b>Areas that do not support UU/UE based on current conditions</b>	<b>Objectives of Institutional Controls</b>	<b>Institutional Control Instrument Implemented or Planned</b>
<b>West KL Avenue Landfill Property</b> - Constructed landfill cap identified in Figure 6	Protect integrity of landfill cap and prevent exposure to the underlying landfill waste.  Prohibit residential, commercial or industrial uses	Restrictive Covenant (Attachment 2) recorded at vol 15325 (liber 1720 page 1118) at county recorder's office on April 19, 1994
<b>West KL Avenue Landfill Property</b> – Area of soil treated to industrial cleanup standards identified in Figure 6	Prevent exposure to on-site contamination by limiting land use within the landfill property area.	Restrictive Covenant (Attachment 2) recorded at vol 15325 (liber 1720 page 1191) at county recorder's office on April 19, 1994
<b>West KL Avenue Landfill Property – On-Site Groundwater</b> Current area that exceeds groundwater cleanup standards identified in Figure 6	Prohibit groundwater use until cleanup standards are achieved	Restrictive Covenant (Attachment 2) recorded at vol 15325 (liber 1720 page 1118) at county recorder's office on April 19, 1994
<b>Groundwater – Off-Site</b> Current area in which potable use of groundwater is prohibited as shown in Figure 6	Prohibits drinking water well installation within areas of contaminated groundwater	Kalamazoo County Amendment to Kalamazoo County Sanitary Code, October 7, 2003
	Restricts groundwater use to non-potable uses until drinking water standards are achieved	Planned: Kalamazoo countywide groundwater use ordinance, which is expected to be in place by January 2010

## Status of IC Requirements and Implementation

At this time, initial IC evaluation activities have revealed that required ICs have been implemented on the landfill property but have not been fully implemented to address the off-site groundwater. We anticipate that the IC Plan, which includes further review of the deed restrictions on the landfill property and implementation of ICs for the off-site groundwater will be completed by EPA in conjunction with the KLA group, the MDEQ, and Kalamazoo County's review.

## Decision Documents

The 1990 ROD included ICs as part of the overall remedial action at West KL:

“Deed restrictions, or similar assurances, restricting the use of the shallow groundwater as a drinking water source, at least until the cleanup standards are achieved” and “placement of deed/use restrictions, prohibiting the construction of buildings or other structures on the landfill property and property immediately adjacent to the landfill.”

After issuance of the ROD, the court entered a remedial action CD in November 1992 whereby Kalamazoo County and Oshtemo Township, owners of the landfill property and property adjacent to the landfill, respectively, agreed to record deed restrictions on the “site property” and refrain from using the site in any manner that would interfere with the remedial components. Kalamazoo County and Oshtemo Township also agreed to prohibit future land use and not to extract the groundwater underlying the site.

The first ROD Amendment signed by EPA in 2003, added the following ICs as part of the overall remedial action at the site:

“Implementation of ICs (in the form of a county ordinance) on private drinking water wells to prevent exposure to contaminated groundwater by prohibiting installation of new drinking water wells within the (2003) municipal water supply zone.”

The 2003 ROD Amendment created a new municipal water service zone around the area of groundwater contamination, and a buffer zone within a determined area extending beyond the contamination, in which every property in this area will be connected to city water. After issuance of the 2003 ROD Amendment, the court entered the first amendment to the CD in 2005, under which the KLA Group agreed to implement ICs on properties within the 2003 Municipal Water Supply Area shown on Figure 3 in Attachment 1.

The second ROD Amendment signed in 2005 also included ICs as part of the overall remedial action at the site:

“Implementation of ICs in the form of a county ordinance to ensure that contaminated groundwater is only used in ways that remain protective of human health. The county ordinance would prohibit the installation of new drinking water wells but would allow existing water wells to be retained if it is used solely for irrigation or other non-potable uses and if approved by Kalamazoo County and MDEQ.”

The court entered the second amendment to the CD in 2008, under which the KLA Group agreed to implement ICs through appropriate local governmental action prohibiting installation and use of private drinking water wells within the municipal water supply zone created by the 2003 and the 2005 ROD Amendments. See Figure 4 for the location of the 2005 Municipal Water Supply Area.

### Compliance with Deed Restrictions

The EPA evaluated the deed restrictions for the site property. Based upon this review, EPA determined that all non-UU/UE areas are addressed effectively by the ICs as discussed below. ICs (deed restrictions) are in place at the property. A restrictive covenant was recorded that prohibits future development of the landfill (including but not limited to, on-site excavations, construction and drilling), the installation of groundwater drinking water wells, and the extraction of the groundwater underlying the site. Deed restrictions were recorded with the Kalamazoo County Recorder of Deeds on April 19, 1994 that prohibit the above uses. The EPA’s evaluation of ICs also confirmed that the physical description of the current non UU/UE areas is covered by the ICs. Additionally, the restrictive covenant embodies all IC objectives as required by the 1990 ROD and 1992 CD. The restrictive covenant also indicates that the deed restrictions run with the land and are binding upon all persons who acquire title to any legal interest in property within the Facility. See Attachment 2 for copy of deed restriction. The EPA will review the title and enforceability of existing covenants to ensure that current law does not adversely impact the enforceability of the IC. The additional IC evaluation activities will be part of the IC Plan to be developed by EPA.

### Long Term Stewardship

Long-term protectiveness at West KL requires compliance with ICs including the existing deed restrictions and the groundwater use ordinance in the future to assure that the remedy continues to function as intended. To assure proper maintenance and monitoring of the ICs, long-term stewardship procedures will be reviewed and incorporated into the site O&M plan. Initial review of the O&M plan determined that the plan currently does not identify the parties responsible or mechanisms that will be used for inspecting and monitoring compliance with the land use restrictions. The O&M plan will require regular inspection of ICs at the site and annual certification to EPA that the required ICs are in place and effective. Additionally, EPA will oversee the development of a communications plan and exploration of the use of a one-call system for long-term



stewardship. As part of this Five-Year Review, EPA is recommending that the KLA Group update the O&M plan to address this issue.

The County and Oshtemo Township are in compliance with the ICs as no unauthorized use of the site has occurred as evidenced by a previous EPA site visit and by quarterly landfill inspection reports. There are no unauthorized activities that would interfere with remedy components, no extraction of groundwater, and the current land use is consistent with industrial use.

#### Compliance with Site-Wide Groundwater ICs

The groundwater IC (county ordinance) is not yet in place. The KLA Group prepared an application to establish a GRUZ but the application was updated several times as the extent of the municipal water supply area expanded. Once the next round of groundwater sampling is collected in April 2009 and analytical results received, the KLA Group will update and resubmit the application to EPA and MDEQ. Subsequent to EPA and MDEQ review and endorsement, the KLA Group can submit the application to Kalamazoo County. We anticipate this to occur in the summer of 2009.

Although the countywide groundwater IC ordinance is not yet in place, almost all homes located within the impacted groundwater area are connected to city water or deeper wells, and residents are not being exposed to contaminants in the groundwater. Although most residents accepted city water connections or deeper wells, two residents refused and are currently using their private wells for drinking water. The homeowners also refused to have their private wells tested so it is unknown if these residents are being exposed to site-related contaminants above MCLs. The location of the two homes is shown in dark gray on Figure 4. Once the countywide groundwater IC ordinance is in place, these homeowners will be required to connect to city water or a deeper well for potable uses; they will be required to abandon their shallow private drinking water wells unless the wells are used for irrigation or other non-potable uses, and only if approved by Kalamazoo County and MDEQ. Implementation of the countywide groundwater IC ordinance will prevent the use of contaminated water for drinking and other ingestion purposes by prohibiting the installation of new water wells and prohibiting the use of groundwater for drinking and other ingestion purposes. The EPA expects the County groundwater use ordinance to be implemented by January 2010.

#### ***Kalamazoo County Sanitary Code***

Kalamazoo County adopted an amendment to the Kalamazoo County Sanitary Code on October 7, 2003 that prohibits the use of shallow aquifer groundwater for human consumption in the restricted zone (municipal water supply area) but allows for other uses such as for irrigation purposes, if approved by the MDEQ. See Attachment 3 to this Five-Year Review Report for copy of 2003 Amendment to the Kalamazoo County Sanitary Code. An excerpt of the County's Sanitary Code as it pertains to the

groundwater use restrictions is below.

*ARTICLE IIIb: WATER SUPPLY REGULATIONS - RESTRICTED ZONES  
CHAPTER 26b: WATER SOURCES FOR HUMAN CONSUMPTION*

“Except as provided in Chapter 22b of this Code, the water supply delivered for human consumption to any property located within a Restricted Zone shall be delivered only from a Municipal water system or by the use of bottled water delivered and purchased in containers under conditions approved by the State of Michigan. For the purposes of this subsection, the term “Human Consumption” means use in food or drink intended for human ingestion, use in food preparation or food service, use in the interior of a dwelling or dwelling unit for household purposes, and use in any building for personal washing.”

Kalamazoo County Sanitary Regulations currently require a permit before drilling new or replacement water wells. The County may deny a permit if the location of the well is in a known groundwater contamination area. Once the KLA Group submits the application to establish a GRUZ as discussed in the paragraph above, and the County approves the application, the County will enforce the County’s Sanitary Code, which requires all homes within the GRUZ to connect to city water or a deep aquifer well, and abandon their shallow private drinking water well. The GRUZ application will have a map showing the boundaries of the groundwater use restricted area, which currently corresponds to the areas that do not support UU/UE shown on Figure 6 in Attachment 1. We expect it will take 6 months for the County to review, approve and have the ordinance ready for passage by the city council by January 2010.

IC Assessment

IC’s on the landfill are in place and appear to be effective at the landfill property. There have been no uses of the property inconsistent with the ICs. As discussed on page 23 above, EPA will review the title and enforceability of existing covenants to ensure that current law does not adversely impact the enforceability of the ICs. There are no human or ecological exposures to the landfill waste as the landfill cap is in place and is properly maintained. There are no known human exposures to contaminated groundwater. Except for the two residences discussed on page 25 above, there are no shallow wells being used for drinking water and no groundwater being extracted from any shallow well for drinking purposes. Therefore, the ICs at West KL appear to be effective at preventing human and ecological exposure to the landfill waste and in preventing exposure to contaminated groundwater. With respect to the countywide groundwater IC ordinance, EPA anticipates the ordinance to be implemented by January 2010 in accordance with the schedule and follow-up actions specified in Table 5 under Section IX of this report.

## **System Operations and Maintenance Costs**

The West KL remediation and long-term O&M are being paid for by the PRPs and are being managed by the KLA Group, with EPA oversight. The KLA Group is not required to report its expenditures. However, the estimated annual operation and maintenance costs associated with the amended landfill cap and MNA in the 2005 ROD Amendment are \$143,520, and the anticipated cost for implementing the contingent remedy, if required, is \$393,520.

The O&M Plan contains schedules for the inspection and maintenance of the landfill cap, surface water management systems, condensate collection system, landfill gas management system; and Site security. ICs are not currently part of the O&M Plan but EPA will require the KLA Group to update the O&M Plan to include ICs.

## **V. Progress Since the Last Five-Year Review**

This is the first Five-Year Review for West KL.

## **VI. Five-Year Review Process**

### **Administrative Components**

The EPA led the Five-Year Review and was assisted by the MDEQ in this review as the support agency. The EPA orally notified MDEQ and the KLA Group in the fall 2008 that it was beginning the Five-Year Review process. The EPA also sent MDEQ and the KLA Group a follow-up letter in December 2008 to notify them that EPA was starting the first Five-Year Review at West KL.

### **Community Notification and Involvement**

The EPA notified the Kalamazoo community of the start of this first Five-Year Review for West KL by publishing an advertisement in the Kalamazoo Gazette newspaper on October 29, 2008. A copy of the advertisement is included in Attachment 4 at the end of this report. The EPA invited community members to submit comments. As of April 2009, EPA received no comments from the community concerning the Five-Year Review.

### **Documents Reviewed**

A complete list of documents reviewed for this Five-Year Review is included as Attachment 5 at the end of this report.

## Data Review

The EPA reviewed groundwater data from wells that are part of the monitoring well network to monitor performance of the groundwater remedy, MNA. The results of EPA's data review are below.

- Groundwater data shows that MNA is generally effective at treating the majority of organic compounds in the groundwater. MNA performance groundwater monitoring conducted since 1996 shows that some organic compounds have been eliminated (e.g. acetone) and/or the concentrations are decreasing below MCLs, and that the aerial extent of the groundwater plume for some constituents may be collapsing, such as 1,1-Dichloroethane (1,1-DCA) and 1,2-Dichloroethane (1,2-DCA).
- In general, natural attenuation has reduced the total mass of some organic contaminants in the groundwater plume by approximately 82 percent since the RI was conducted.
- Concentrations of Tetrahydrofuran (THF) and 1,4-DD are present throughout the plume and at the downgradient leading edge of the plume near 1<sup>st</sup> Street. Concentrations of THF are above State residential groundwater cleanup criteria in wells near Skyview Estates east of 1<sup>st</sup> Street and are below State cleanup standards west of 1<sup>st</sup> Street. Since 1,4-DD has only been sampled and analyzed for since 2004, there is insufficient data at this time to confirm whether its plume size is stable and not expanding at the leading edge of the plume. The KLA Group submitted a work plan in April 2009 to install two additional monitoring wells downgradient of the leading edge of the plume to further evaluate groundwater conditions in this area. Additionally, the ROD Amendment 2 requires the KLA Group to complete a full evaluation of the effectiveness of the MNA remedy five years after initiation of construction of the landfill cap, which will be in September 2010.

The KLA Group has assisted Kalamazoo County Health and Community Services with residential well monitoring since 2000. The KLA Group is currently implementing a Residential Monitoring Plan that includes semi-annual and annual sampling of residential wells not currently connected to city water. The County's sampling results are sent by mail to each homeowner and are posted to the County's web site at [kalcounty.com](http://kalcounty.com). The MDEQ Water Bureau has been monitoring certain residential wells near West KL. The EPA's review of MDEQ's and the County's sampling results from 2007-2008 indicates that the drinking water at these homes is safe as no site-related contaminants were found in any well above acceptable drinking water standards.

In March 2009, the MDEQ published the results of their 2008 hydrogeologic investigation that assessed the potential source of groundwater impact in an area northwest of the KL landfill. Based on this investigation, the MDEQ concluded that the

source of contamination is within the confines of the northwest corner of the landfill itself and there does not appear to be another source of contamination outside the landfill. The investigation also indicated that the "dumplet" on the Dungy property is not a source of contamination since significant contamination was found in the aquifer upgradient from the dumplet and that the contamination did not originate at the service station since no significant contamination was found in the shallow groundwater immediately downgradient of the service station.

The MDEQ hydrogeologic investigation report also contains some recommendations, one of which is to investigate the full extent of contamination in the deeper aquifer northwest of the landfill. While EPA and MDEQ agree that there is no indication of exposures to contaminated groundwater in the area northwest of the landfill, EPA and MDEQ will meet with the KLA Group after issuance of this Five-Year Review Report to discuss the recommendations made in the MDEQ report.

### **Site Inspection**

The EPA attended a site meeting in November 2008, and as part of this meeting, EPA toured the site. The EPA did not notice any disturbance or cracks in the landfill cap; a locked chain-link fence secures the site; and all components of the landfill remedy appeared to be in good condition and working properly. The EPA's observations are consistent with the observations made by the KLA Group during the quarterly landfill inspections. The EPA will conduct a more detailed site inspection in spring 2009, once the area is free of snow cover.

### **Interviews**

The EPA did not formally interview members of the public about the protectiveness of the remedial action, as homeowners within the affected groundwater area are hooked-up to city water. No community members contacted EPA subsequent to the public notice of the initiation of this Five-Year Review.

## **VII. Technical Assessment**

The EPA asked the following three key questions during this technical assessment to provide the basis for our protectiveness determination. Our conclusions are based on the information reviewed in the previous sections:

*Question A: Is the remedy functioning as intended by the decision documents?*

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?*

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

**Question A** – Is the remedy functioning as intended by the decision documents?

**Answer A** – Yes. The landfill remedy is operating and functioning as intended by the ROD and the 2003 and 2005 ROD Amendments. The landfill cap has achieved the remedial objectives to prevent direct contact with the landfill waste and to minimize the migration of contaminants to groundwater thereby reducing the overall amount of time to achieve cleanup of the groundwater plume. Although the effectiveness of MNA to achieve cleanup standards within a reasonable time-period will be evaluated in 2010, five years after initiating the landfill cap construction, groundwater data collected both prior to and after the landfill cap construction shows reductions in many of the groundwater contaminant concentrations.

Residents within the GRUZ have clean drinking water and are not being exposed to site-related contaminants in the groundwater. Residents whose wells were either impacted or that could potentially become impacted, had their private water wells replaced or their homes were connected to city water with the exception of two residences, where the owners refused.

Operation and maintenance of the landfill components including the landfill cover, gas monitoring probes, gas extraction wells, and the site security fence has been effective. The EPA did not notice any disturbance or cracks in the landfill cap; a locked chain-link fence secures the site; and all components of the landfill remedy appeared to be in good condition and working properly. The implementation of IC's (deed restrictions) at the landfill property has prevented exposure to the landfill waste and ingestion of contaminated groundwater. No activities were observed that would have violated the institutional controls.

The County ordinance establishing a GRUZ, once in place, will further assure the protection of human health. The EPA did not identify other opportunities for optimizing the remedial action. There are no early indicators at this time of potential issues that could place the protectiveness at risk.

**Question B** – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

**Answer B** – Yes. The exposure assumptions, toxicity data, cleanup levels, and RAOs specified in the ROD and subsequent ROD Amendments remain the same. The ROD cleanup levels for groundwater are either MCLs and MCLGs above zero, or MDEQ standards for groundwater use, whichever is more stringent, as established in the 2003 and 2005 ROD Amendments. While MCLs and MCLGs have not changed, MDEQ groundwater cleanup standards have changed. The 2005 ROD Amendment incorporates the revised MDEQ Part 201 groundwater cleanup criteria. The Part 201 residential groundwater cleanup standards were developed using the most current toxicological and regulatory information at the time. As with the 1990 ROD, cleanup standards in the 2003 and 2005 ROD Amendments are either MCLs and MCLGs above

zero, or Part 201 standards, whichever is more stringent. Table 3 shows the changes to chemical-specific cleanup standards for groundwater since issuance of the initial 1990 ROD. The 2005 ROD Amendment cleanup standards listed in the table are the current cleanup standards for groundwater. There are no other changes in cleanup standards, ARARs or to-be-considered (TBCs) affecting the protectiveness of the remedy.

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (ingestion of contaminated groundwater and inhalation of volatiles by residents and dirt bikers) and potential future exposures (ingestion of contaminated groundwater). Since the landfill is capped and land use restrictions are in place, there is no current or potential future exposure via inhalation of volatiles by residents and dirt bikers. The only exposure pathway of concern is ingesting contaminated groundwater. Changes to cleanup standards for this exposure pathway are discussed in the paragraph above. There are no changes in the physical conditions or land uses at or near West KL that would affect the protectiveness of the remedy. The remedy is progressing as intended by the ROD and subsequent ROD amendments.

**Table 3: Changes in Chemical-Specific Standards**

Groundwater Cleanup Levels Comparison in parts per billion (ppb)				
Chemical	1990 ROD Cleanup Standards (Act 307)	2003 ROD Amendment Cleanup Standards (Part 201)	Current Federal Maximum Contaminant Level (MCL)	2005 ROD Amendment Cleanup Standards (Revised Part 201)
Acetone	700	730	NA	730
Barium	5,000	2,000	2,000	2,000
Benzene	1	5.0	5.0	5.0
2-Butanone	350	13,000	NA	13,000
Cadmium	4	5.0	5.0	5.0
Chromium (total)	35	100	100	100
1,1-Dichloroethane	700	880	NA	880
1,2-Dichloroethane	0.4	5.0	5.0	5.0
cis-1,2-DCE	140	100	70	70
trans-1,2-DCE	NA	100	100	100
1,4-diethylene dioxide (1,4DD)	NA	NA	NA	85

Ethylbenzene	30	74	700	74
Iron	300	2,000	NA	2,000
Lead	5.0	4.0	NA	4.0
4-Methyl-2-pentanone	350	1,800	NA	1,800
Nickel	100	100	NA	100
Phenol	300	4,400	NA	4,400
t-butyl alcohol	NA	78,000	NA	3,900
Tetrahydrofuran	NA	1,900	NA	95
Toluene	40	790	1,000	790
Trichloroethene	NA	NA	5.0	5.0
Vinyl chloride	0.02	2.0	2.0	2.0
Xylenes	20	280	10,000	280

**Question C** – Has any other information come to light that could call into question the protectiveness of the remedy?

**Answer C** – No. There is no other information at this time that calls into question the protectiveness of the remedy at West KL.

### **Technical Assessment Summary**

According to the data reviewed in Attachment 5 to this report and discussions with the MDEQ, the remedy at West KL is functioning as intended by the ROD and the 2003 and 2005 ROD Amendments. While the countywide groundwater IC ordinance is not yet in place, except for the two residents who refused city water, residences with impacted wells or wells that could potentially become impacted have clean water as their private shallow wells were replaced or their homes were connected to city water. As these residents have clean water they are not being exposed to site-related contaminants in the groundwater. Once the countywide groundwater IC ordinance is in place, the two homeowners that refused to stop using their shallow wells will be required to connect to city water or a new well; and they will be required to abandon their private shallow water wells unless the wells are used for non-potable uses approved by Kalamazoo County and MDEQ. There has been no change in the physical conditions or current or expected land-use at West KL that would affect the protectiveness of the remedy. The ARARs pertaining to landfill cap construction identified in the ROD have been met. There are no changes to the exposure routes or receptors used in the risk assessments that affect the protectiveness of the remedy. There are no other changes in groundwater cleanup standards, other than those groundwater standards modified via



the 2005 ROD Amendment, ARARs, or TBCs that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

**VIII. Issues**

Table 4 details the potential protectiveness issues EPA identified during the first Five-Year Review for West KL.

**Table 4: Issues**

Issues	Affects Current Protectiveness?	Affects Future Protectiveness?
The GRUZ needs to be updated to include the April 2009 groundwater data	No	Yes
Required countywide groundwater IC ordinance has not been implemented	No	Yes
O&M Plan must be amended to include monitoring, maintaining and enforcing effective ICs	No	Yes

**IX. Recommendations and Follow-up Actions**

**Table 5: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
The GRUZ needs to be updated to include April 2009 groundwater data	Update the GRUZ to include April 2009 groundwater data	KLA Group	EPA/ MDEQ	May 2009	No	Yes

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Required countywide groundwater IC ordinance has not been implemented	1. Update the application for the County ordinance to include revised GRUZ;	KLA Group	EPA/ MDEQ	May 2009	No	Yes
	2. Agencies review and EPA endorse application for County ordinance;	EPA/ MDEQ	EPA	Summer 2009	No	Yes
	3. Submit EPA approved application to Kalamazoo County;	KLA Group	EPA	Summer 2009	No	Yes
	4. Implement countywide groundwater IC ordinance by January 2010.	Kalamazoo County and KLA Group	EPA	January 2010	No	Yes
O&M Plan must be amended to include monitoring, maintaining and enforcing effective ICs	1. Update O&M Plan to require inspection of ICs (deed restrictions) at the landfill property to ensure long-term stewardship, which includes implementing, monitoring, maintaining and enforcing effective ICs; and	KLA Group	EPA/ MDEQ	Summer 2009	No	Yes

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
	2. Develop an IC Plan to further evaluate the deed restrictions and plan for implementation of the groundwater ordinance.	EPA	EPA	October 2009	No	Yes

## X. Protectiveness Statement

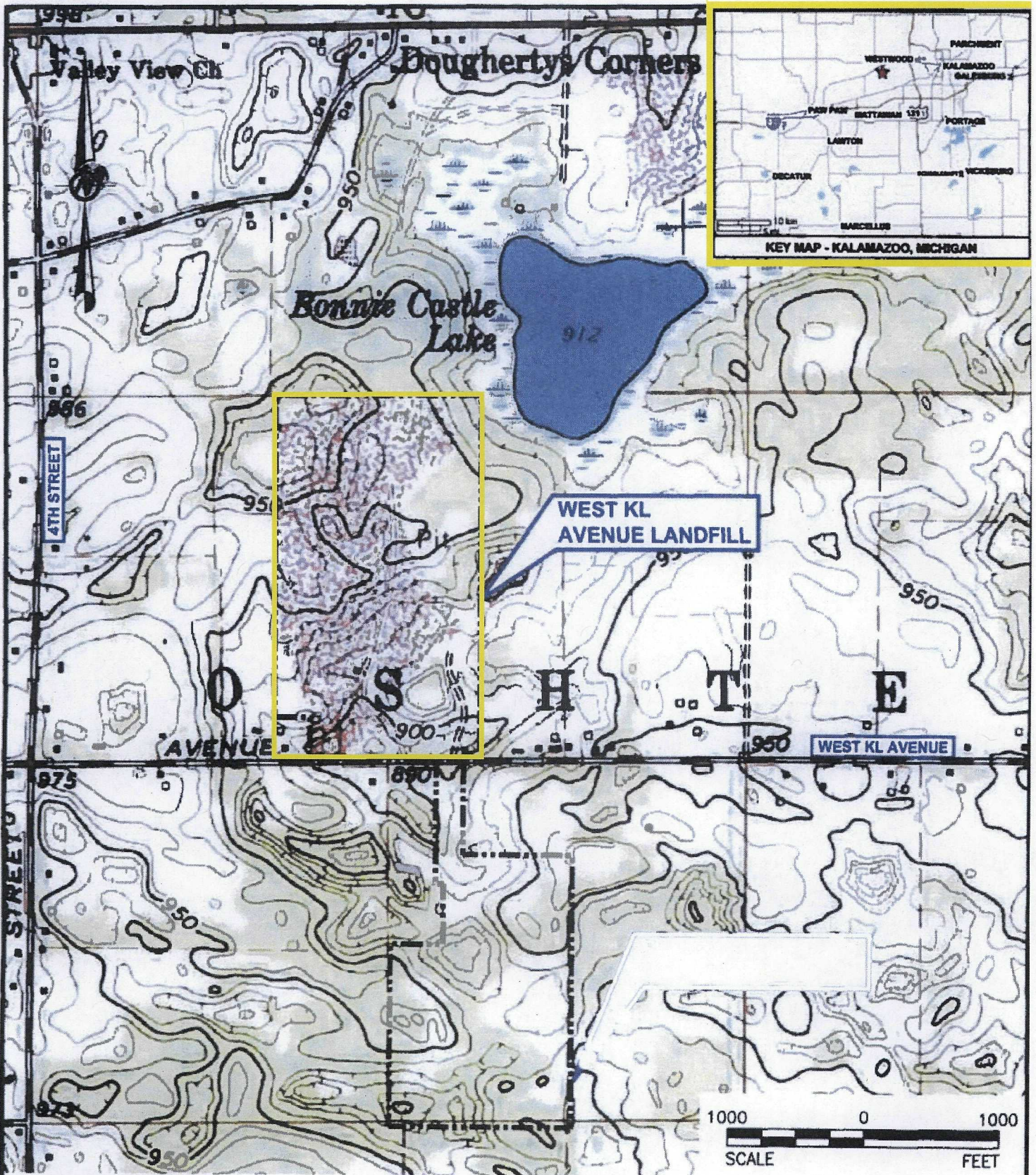
The remedy at West KL currently protects human health and the environment in the short-term because the remedy prevents direct contact and exposure to contaminants in the landfill waste and groundwater, through implementation of the following actions: constructing an engineered cover over the landfill wastes that prevents direct contact with contaminants and reduces the releases of contaminants into the environment; connecting over 200 homes within the proposed GRUZ to a potable water supply by providing hook-ups to city water or by constructing a new potable well in the deeper aquifer; installing a fence around the West KL property to restrict access to the landfill and its contaminants; and imposing IC deed restrictions on the landfill property prohibiting land development and groundwater use. Long-term protectiveness of this remedy relies on compliance with ICs. Compliance with ICs requires implementation of ICs and long-term stewardship of monitoring, maintaining and enforcing these landfill and groundwater ICs. This stewardship requires additional IC evaluation activities of the deed restrictions and will require amending the proposed GRUZ and implementing a countywide groundwater use ordinance to effectively prohibit potable groundwater use from two additional homes that may be potentially impacted. As proposed, the ordinance requires all homes within the GRUZ to abandon potable use of existing private drinking water wells and connect to the city water supply. The West KL remedy will protect human health and the environment in the long-term because the landfill cover will reduce the release of contaminants to the environment while preventing direct contact threats, and the groundwater remedy of MNA will attain long-term protectiveness when groundwater cleanup standards are achieved throughout the plume area. Although the effectiveness of MNA to achieve cleanup standards within a reasonable time-period will be evaluated in 2010, five years after initiating the landfill cap construction, groundwater data collected both prior to and after the landfill cap construction show reductions in many of the groundwater contaminant concentrations. The long-term protectiveness of the remedy relies on the stewardship of implementing, monitoring, maintaining and enforcing the landfill ICs, to prevent the exposure to contaminants from the landfill.

## **XI. Next Review**

The EPA will conduct the second Five-Year Review for West KL five years after the signature date of this first Five-Year Review Report. This first Five-Year Review was due on August 23, 2009 but it was completed in May 2009. Therefore, the second Five-Year Review Report will be completed by May 2014.

# **Attachment 1**

## **Figures**



**REFERENCE**

1.) BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF KALAMAZOO, MICHIGAN, DATED 1973.

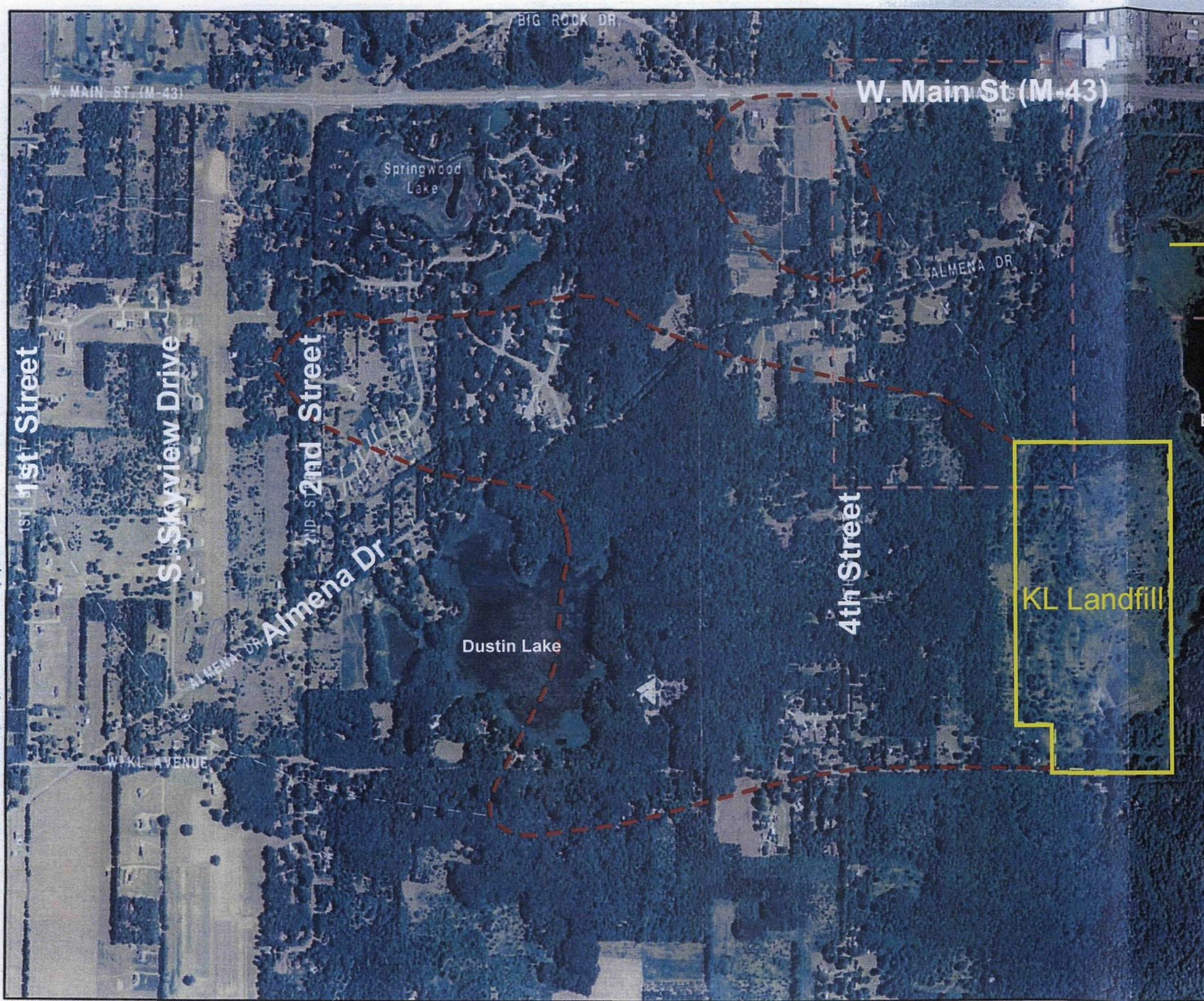
**NOTE**

1.) LOCATIONS OF SITE BOUNDARIES ARE APPROXIMATE.

TITLE

**Figure 1  
SITE LOCATION MAP**

**WEST KL AVENUE LANDFILL**



GRAPHIC SCALE  
0' 50' 100' 200'

LEGEND

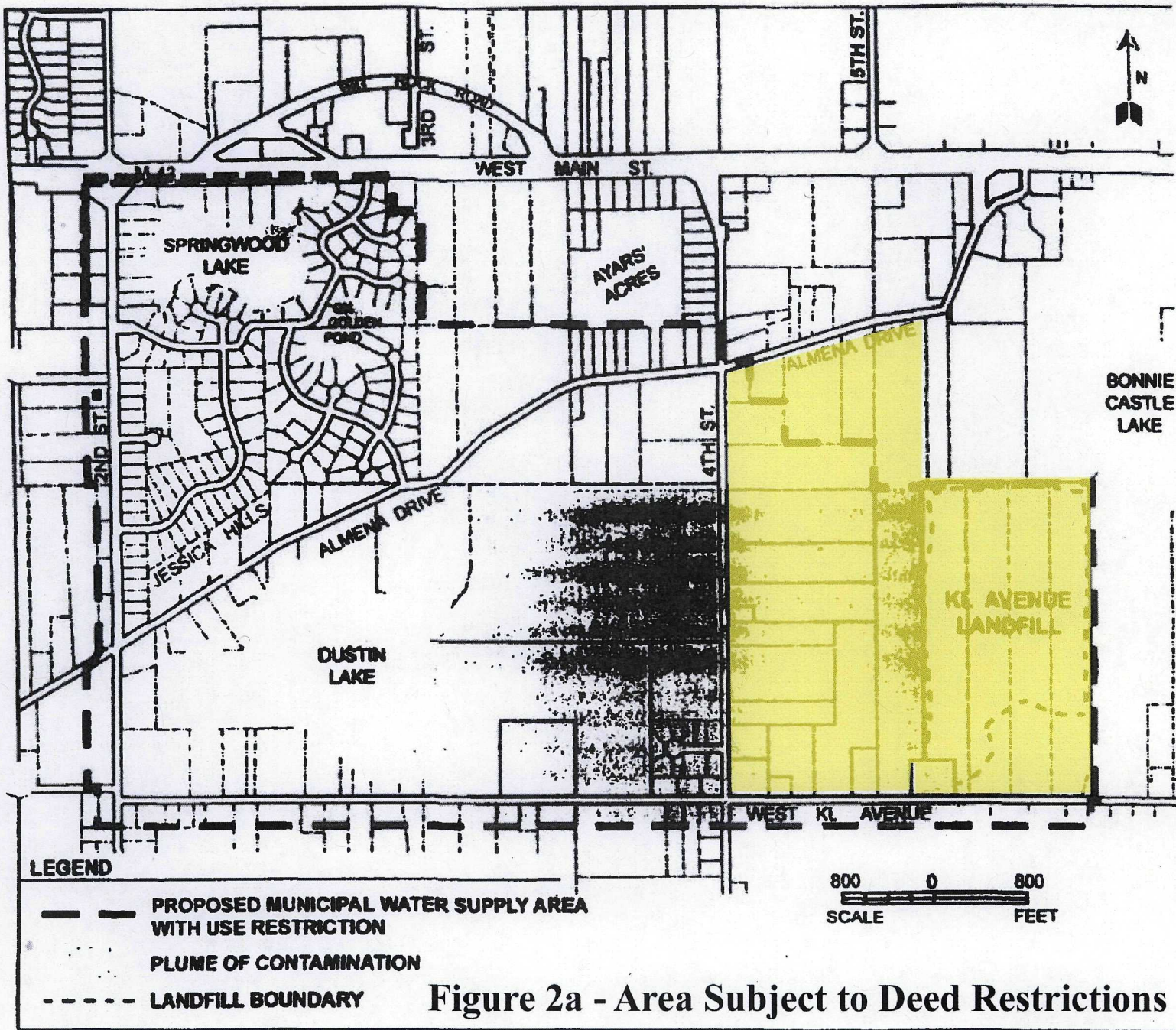
- Approximate Extent of Impact Above Maximum Contaminant Level
- Approximate Extent of Impact Above Generic Residential Cleanup Criteria
- Approximate Extent of MSG Hydrogeologic

Bonnie Castle Lake

KL Landfill

W. KL Avenue

**Figure 2  
Site Map**





**RESIDENTIAL WELL SAMPLE LOCATION MAPS**

**HAVE BEEN REDACTED – FIVE PAGES**

**CONTAINS POTENTIAL PERSONALLY-IDENTIFYING INFORMATION**

**Attachment 2**  
**Restrictive Covenant**

DECLARATION OF DEED RESTRICTIONS

0'

THIS DECLARATION, made effective the 19th day of APRIL, 1994, by the COUNTY OF KALAMAZOO, a governmental entity, and the CHARTER TOWNSHIP OF OSHTEMO, a governmental entity, hereinafter collectively referred to as "Declarants."

15325

1720 PG 1190

WHEREAS, Declarants are the owners of certain property in the Township of Oshtemo, County of Kalamazoo, State of Michigan, which is more particularly described in Exhibit "A" attached hereto and referred to herein as "property," and;

WHEREAS, Declarants, as parties to a Consent Decree entered on November 18, 1992 and filed in the Kalamazoo County Register of Deeds' Office, Liber 1720, Page 1118, have agreed to certain deed restrictions on the property described in Exhibit "A."

NOW, THEREFORE, Declarants hereby declare that the property described herein shall be held, sold, and conveyed subject to the following restrictions, covenants, and conditions, which are necessary to effectuate remedial action for the property and to protect the public health or welfare or the environment, and which shall run with the property and be binding on all parties having any right, title, or interest in the property or any part thereof, their heirs, successors, legal representatives, and assigns, and shall inure to the benefit of each owner thereof.

1. There shall be no interference by any person with construction, operation, maintenance, and monitoring of all components of and structures and improvements resulting from or related to the response actions implemented pursuant to the aforementioned Consent Decree;

STATE OF MICHIGAN  
 COUNTY OF KALAMAZOO  
 RECEIVED  
 APR 21 1994 10 21  
 12 11 15

CLERK REGISTER

There shall be no extraction of the groundwater underlying the facility and adjacent properties for any purpose unless prior written approval from the U.S. EPA is obtained;



3. There shall be no residential, commercial, nor industrial use of the facility including, but not limited to, construction of any residences, buildings, or structures other than for the purpose of implementing, monitoring, and maintaining the remedial action required by the aforementioned Consent Decree unless approved in writing by the U.S. EPA;
  
4. There shall be no construction, installation, nor use of any buildings, wells, pipes, roads, ditches, or any other structures on the facility that may affect the physical integrity or operation and maintenance of the landfill cap; groundwater, surface water, and landfill gas monitoring systems; and the groundwater extraction and treatment systems, unless such construction, installation, or use is approved in advance in writing by the U.S. EPA.

The aforementioned restrictions are contained in Chapter 5, Paragraph 9 of the previously mentioned Consent Decree.

REF: 1720 PG 1192

IN WITNESS WHEREOF, the undersigned, being the Declarants herein, have executed this instrument effective on the date set forth above.

WITNESSED:

COUNTY OF KALAMAZOO

Shirley J. Grigsby  
Shirley J. Grigsby

By: Richard D. Kleiman  
Richard D. Kleiman, Chairman  
Board of Commissioners

Nancy Donovan  
Nancy Donovan

By: James O. Youngs  
James O. Youngs  
Clerk/Register

STATE OF MICHIGAN )  
 ) SS.  
COUNTY OF KALAMAZOO )

On April 19, 1994, before me, a Notary Public in and for said County, personally appeared Richard D. Kleiman and James O. Youngs, to me known to be the same persons described in and who executed the within instrument, who acknowledged the same to be their free act and deed.

Nancy C. Donovan  
Notary Public, Nancy C. Donovan  
Kalamazoo County, Michigan  
My Commission Expires Oct 20, 1996

WITNESSED:

USE: 1720 Pg 1193

CHARTER TOWNSHIP OF OSHTENO

Laura Kuhn  
Laura Kuhn

By: Ronald Fleckenstein  
Ronald Fleckenstein  
Township Supervisor

Deborah Everett  
Deborah Everett

By: Elaine Branch  
Elaine Branch  
Township Clerk

STATE OF MICHIGAN )  
 )SS.  
COUNTY OF KALAMAZOO )

The foregoing instrument was acknowledged before me this 14th day of April, 1994, by Ronald Fleckenstein and Elaine Branch, the Supervisor and Clerk respectively, of Oshteno Charter Township, a Michigan municipal corporation, on behalf of the Township by authority of the Oshteno Charter Township Board of Trustees.

Wendy R. Fleckenstein  
Notary Public, Wendy R. Fleckenstein  
Kalamazoo County, Michigan  
My Commission Expires: 6-22-94

This document was prepared by Steven E. Burnham, P43358)  
KALAMAZOO COUNTY BOARD OF COMMISSIONERS  
201 West Kalamazoo Avenue  
Kalamazoo, Michigan 49007  
(616) 384-8111

EXHIBIT A

INDEX 1720 pg 1194

PARCELS OWNED BY THE COUNTY OF KALAMAZOO:

Land situated in the Township of Oshtemo, County of Kalamazoo, State of Michigan, more particularly described as:

1. Commencing at a point 13 rods 8 feet East of the Southwest corner of the West half of the Northeast quarter of said Section 21, thence East 23 rods, thence North 160 rods, thence West 23 rods, thence South 160 rods to the place of beginning. Excepting commencing at a point 13 rods 8 feet East of the Southwest corner of the West half of the Northeast quarter of Section 21, thence East 23 rods for the place of beginning of the property hereinafter described, thence North 280 feet 6 inches, thence West 37 feet, thence Southwesterly 295 feet 4 inches to a point 123 feet 9 inches West of the place of beginning, thence East 123 feet 9 inches to the place of beginning.
2. Commencing 49 rods 1½ feet East of the Southwest corner of the East half of the Northwest quarter of Section 21, Town 2 South, Range 12 West, thence East 21 rods, 11½ feet, thence North 160 rods to the North line of said section, thence West 21 rods 11½ feet, thence South 160 rods to the place of beginning.

Also commencing at a point 42 rods 1½ feet East of the Southwest corner of the East half of the Northwest quarter of Section 21, Town 2 South, Range 12 West, thence East 7 rods, thence North 160 rods, thence West 22 rods 11½ feet, thence South 140 rods, thence East 15 rods 11½ feet, thence South 20 rods to beginning.

PARCEL OWNED BY THE CHARTER TOWNSHIP OF OSHTEMO:

Land situated in the Township of Oshtemo, County of Kalamazoo, State of Michigan, more particularly described as:

1. Commencing on the East and West one quarter line of Section 21, Township 2 South, Range 12 West, 70 rods 13 feet East of the Southwest corner of the East one-half of the Northwest one-quarter of said Section 21; thence East 22 rods 11½ feet; thence North 160 rods to the North line of said Section; thence West along said North line 22 rods 11½ feet; thence South 160 rods to the place of beginning.

**Attachment 3**

**Kalamazoo County Sanitary Code  
Article IIIb  
Water Supply Regulations – Restricted Zones**



## **ARTICLE IIIb: WATER SUPPLY REGULATIONS - RESTRICTED ZONES**

### **CHAPTER 17b: PURPOSE**

The County of Kalamazoo has determined that the use of certain groundwater wells, and the water supplies from such wells, for human consumption or other purposes may constitute a public health risk and endanger the safety of the residents of the County. These identified public health risks affect premises that are located on or in the vicinity of sites that are the source, or location, of Contaminated Groundwater, or where there is a known threat from Contaminated Groundwater. The County has determined it is in the best interests of the public health, safety and welfare to prohibit certain uses of groundwater from wells at properties located in the vicinity of such contaminated sites.

### **CHAPTER 18b: DEFINITIONS**

As used in Article IIIa:

SECTION 18b.01: Affected Premises means a parcel of property, which is located within a Restricted Zone.

SECTION 18b.02: Applicant means a person who applies for the establishment of a Restricted Zone.

SECTION 18b.03: Contaminated Groundwater means groundwater that contains concentrations of materials in excess of the residential drinking water criteria established by the MDEQ in operational memoranda or rules promulgated pursuant to Part 201, Environmental Remediation (MCL 324.20101 et seq.), or Part 213, Leaking Underground Storage Tanks (MCL 324.21301a et seq.) of the Natural Resources and Environmental Protection Act, 1994 PA 45 1, as amended, MCL 3 24. 1 01 et seq.

SECTION 18b.04: Groundwater means underground water within the zone of saturation.

SECTION 18b.05: MDEQ means the Michigan Department of Environmental Quality, or its successor agency.

SECTION 18b.06: Person means any individual, co-partnership, corporation, association, club, joint venture, estate, trust, governmental unit or agency and/or any other group or combination acting as a unit, and the individuals constituting such group or unit.

SECTION 18b.07: Restricted Zone means an area or areas described in Chapter 19b of this Code.

SECTION 18b.08: USEPA means the United States Environmental Protection Agency, or its successor agency.

SECTION 18b.09: Water Division means the Water Division, or its successor, of the MDEQ.

SECTION 18b.10: Well means an opening in the surface of the earth for the purpose of removing fresh water through non-mechanical or mechanical means for any purpose other than a public

emergency or conducting response actions that are consistent with the Michigan Natural Resources and Environmental Protection Act, the Comprehensive Environmental Response, Compensation and Liability Act, the Resource Conservation and Recovery Act, or other applicable statute.

## **CHAPTER 19b: RESTRICTED ZONES**

Established Restricted Zones. The following described areas in the County shall be Restricted Zones under this Chapter. They may be referred to by reference to the names provided in the caption preceding their descriptions. A map of each Restricted Zone is located in Appendix A of this Code.

## **CHAPTER 20b: ADDING NEW RESTRICTED ZONES; PRELIMINARY CONSIDERATION**

The County Board of Commissioners may amend this Code to add new Restricted Zones in accordance with the following procedure.

SECTION 20b.01: A Person seeking the establishment of a Restricted Zone shall first file with the County Administrator a request that the County establish a Restricted Zone pursuant to this Code. The Request must include a written Notice that identifies the proposed general boundaries of the Restricted Zone, the reason for establishing the Restricted Zone, a preliminary map of the Restricted Zone, and the proposed time schedule for implementing the Restricted Zone. The Person submitting the request to the County Administrator shall also provide a copy of the Notice to the local unit of government (city, township and/or village) having jurisdiction over the proposed Restricted Zone. When the proposed Restricted Zone is located with/in more than one local unit of government, the Person shall provide copies of the Notice to all of the local units of government.

SECTION 20b.02: The County Administrator shall notify the County Board of Commissioners of the receipt of the Request for the Establishment of a Restricted Zone by the Board of Commissioners' first regularly scheduled meeting after the Administrator receives the Request.

SECTION 20b.03: The County Board of Commissioners shall not consider establishing a Restricted Zone unless the Person submitting the Request demonstrates that creation of the Restricted Zone would eliminate the need to impose environmental restrictive covenants on property or would otherwise provide a tangible or quantifiable benefit.

SECTION 20b.04: The County Board of Commissioners shall not consider establishing a Restricted Zone unless the Person requesting the establishment of the Restricted Zone guarantees and provides for municipal water service, unless the Board of Commissioners determines that providing municipal water service is technically unreasonable from an engineering perspective, or is otherwise impractical.

SECTION 20b.05: The County Board of Commissioners shall not consider establishing a Restricted Zone unless the Applicant guarantees, and provides the County Board of Commissioners with the identification or location of all non-conforming wells on any affected premises, and provides for the proper abandoning and plugging of all nonconforming wells on any Affected Premises without cost to the owners or occupants, other than the person requesting the establishment of the Restricted Zone, of the Affected Premises and in compliance with Chapter 23.a "Water Sources for Human Consumption" of this Code. To meet this guarantee, the Person shall either

provide the County Administrator with written Proof of the provision of such service and the plugging/abandonment of such wells; or establish an escrow account, letter of credit, performance bond, or other acceptable form of financial assurance, in an amount and form acceptable to the County Board of Commissioners, to ensure that the Person making the Request will provide such service and the plugging/abandonment of such wells.

SECTION 20b.06: If, after reviewing the Person's request for consideration of the establishment of a Restricted Zone and considering the standards set forth in Sections 20b.01-20b.05, and after taking into consideration whether the establishment of a Restricted Zone will benefit the health safety and/or welfare of the residents of Kalamazoo County, the County Board of Commissioners is willing to consider the request for the establishment of a Restricted Zone, the Administrator shall provide the Person making the request with a written, preliminary, and non-binding, indication of the County's willingness to consider the Application.

#### **CHAPTER 21b: ADDING NEW RESTRICTED ZONES; FORMAL CONSIDERATION AND APPROVAL**

SECTION 21b.01: After receiving the County's preliminary indication of its willingness to consider the establishment of a Restricted Zone, a Person may submit an application for the formal establishment of a Restricted Zone to the County Administrator. The formal application can be in the form of a proposed remedial action plan or other appropriate documentation if appropriate cross-references are made for ease of reference.

SECTION 21b.02: The application for the formal establishment of a Restricted Zone shall include, at a minimum, the following information, together with any escrow deposit as required under this Section.

- i. The name, address, and phone number of the Applicant, as well as each person having an interest as owner, tenant easement holder or mortgagee of record in the real property which is the source or site of the contaminated groundwater, if known.
- ii. The street address and legal description of the real property which is the source or site of the contaminated groundwater, if known, and the nature of the Applicant's relationship to that property and involvement concerning the contaminated groundwater.
- iii. The nature and extent of the groundwater contamination and the substances causing the contamination, both in summary form and in plain English. These disclosures should also include a description in detail and in technical terms, stating the types and concentrations of contaminants', a map or survey showing the contaminants' current location- a statement of the contaminants' likely or anticipated impact on groundwater and the nature of the risks presented by the use of the groundwater, as well as the likely or anticipated path of the contaminants' migration if not remediated or corrected and a detailed statement of any plan to remediate, correct and/or contain the contamination.
- iv. A detailed map and legal description of the proposed Restricted Zone.

- v. The street addresses and general description of the proposed Restricted Zone.
- vi. The names, addresses (mailing and street), and phone numbers (if readily available) of all persons with an interest as owner, tenant, easement holder, or mortgagee of record in any of the Affected Premises.
- vii. The location, current status, and usage characteristics of all existing groundwater wells within the proposed Restricted Zone.
- viii. The MDEQ's or USEPA's (as appropriate) written approval of the proposed Restricted Zone as an alternative to imposing restrictive covenants on property on which no release has occurred; and,
- ix. A copy of the information submitted to the MDEQ or USEPA concerning the proposed Restricted Zone, along with a written statement from an MDEQ or USEPA representative with approval authority stating that the proposed Restricted Zone and use regulations have received MDEQ or USEPA approval as part of the response actions for the groundwater contamination. The MDEQ or USEPA approval may be contingent upon the County's establishment of the proposed Restricted Zone pursuant to this Chapter.
- x. Applicant shall provide a detailed statement or description of any contemplated exemptions from the prohibitions contained in this Code concerning the use of existing and future wells within the Restricted Zone.
- xi. A description and time schedule for any actions the Applicant will take to implement any remediation plan, to mitigate the adverse impact of the implementation of the Restricted Zone (e.g. providing substitute water service), and to properly close and abandon any existing wells subject to the use prohibition within the proposed Restricted Zone.
- xii. Copies of the notices provided to the owners of Affected Property within the Restricted Zone, together with a sworn statement that such notices were provided to all such owners with details of the manner in which such notices were provided. At a minimum, the notice must:
  - a. Identify the sender of the notice including the sender's name, address, contact person and telephone number.
  - b. Identify the owner of the property which is the source of the contamination or who is seeking the creation of the Restricted Zone including the owner's name and property address.
  - c. State what the effects of the Restricted Zone will be, i.e. how use of the groundwater will be restricted.
  - d. Identify the Person who can be contacted at the County, the MDEQ or USEPA, and the Applicant for more information.

- e. A description of the groundwater plume and a brief description of the nature of the contamination, and
- f. Any other information reasonably requested by the County Administrator.

SECTION 21b.03: In addition to the formal application provided for in Section 18b.01-18b.02, the Applicant shall also submit a written statement to the County Administrator in which Applicant agrees to pay all costs incurred by the County in the establishment of the proposed Restricted Zone, including without limitation, reimbursement for staff time, the fees of environmental consultants and legal counsel, the cost of publication, any per them or other amounts paid to public officials for attending any special meetings, etc... This statement shall also consent to the placement of a lien on the Applicant's premises if the amounts due under this Section are not timely paid (i.e. paid within 30 days of the issuance by the County of an invoice). That statement shall be in a form acceptable to the County's legal counsel and shall be in a form so as to be recordable in the records of the Kalamazoo County Register of Deeds.

SECTION 21b.04: Along with the Application, the Applicant shall pay a deposit, or create an escrow account, in an amount equal to the costs the County Administrator estimates the County will incur in establishing the Restricted Zone, including without limitation, reimbursement for staff time, the fees of environmental consultants and legal counsel, the cost of publication, any per them or other amounts paid to public officials for attending any special meetings, etc... The deposit shall not bear interest and the County may use the funds pay for costs as they are incurred. If the Applicant elects to establish an escrow account, the Applicant shall continuously maintain a minimum balance of \$500.00 in that escrow account. If the Applicant fails to maintain the escrow as required by this provision, the County may, but is not required to, discontinue its processing of the request to establish a Restricted Zone and the County is authorized to file a lien against the premises of the Applicant.

SECTION 21b.05: Once the County Administrator or his or her designee determines that the application is complete, the County Administrator shall present the completed Application to the Board of County Commissioners at a regular or special meeting of the Board and request that the Board set a time, date, and place to hold a public hearing on the application.

SECTION 21b.06: After the Board of Commissioners sets the date for the public hearing, the Applicant shall send a written notice of the hearing, by first class mail, to all persons having an interest as owner, tenant, easement holder, or mortgagee of record in any of the Affected Premises. The notice shall include a brief statement regarding the application that fairly informs the recipients of the Restricted Zone's main features and the potential impacts the Restricted Zone may have on the recipients' in general. The Applicant shall mail the Notice at least ten (10) days prior to the hearing. The Applicant shall also publish the Notice in a newspaper of general circulation within the County at least seven (7) days before the hearing. The Applicant shall also mail the Notice to the NMEQ and USEPA representative, as appropriate, who issued the approval of the proposed Restricted Zone and use regulations; and to the MDEQ District Supervisor of the regulatory program with jurisdiction over the contaminated site. For each Notice required under this Section, the Applicant shall file one copy of each Notice, an affidavit of publication for each Notice, an affidavit of publication for each Notice and an affidavit of mailing for each Notice, with the County Administrator prior to the hearing.

SECTION 21b.07: If, after the public hearing, the Board of Commissioners determines that there is a need to establish a new Restricted Zone, the Board of Commissioners shall amend this Code to establish the new Restricted Zone. The County Clerk shall publish a Notice of the amendment to this Code in the same manner required by law for Ordinance amendments.

SECTION 21b.08: The Applicant shall notify all owners and occupants of real property within the newly established Restricted Zone of the need to close and abandon wells located on property located within the Restricted Zone. The Applicant shall also inform the owners and occupants of real property within the newly established Restricted Zone of who will be financially responsible for closing and abandoning the wells.

#### **CHAPTER 22b–23b: RESERVED FOR FUTURE USE**

#### **CHAPTER 24b: EFFECT OF RESTRICTED ZONES, WELLS AND GROUNDWATER USE PROHIBITED**

Except as provided in Chapter 22b of this Code, no person shall install or utilize, or allow, permit, or provide for the installation or utilization of a well in any Restricted Zone. Except as provided in Section 22b of this Code, no person shall use any groundwater from any well located within a Restricted Zone.

#### **CHAPTER 25b: EXCEPTIONS TO PROHIBITION**

A Person may install, utilize, allow, permit, or provide for the installation or utilization of, a well within a Restricted Zone identified in this Code, if one of the following exceptions applies and the individual complies with the requirements set forth in this Section:

##### **SECTION 25b.01: EXISTING WELLS - WATER SERVICE UNAVAILABLE**

The owners and/or occupants of property within a Restricted Zone that contained a working well(s) on the date that the County established the Restricted Zone under this Code, may continue to use the well(s) if it is safe and suitable for use and municipal water service is unavailable to the property.

- i. For purposes of this Subsection, a well will be considered safe and suitable for use if the Person wishing to use the well provides the County with a written annual certification, or more frequent certification if required by the County, that the well is safe and suitable. A Person wishing to use the well must secure certification, at his/her own expense, from a MDEQ-approved laboratory, that the well produces water that is within maximum contaminant levels as defined in Part 201. The Person wishing to use the well must arrange for the testing laboratory to promptly submit the results of the test to the MDEQ or the Kalamazoo County Human Services Department for review and determination that the well is safe and suitable for use and that use of the well does not exacerbate the contamination.
- ii. For purposes of Article IIIb, municipal water service is unavailable only if it is technically unreasonable, from an engineering perspective, or otherwise impractical to supply the premises with municipal water. No split or conveyance of property shall be effective to render municipal water unavailable.

## SECTION 25b.02: PROOF OF NO INFLUENCE

After the establishment of a Restricted Zone under this Code, the Kalamazoo County Human Services Department shall not issue a well permit for the installation of any water supply well within the Restricted Zone unless all of the following conditions are present:

- i. Municipal water service is unavailable to the property; and,
- ii. The MDEQ determines, in writing, that the contaminated groundwater shall not influence or potentially influence the use of the well; and,
- iii. The MDEQ determines, in writing, that future migration of contaminated groundwater shall not affect the use of the well. Such terms and conditions may include, but are not limited to, hydrogeological evaluations including pump tests, an analysis of the degree of protection from vertical migration of contaminants through geologic barriers, and groundwater modeling. The person requesting to install the well shall be responsible for the costs of providing the MDEQ with the information the MDEQ deems necessary to determine whether it will issue a waiver. The Applicant shall provide the person requesting to install the well with all technical and practical information, in the Applicant's possession, that may reasonably aid the person in providing necessary information to the MDEQ; and,
- iv. The individual wanting to install the water supply well submits copies of the MDEQ's determinations to the County- and,
- v. The County Administrator, upon review of the written determinations of the MDEQ, and in consultation with the County Human Services Department and such other technical experts as the Administrator deems necessary, may execute a waiver allowing the installation and use of the water supply well; and,
- vi. Any water supply well approved under this Subsection must be installed using well construction techniques (e.g. double casing) that will maintain the integrity of the aquifer to be used as the supply source and prevent migration of contaminants to the aquifer to be used as the supply source. The individual must also provide the -County Administrator with a written description of the proposed well construction techniques for review and approval prior to the installation of the well; and
- vii. After the well is installed, the owner of the property on which the well is located, shall comply with the annually sampling and testing protocol set forth in Section 22a.01 of this Code; and,
- viii. If the sampling and testing protocol indicate that the groundwater contaminants are influencing the water supply well, the owner of the property shall immediately abandon and plug the well.

## SECTION 25b.03: GROUNDWATER MONITORING

A well within a Restricted Zone may be used for groundwater monitoring and/or remediation as part of a MDEQ or USEPA approved response activity.

#### SECTION 25b.04: CONSTRUCTION DE-WATERING

A well within a Restricted Zone may be used for construction de-watering, if the individual(s) installing and using the well complies with the following conditions:

- i. Use of the de-watering well will not expose an uncontaminated aquifer to contaminated groundwater; result in the Possible cross-contamination between saturated zones. or exacerbate the contamination; and,
- ii. The water generated by that activity is properly handled and disposed of in compliance with all applicable laws, rules, regulations, permit and licensing requirements, orders and directives of any governmental entity or agency of competent jurisdiction.

Any exacerbation of the contamination caused by the use of the well under this exception shall be the responsibility of the person operating the dewatering well, as provided in Part 201 of the Natural Resources and Environmental Protection Act, MCL 324.20101 to 324.20142.

#### SECTION 25b.05: EXISTING, SPECIFIC NON-CONTACT WELLS

For purposes of the Article IIIb of this Code, a “non-contact” water supply system means a water supply system designed and utilized so as to prohibit the use of the water within the system for human ingestion. After the establishment of a Restricted Zone, an existing water supply well within the Restricted Zone shall not be used for non-contact heating, cooling or processing activities unless all of the following conditions are present:

- i. The MDEQ determines, in writing, that the use of a well for non-contact heating, cooling or processing activities will not cause the future migration of contaminated groundwater; and,
- ii. The Person requesting the continued utilization or installation of the well submits a copy of the MDEQ’s written determination to the County Administrator; and,
- iii. The County Administrator, upon review of the written determination of the MDEQ, and in consultation with the County Human Services Department and such other technical experts as the Administrator deems necessary, may execute a waiver allowing the continued utilization, or installation, and use of the well upon such terms and conditions that the MDEQ may identify or require. Such terms and conditions may include, but are not limited to, hydrogeological evaluations including pump tests, an analysis of the degree of protection from vertical migration of contaminants through geologic barriers, and groundwater modeling. The person requesting to continue to utilize the well shall be responsible for the costs of providing the MDEQ with the information the MDEQ deems necessary to determine whether it will issue a waiver. The Applicant shall provide the person requesting to continue to utilize the well with all technical and practical information, in the Applicant’s possession, that may reasonably aid the person in providing necessary information to the MDEQ.



#### SECTION 25b.06: NEW, SPECIFIC NON-CONTACT WELLS

After the establishment of a Restricted Zone under this Code, the Kalamazoo County Human Services Department an individual shall not install a new well to be used for noncontact heating, cooling or processing activities within a Restricted Zone unless all of the following conditions are present:

- i. The NMEQ determines, in writing, that the use of a well for noncontact heating, cooling or processing activities will not cause the future migration of contaminated groundwater; and,
- ii. The Person requesting the installation of the well submits a copy of the MDEQ's written determination to the County Administrator; and,
- iii. The County Administrator, upon review of the written determination of the MDEQ, and in consultation with the County Human Services Department and such other technical experts as the Administrator deems necessary, may execute a waiver allowing the continued utilization, or installation, and use of the well upon such terms and conditions that the MDEQ may identify or require. Such terms and conditions may include, but are not limited to, hydrogeological evaluations including pump tests, an analysis of the degree of protection from vertical migration of contaminants through geologic barriers, and groundwater modeling. The person requesting the installation of the well shall be responsible for the costs of providing the MDEQ with the information the MDEQ deems necessary to determine whether it will issue a waiver. The Applicant shall provide the person requesting the installation of the well with all technical and practical information, in the Applicant's possession, that may reasonably aid the person in providing necessary information to the MDEQ.

#### SECTION 25b.07: SPECIFIC NON-CONTACT IRRIGATION WELLS

After the establishment of a Restricted Zone under this Code, no new well shall be installed, within the Restricted Zone, for use as an irrigation well. An individual may continue to utilize an existing well for non-contact irrigation within a Restricted Zone if all of the following conditions are present:

- i. The MDEQ determines, in writing, that the use of a well for non-contact irrigation will not cause the future migration of contaminated groundwater; and,
- ii. The Person requesting the continued utilization or installation of the well submits a copy of the MDEQ's written determination to the County Administrator; and,
- iii. The County Administrator, upon review of the written determination of the MDEQ, and in consultation with the County Human Services Department and such other technical experts as the Administrator deems necessary, may execute a waiver allowing the continued use of the well upon such terms and conditions that the MDEQ may identify or require. Such terms and conditions may include, but are not limited to, hydrogeological evaluations including pump tests, an analysis of the degree of protection from vertical migration of contaminants through geologic barriers, and groundwater modeling. The person requesting to continue to utilize the well shall be responsible for the costs of providing the MDEQ with the information

the MDEQ deems necessary to determine whether it will issue a waiver. The Applicant shall provide the person requesting to continue to utilize the well with all technical and practical information, in the Applicant's possession, that may reasonably aid the person in providing necessary information to the MDEQ.

Any exacerbation of the contamination caused by the use of the well under this exception shall be the responsibility of the person operating the dewatering well, as provided in Part 201 of the Natural Resources and Environmental Protection Act MCL 324.20101 to 324.20142.

#### **SECTION 25b.08: PUBLIC EMERGENCIES**

A well may be used within a Restricted Zone in the event of a public emergency.

#### **CHAPTER 26b: WATER SOURCES FOR HUMAN CONSUMPTION**

Except as provided in Chapter 22b of this Code, the water supply delivered for human consumption to any property located within a Restricted Zone shall be delivered only from a Municipal water system or by the use of bottled water delivered and purchased in containers under conditions approved by the State of Michigan. For the purposes of this subsection, the term "Human Consumption" means use in food or drink intended for human ingestion, use in food preparation or food service, use in the interior of a dwelling or dwelling unit for household purposes, and use in any building for personal washing.

#### **CHAPTER 27b: NON-CONFORMING WELLS**

Any existing well, the use of which is prohibited by Chapter 21a, shall be plugged or abandoned in conformance with all applicable laws, rules, regulations, permit and license requirements, orders and directives of any governmental entity or agency of competent jurisdiction, or, in conformance with the protocol developed consistent with the American Standards for Testing and Materials standard #D5299-92.

#### **CHAPTER 28b: WELLS AFFECTING CONTAMINATED GROUNDWATER**

Except as provided in Chapter 22b, no well may be used or installed at any place in the County if the use of the well will have the effect of causing the migration of contaminated groundwater or a contaminated groundwater plume to previously unimpacted groundwater, or adversely impacting any groundwater treatment system, unless the well is part of a MDEQ or USEPA approved groundwater monitoring or remediation system.

## **CHAPTER 29b: VIOLATIONS**

Any violation or suspected violation of the provisions of Article IIIb of this Code shall be addressed under Article VII: Declaratory Rulings and Hearing Procedures and Article VI: Criminal Penalties, of this Code.

Section 2. The County Clerk/Register is hereby directed to publish a summary copy of the Amendment to the Kalamazoo County Sanitary Code in the Kalamazoo Gazette promptly after passage of this Amendment.

Section 3. Upon passage, this Amendment shall become effective November 6, 2003.

Timothy A. Snow  
County Clerk/Register

## **Attachment 4**

### **Notice of Five-Year Review Newspaper Advertisement**



## EPA Reviews West KL Avenue Landfill Superfund Site Kalamazoo, Michigan

U.S. Environmental Protection Agency is reviewing the effectiveness of the cleanup at the West KL Avenue Landfill Superfund site, Oshtemo Township, Mich. Superfund law requires five-year reviews of sites where the cleanup is either done or in progress but hazardous waste remains on-site. These five-year reviews ensure the cleanup remains effective and protects human health and the environment. This is the first five-year review for this site.

At the West KL Avenue Landfill site, EPA's cleanup involved capping the landfill with a water-resistant layer of clay; installing a methane gas collection system, secure fencing and new drainage ditches; institutional controls; and monitored natural process to clean up contaminated ground water. Institutional controls include filing deed restrictions to prevent construction, digging, or excavation within the site and prevent drinking water wells from being installed in the landfill. Additionally, the Agency included a requirement for a municipal water service hook-up to residents within and around the area affected by the pollution so people will not drink from contaminated wells.

As part of this five-year review, which will take several months, EPA is looking at:

- Site information.
- How the cleanup was done.
- How well the cleanup is working.
- Any future actions needed.

A notice of completion of the review will be run in another ad similar to this one and the reports will be available for review at: Kalamazoo Public Library, Oshtemo Branch, 7265 W. Main St., Kalamazoo, MI or by going online at: <http://epa.gov/region5/area/westavenue/>

Questions or concerns regarding the cleanup or the review should be directed to:

**Shari Kolak**  
Remedial Project Manager  
EPA Region 5 (SR-6J)  
77 W. Jackson Blvd., Chicago, IL 60604  
312-886-6151  
kolak.shari@epa.gov  
800-621-8431, Ext. 66151  
Weekdays 9:30 a.m. - 5:30 p.m.

**Dave Novak**  
Superfund Community Involvement Coordinator  
EPA Region 5 (P-19J)  
77 W. Jackson Blvd., Chicago, IL 60604  
312-886-7478  
Novak.dave@epa.gov  
800-632-8431, Ext. 67478  
Weekdays 9:30 a.m. - 5:30 p.m.

## **Attachment 5**

### **List of Documents Reveiwed**

## **List of Documents Reviewed for Five-Year Review Report**

1. Superfund Preliminary Site Closeout Report (December 2006)
2. Record of Decision (ROD) (September 1990)
3. ROD Amendment 1 (February 2003)
4. ROD Amendment 2 (September 2005)
5. Remedial Design/Remedial Action Consent Decree (November 1992)
6. Remedial Investigation and Feasibility Study Reports (May 1989 and March 1990)
7. Deed Restrictions for West KL Avenue Landfill (April 1994)
8. State Preliminary Five-Year Review Comment Letter (January 2009)
9. Data Summary Reports – RD/RA Groundwater Monitoring, Quarterly Sampling Events (January 2007 and July 2007)
10. Data Summary Reports – RD/RA Groundwater Monitoring, Semi-Annual Sampling Event (October 2007 and October 2008)
11. Data Summary Reports – RD/RA Groundwater Monitoring, Annual Sampling Event (April/May 2007 and April 2008)
12. Semi-Annual Progress Report – RD/RA (July-December 2007 and July-December 2008)
13. Data Summary Reports - Residential Monitoring, Semi-Annual Sampling Event (April/May 2006, October 2007, October 2008)
14. Data Summary Reports - Residential Monitoring, Annual Sampling Event (November 2006, April/May 2007, April/May 2008)
15. Revised Draft Work Plan for Extension of Municipal Water (December 2007)
16. Draft Application for Establishment of a Restricted Zone – Kalamazoo County (December 2007)
17. Landfill Cap Operation and Maintenance Plan (June 2007)
18. 2004-06 Municipal Water Supply Connections & Well Closings (April 2007 and May 2007)
19. MDEQ Hydrogeologic Investigation Technical Memorandum (March 2009)

## **Appendix**

### **State Five-Year Review Comment Letter**





JENNIFER M. GRANHOLM  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING



STEVEN E. CHESTER  
DIRECTOR

January 16, 2009

Ms. Shari Kolak  
United States Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard  
Chicago, Illinois 60604

Dear Ms. Kolak:

**SUBJECT: Preliminary Five-Year Review Thoughts, West KL Avenue Landfill Site  
Kalamazoo County, Michigan**

Staff the of Michigan Department of Environmental Quality (MDEQ) are requesting that the United States Environmental Protection Agency (U.S. EPA) take into consideration the following issues and recommendations for inclusion in the upcoming West KL Avenue Landfill site five-year review report.

- The full extent of contamination northwest of the landfill is unknown. Further investigation is needed in that area to help determine the full extent of contamination.
- It is recommended that one or more sentinel monitoring wells be installed to provide early warning for potentially vulnerable water wells. Such monitoring wells should be sampled for volatile organic compounds and 1,4-dioxane to ensure safe drinking water.
- Properties with impacted water wells may need to be connected to the municipal water supply. The need for more active interim response measures should be considered for impacted water wells.
- The groundwater use restriction zone proposed by the potentially responsible parties in 2007 should be updated to include most recent data and should allow for reasonable buffer area.

The MDEQ appreciates the consideration of these issues and recommendations for inclusion in the upcoming five-year review report for this site. We look forward to receiving the draft report soon so we can provide meaningful input.

Please contact me if you have any questions on this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Waleign Wagaw". The signature is fluid and cursive, with the first name "Waleign" and the last name "Wagaw" clearly distinguishable.

Waleign Wagaw  
Grant and Technical Support Unit  
Superfund Section  
Remediation and Redevelopment Division  
517-373-9896

cc: Ms. Rosita Clarke-Moreno, U.S. EPA  
Mr. Thomas Short, U.S. EPA  
Mr. Mark Henry, MDEQ  
Ms. Carol Hefferan Tracy, MDEQ  
Mr. Robert Franks, MDEQ