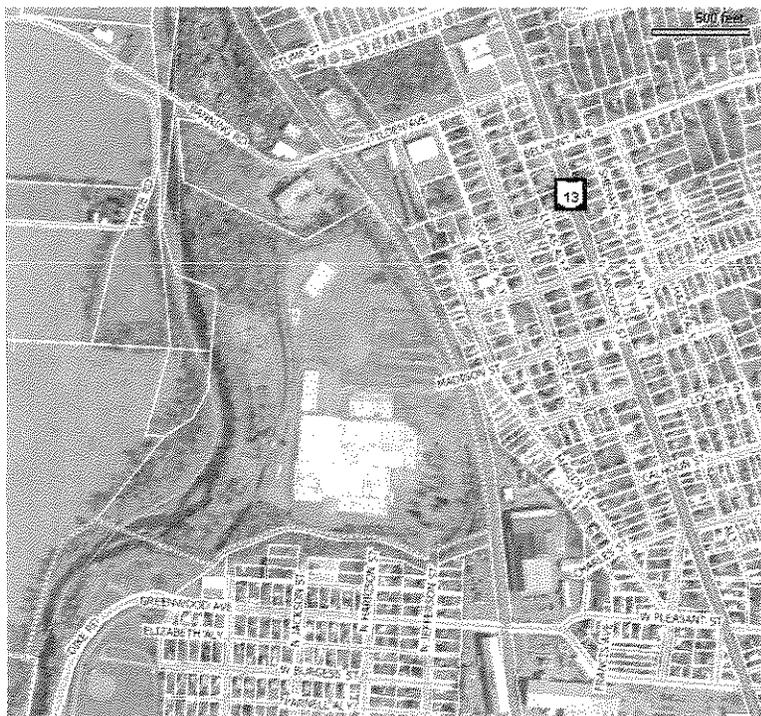




State of Ohio
Environmental Protection Agency

Division of Emergency & Remedial Response

Site Assessment Report Ludlow Packaging (Former American National Can) Site



October 13, 2009

Governor Ted Strickland
Director Chris Korleski

OHIO ENVIRONMENTAL PROTECTION AGENCY (OHIO EPA)
DIVISION OF EMERGENCY & REMEDIAL RESPONSE (DERR)

SITE ASSESSMENT REPORT

LUDLOW PACKAGING (FORMER AMERICAN CAN) SITE

Knox County

DERR Project No.: 142000475003

U.S. EPA I.D. No.: OHD095031399

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EXECUTIVE SUMMARY

The former Ludlow Packaging site (AKA American National Can Co.) is located on West Madison Street, northwest of Mount Vernon, Clinton Township, Knox County, Ohio. See Figure 1 Site Location Map.

The property is approximately 45 acres in size and was continuously occupied from 1926 until 1999 when the large factory building with attached offices, railroad spur and several smaller detached buildings were razed.

The current property owner, Pechiney Plastics Packaging, Inc., has performed several site assessments and has demolished on-site buildings (Dave Ellison, November 17, 2008). Areas of soil and ground water contamination remain at the site.

Site contaminants include metals, volatile organic chemicals, and semi-volatile organic chemicals in soil and ground water. According to information provided to Ohio EPA, site soils are contaminated with arsenic, lead, toluene, xylenes, benzo(a)pyrene, phenanthrene, benzo(a)anthracene, and benzo(b)fluoranthene above the U.S. EPA Region 9 preliminary remediation goals for residential land use and ground water beneath the site is contaminated with arsenic, benzene, toluene, ethylbenzene, xylenes, methylene chloride, 1, 2, 4-trimethylbenzene, and PCE above the U.S. EPA maximum contamination levels for drinking water. The maximum concentration of toluene in ground water at the site indicates the presence of free phase product. In addition, sediments in the Kokosing River downstream from the site are contaminated by fluoranthene, pyrene and lead above the U.S. EPA Region 5 RCRA ecological screening levels for sediment.

The site is located within the one-year travel time zone of the source water protection area serving the Mount Vernon public water supply. At this time, the vertical extent of groundwater contamination and the connection between the contaminated upper saturated zone and the lower drinking water aquifer are poorly defined.

Currently, there is a potential threat to human health if the ground water pathway from the site to the drinking water aquifer and public water supply wells is completed. There are also potential risks to future on-property construction workers and residents exposed to contaminated soil and ground water through direct contact, ingestion and inhalation pathways at the site.

The potential threat to the Kokosing River is primarily to benthic organisms adjacent to the site or in pools downstream of the former facility outfall. The threat to human health via direct contact with sediment or by ingestion of aquatic life from releases at the site will be assessed in a comprehensive study of the Kokosing River in this area that is currently being prepared by Ohio EPA, Division of Surface Water.

The city of Mount Vernon and a local, private manufacturing company are interested in a brownfield redevelopment project at this site. The City applied for \$400,000 from the U.S. Environmental Protection Agency's Community-Wide Assessment Grant (\$200,000 Hazardous Substances and \$200,000 Petroleum Assessment); however, in mid-May 2009, the City was informed that they were unsuccessful in securing the requested federal grant. In September 2009, the City applied for state assessment funds from the Clean Ohio Assistance Fund (COAF) for Phase II property assessment activities. The COAF application is under review.

1.0. INTRODUCTION

The former Ludlow Packaging site (AKA American National Can Co.) is located on West Madison Street, northwest of Mount Vernon, Clinton Township, Knox County, Ohio (See Figure 1). The property is approximately 40 to 45 acres in size. Facilities at the site were continuously occupied by packaging manufacturer plants from 1926 until 1999 when the buildings were demolished. Today, the site contains the former concrete floors and building footers as well as vegetated areas including the constructed levees along the Kokosing River.

The objectives of this state site assessment are to determine the nature and extent of contamination and to evaluate the potential migration and exposure pathways. This site assessment was conducted in accordance with Ohio Environmental Protection Agency (Ohio EPA), Division of Emergency and Remedial Response (DERR) guidance. Available information including Phase I and Phase II environmental site assessment reports and reports on interim remedial actions was reviewed and used to evaluate conditions at the site. These environmental reports were provided by Pechiney Plastic Packaging, Inc.; K. Mavis, Mayor of Mount Vernon, Ohio through the City's Clerk of Council; Burgess & Niple, Inc.; and Lawhon & Associates, Inc.

This site assessment is based solely on the evaluation of existing data; no new environmental samples were collected by Ohio EPA.

2.0. BACKGROUND

Site Name: Ludlow Packaging (Plant 51)	Alias: American National Can, Flexible Packaging Division
DERR Project No.: 142000475003	U.S. EPA I.D. No.: OHD095031399
District: CDO	County: Knox
Site Address: 201 Madison Street, Mount Vernon, Ohio 43050	

Directions to Site: From Ohio EPA's CDO are below:

Total Time: Approximately 1 hours 15 minutes, Total Distance: Approximately 56 miles

1. Start at **EPA CDO/CO Parking Lot, COLUMBUS** Turn **LEFT** onto **RICH STREET**
2. Turn **RIGHT** on **THIRD STREET** and take ramp onto **OH-315 N/ AIRPORT/WORTHINGTON/I-670 E**
3. Take the **I-670 E** exit onto **I-670 E**
4. Take **LEFT** exit **#5B/CLEVELAND** onto **I-71 N**
5. Take exit **#140/MT GILEAD/CARDINGTON**
6. Turn **RIGHT** on **STATE ROUTE 61(OH-61)**
7. Turn **LEFT** on **COUNTY ROAD 15(CR-15)**
8. Bear **LEFT** on **OH-656**
9. Bear **RIGHT** on **OH-229**
10. Turn **LEFT** on **W HIGH ST(US-36)**
11. Turn **LEFT** on **DIKE RD**
12. Continue on **GREENWOOD AVE**
13. Continue on **W PLEASANT ST**
14. Turn **LEFT** on **MARION ST**
15. Turn **LEFT** on **MADISON ST**
16. Arrive at **201 MADISON ST, MT VERNON**, on the **RIGHT**

Source: Modified from 2008 Yahoo! Inc.

Latitude: 40° 24' 04" N

Longitude: 82° 29' 52" W

2.1. MAP(S) ATTACHED (LIST):

Figure 1 Site Location Map

Figure 2 Site Features Map (1970 Aerial Photograph)

Figure 3 Parcel Map (2005 Aerial Photograph)

Figure 4 Public Ground Water Systems – map

Figure 5 Four Mile Radius Map

Figure 6 Natural Heritage Data Map

2.2. SITE DESCRIPTION

The former Ludlow Packaging site (AKA American National Can) site is located on West Madison Street, northwest of Mount Vernon, Clinton Township, Knox County, Ohio. See Figure 1 Site Location Map. The site is located in an area surrounded to the north and east by residential areas (formerly Conrail Railroad), to the south by the former Cooper Industries and to the west by constructed levees along the Kokosing River.

Parcel ID #1202646000, Map Number 66.37 includes approximately 44.356 acres at zero (0) Madison Street with eight parcels created on November 2, 2006 according to the Knox County, Ohio Property Record Card. On September 7, 1999, Pechiney Plastic Packaging Inc. (Pechiney), a Delaware corporation, acquired the facility property from the American National Can Co. The address of Pechiney's contact is 8700 West Bryn Mawr Avenue, Chicago, Illinois 60631. In 2003, Alcan Inc. acquired Pechiney. By October 2007, Rio Tinto Aluminum had acquired Alcan and become known as Rio Tinto Alcan, an Australian company, with its head office located at 1188 Sherbrooke Street West, Montreal, Quebec, H3A 3G2, Canada.

2.3. REGULATORY INFORMATION

The Ludlow Packaging site has been regulated by the Ohio EPA Divisions of Hazardous Waste Management (DHWM), Air Pollution Control (DAPC) and Surface Water (DSW). The site is no longer an active facility. The various Ohio EPA permits have expired. It was determined that there are no active state enforcement orders for this site.

The DHWM, Cessation of Regulated Operations (CRO) Contact Program form was completed on December 28, 1998. The Resource Conservation Recovery Act (RCRA) inspections conducted by DHWM, ending with an inspection in March of 2002, indicated that Pechiney had returned to compliance with RCRA hazardous waste generator activities and was re-classified as a conditionally exempt small quantity generator.

U.S. EPA. The site is not currently listed as a National Priorities List site under the federal Comprehensive Environmental Compensation, Response and Liability Act (CERCLA). However, the site is currently listed on U.S. EPA's "archived" CERCLIS as Ludlow Packaging (OHD095031399).

The site is subject to the requirements of the federal Toxic Substances Control Act (TSCA) for handling and disposal of polychlorinated biphenyls (PCBs). Based on a report contracted by the property owner, the PCBs were removed. PCB removals have not been verified by U.S. EPA.

BUSTR. On July 2, 1999, the Ohio Fire Marshal, Bureau of Underground Storage Tank Regulations (BUSTR) granted a no further action status for completion of a petroleum tank closure assessment following an alleged 1987 removal of petroleum underground storage tanks (USTs).

Knox County Health Department. The Knox County Health Department files contain several complaints of open dumping in 2003 and 2004 at the site.

2.4. SITE HISTORY

The facility property was continuously occupied by packaging manufacturer plants from 1926 until 1999. In 1926, the property was initially owned by the Union Rubber and Tire Company and acquired by Shellmar Products, a cellophane wrapping manufacturer. Continental Can Company acquired the property followed by Ludlow Packaging Company who was purchased by American National Can for \$489,143. American National Can manufactured baby formulae bags, meals-ready-to-eat (MREs) containers for the military, battery hulls and aluminum film canisters. See Figure 2 Site Features Map (1970 Aerial Photograph) and Figure 5 Four Mile Radius Map, which show the active facility and area features, respectively.

The site once contained a large factory building with attached offices, railroad spur and several smaller detached buildings until the buildings were razed in 1999-2000. See Figure 2 for former facility structures.

The August 1926 Sandborn Fire Insurance Map for Mount Vernon shows Union Tire and Rubber Co. located at the property, which is approximately one mile from the public square. Two buildings are shown on the property with an area labeled "proposed extension." Jefferson Avenue extends onto the property but is labeled as "not open." One of the factory buildings was built in 1920.

The August 1926 Sandborn Map for Mount Vernon with updates through January 1949 shows Shellmar Products Co. at the property. To the east of the facility property were the Baltimore and Ohio Railroad and livestock pens. The Shellmar Products factory manufactured cellophane wrapping materials. In addition to the main factory building there was an office, an ink building and five solvent tanks with an earthen dike shown on the map. A log yard is shown adjacent to the facility. (See Sanborn Fire Insurance Maps in Appendix B Exhibits, for additional information including figures from Phase I and II environmental property assessments performed by others.)

Based on an Ohio EPA February 11, 1994 Field Activity Report, American National Can made plastic packaging products including baby bottle liners, serological bags and gum wrappers. The processes involved extruding sheet plastic from solid resin pellets and printing (using solvent-based inks). The extrusion/printing byproducts were recycled when possible. Un-recyclable byproducts (i.e., hazardous waste) were collected in drums, labeled, and manifested for off-site disposal.

Following an inspection of the facility, Ohio EPA, DHWM, issued a November 4, 1997 letter to American National Can that advised this site was within the wellhead protection area surrounding the city of Mount Vernon's public water supply wells and that an improperly maintained well could be an easy conduit for contamination to reach the City's ground water supply. On December 12, 1998, American National Can submitted a completed CRO Program Contact form to DHWM. By 2002, Pechiney, the new owner of the site, returned to compliance with RCRA hazardous waste generator activities. Pechiney abandoned seven on-site former production wells in December of 2002.

Below is a general chronology of relevant events at the Ludlow Packaging site:

<u>Year(s)</u>	<u>Description of Event(s)</u>
1926	Packaging manufacturing activities began.
1984	Preliminary Assessment (PA) completed by Ohio EPA.
1986	Ohio EPA detected VOCs in deep Production Well #2.
1990	Ohio EPA detected VOCs in deep Public Water Supply Well #7.
1994	Revised PA completed by Ohio EPA.
1997	Letter from Ohio EPA that site is within wellhead protection area.
1998	Packaging manufacturing activities ceased. RMT, Inc. installed ten soil borings and five monitoring wells.
1999-2000	Site buildings demolished. RMT, Inc. installed 59 soil-gas collectors, 11 soil borings and eight monitoring wells during three phases of work in 1999.

- 2002 Returned to compliance with RCRA Hazardous Waste Generator activities.
Seven former production wells were abandoned.
- 2005 Lawhon & Associates, Inc. performed an electromagnetic/ground penetrating radar survey of select areas of the site and installed 25 soil borings and seven monitoring wells.
- 2006 Metal rods observed in levee.
State Site Assessment began.
- 2007 Ohio EPA, DSW conducted sediment quality sampling in Kokosing River study area.
- 2008 City applied for U.S. EPA Area-Wide Brownfield Grant.
- 2009 City's Brownfield Grant application was unsuccessful.
Ohio EPA prepares *State Site Assessment Report*.

Erosion of Disposal Area. By April 1970, land disturbance immediately west of the facility and next to the river was evident from aerial photography. Since that time, erosion of this disturbed area has been observed. On July 12, 2006, Frank DiMarco, Central Ohio Scenic Rivers Manager, Ohio Department of Natural Resources (ODNR) contacted Ohio EPA about two metals rods found on the side of the levee by the Kokosing River. One of the rods was about three inches long and 3/8 inch in diameter. A former employee said that they dumped "everything" (drums, clinker that looks like lava rock) over the levee. Kids were reported to play in the area. It was noted that the fill material may have been from the time of World War II.

Site Clean Up Activity. Mr. Dave Ellison, Division of Environmental Health and Safety, Pechiney, in a November 17, 2008 telephone conversation with Ohio EPA staff stated that Pechiney started to clean up the site but stopped about six years ago (2002). Over the last ten years, their environmental consultant, RMT, Inc., has generated volumes of studies and a cleanup plan. Pechiney has spent about \$1.5 million at the site including demolition of the buildings. An attempt to chemically treat ground water beneath the site was unsuccessful due to high chemical concentrations. The highest area of ground water contamination on site is below remaining concrete slabs. Other ground water cleanup options have been estimated to cost about \$1 million.

2.5 REDEVELOPMENT ACTIVITIES

Ohio EPA and Ohio Department of Development staff attended a June 5, 2008 meeting with Mount Vernon Mayor Mavis, staff and other invited attendees. During this meeting, a conceptual overview of a potential redevelopment project for the former Ludlow Packaging site was provided. A potential energy technology project would use about 25 acres of the property for solar power generation. The \$10-million project is designed to improve green power generation from photovoltaic cells in Ohio. The project would re-use the concrete surfaces at the site. The concrete slabs at the site total approximately 14,800 sq. ft. and could be considered as an estimated \$228,000 liability if they needed to be removed.

The June 2008 meeting concluded with a brief site visit. Ohio EPA staff observations included the following:

- The site was partially fenced.
- Concrete slabs and foundations exist on about eight acres of the site.
- Vegetation grows in and around the concrete slab areas.
- The concrete has areas of staining and raised concrete curbs with metal supports containing brick fragments, dark wooden blocks, water with oil sheens and vegetation.
- A fire hydrant was present in a sub-slab vault or utility corridor, and other manholes were observed.
- Some broken floor tiles were scattered on portions of a slab.

Ohio EPA staff met with the City on August 21, 2009, to share information about the site and on recent changes to the Clean Ohio Fund programs. Since the 2008 meeting, the City annexed the property to maintain the flood control levee and maintains interest in future development plans for the energy development project and to provide a green belt area with a connecting bike trail. In 2009, Knox County was categorized as a priority investment area with access to the Clean Ohio Assistance Fund (COAF).

In September 2009, the City applied for state assessment funds from the COAF for Phase II property assessment activities. The COAF application is under review.

2.6. PREVIOUS FIELD WORK

Ohio EPA.

Division of Drinking and Ground Waters.

The Ambient Ground Water Monitoring Program managed by Ohio EPA, Division of Drinking and Ground Waters (DDAGW), has sampled the Mount Vernon public water supply Well #8, a Ranney well with three 100 foot lateral screens, since 1991 and continues to sample it as part of the ambient monitoring program. Concentrations of many of the parameters including arsenic, barium, copper, lead, nickel, and selenium spiked during the 1994 to 1995 timeframe. Concentrations of total chromium appear to have increased in this well since 1999. There have been no concentrations of volatile organic compounds (VOCs) above reporting limits in the samples collected from Well #8 during the period of 1994 through 2008.

In 1986, ambient ground water sampling of one of the production wells at the site, Ludlow Packaging Well #2, located on the southwest side of the plant, was performed by Ohio EPA, Division of Ground Water. The laboratory report indicated that two VOCs exceeded their respective U.S. EPA maximum contaminant levels (MCLs) for drinking water. This well was completed in the same buried valley aquifer used by the Mount Vernon public water supply wellfield.

Division of Emergency and Remedial Response 1991.

The Mount Vernon public water supply wellfield was investigated by Ohio EPA DERR in 1991 (April 11, 1991). Ground water samples from the Mount Vernon public water supply wells were collected and analyzed. Well #7 contained 0.0013 mg/l perchloroethane (PCE) in 1985 (Ohio EPA, Division of Public Water Supply, August 15, 1985). Ohio EPA staff re-sampled this well in November 1990 and again in January 1991. Well #7 was located east of the Kokosing River, north of Riverside Park and south of Greenwood Avenue and approximately 800 feet southwest of the Ludlow Packaging site. This public water supply well was completed to a depth of 98 feet in a highly permeable sand and gravel aquifer.

Division of Emergency and Remedial Response 2006.

On December 11, 2006, Ohio EPA, DERR/Central District Office (CDO) staff performed a site visit in response to a complaint received by Frank DiMarco, Central Ohio Scenic Rivers Manager, ODNR, on October 6, 2006. The complaint stated that metals rods had been found in the Kokosing River and in eroding fill material along the bank adjacent to the site.

Ohio EPA's DERR/CDO staff observed that the buildings had been razed to concrete slabs and some piles of demolition debris were present at the site. On the northeast side of the site, there was an area of limited vegetation and black material inside the perimeter fence. On the south side of the site, there was an earthen mound, vegetation and remnants of a structure and numerous drainage pipes flowing into a small waterway that drained to the river. On the west side of the site, there was a concrete pad with four large ring stains, possibly from above ground storage tanks, and a gate providing access to the levee and the area to the west of the levee. The area west of the levee was vegetated, and a large burn area was observed near the bank of the river. The burn area consisted of large amounts of burned material, metal, plastic, paper and other miscellaneous debris approximately four to five feet deep. Some debris extended below the river's surface. A monitoring well was located to the north of this area.

Division of Surface Water 2007.

Ohio EPA, DSW staff conducted sediment quality sampling in the Kokosing River study area during July-September 2007. See Appendix D, Kokosing River Basin Sediment Data, for the draft table summarizing the results that will be part of the "*Ohio EPA Biological and Water Quality Study of the Kokosing River*," which is currently being prepared. The sample collected from River Mile (RM) 28.61 at Tilden Avenue is upstream of the site and the sample collected from RM 24.30 adjacent to Glenn Road is downstream of the site and the Mount Vernon wastewater treatment plant.

Non-Ohio EPA.

Below are summaries of the environmental documents received by Ohio EPA in response to information request letters.

Phase I Environmental Site Assessment 1998.

The Phase I environmental site assessment performed by RMT, Inc. was conducted following the "Phase I Property Assessment for the Voluntary Action Program" rules (Ohio Administrative Code Chapter 3745-300-06), except for the lack of operational information prior to 1960, title search and aerial photograph review.

Nine identified areas with potential for known or suspected releases of hazardous substances or petroleum were identified. These were identified as: A - Above Ground Storage Tanks and Former Underground Piping, B - Old Ink House, C - Boiler Room, D - Former 1,500 Gallon Solvent USTs, E- Former #2 Diesel Fuel UST, F - Former Area(s) of Surface Burning, G - Loading Dock Spills, H - Former Coal Storage and I - Soil Staining.

Raw materials identified at the site included the following solvents: ethyl alcohol, ethyl acetate, methyl alcohol, toluene, methyl ethyl ketone (MEK), normal propyl alcohol, normal propyl acetate, isopropyl alcohol, acetone, and VMP naphtha. Other hazardous substances used at the facility included chrome and copper plating and stripping, metal hardening (cyanide) and photographic processing materials.

Phase II Environmental Site Assessment 1998.

Ten soil borings were installed and five borings were converted to ground water monitoring wells. This preliminary Phase II assessment performed by RMT, Inc., reported exceedences of the Ohio EPA Voluntary Action Program (VAP) leach-based generic standards for toluene, arsenic, barium and cadmium in shallow soils at the site. The VAP generic unrestricted potable use standard for toluene was also exceeded in ground water at the site.

Shallow soil contamination was found at the Old Ink House, Identified Area B. Ground water was present at the site at a depth of approximately 11 to 14 feet below ground surface, and flowed generally toward the southwest. Toluene in shallow ground water above its MCL was present at the Former 1,500 Gallon Solvent USTs, Identified Area D. Concentrations of toluene and xylenes were identified in ground water in this area and in the Old Ink House area. The chemical, cis-1,2-dichloroethene, was detected in ground water beneath the Former Area of Surface Burning, Identified Area F.

Additional Phase II Environmental Site Assessment 1999.

This additional Phase II assessment performed by RMT, Inc. included a soil-gas survey consisting of 59 soil-gas collectors deployed on January 20 and 21, 1999, and retrieved on February 2, 1999. Eight VOCs were detected in the soil-gas samples. Benzene, carbon tetrachloride, methyl tert-butyl ether (MTBE) and 1,1,1-trichloroethane were not detected above their respective reporting limits. The soil-gas data were used to determine the potential location and extent of VOC-impacted soil.

Seven soil borings and six monitoring wells were installed on March 22 and 23, 1999. Following characterization activities and pending approval, remaining wastes were to have been shipped off-site by March 31, 1999.

Ground water beneath the site was approximately 11 to 14 feet below ground surface in sand and gravel units. The ground water flow direction on April 1, 1999, was determined to be generally to the southwest toward the Kokosing River.

Concentrations of ethylbenzene, xylenes, toluene, 1,2,4-trimethylbenzene and tetrachloroethane (.0197 mg/kg, 0.1252 ug/kg, 0.0661 mg/kg, 0.00855 mg/kg and 0.00804 mg/kg, respectively) were detected in soil samples. Arsenic concentrations in soil were reported to range between 11.7 to 16.3 mg/kg.

VOCs reported in ground water samples included ethylbenzene, xylenes and toluene (0.894 mg/l, 4.134 mg/l and 10.700 mg/l, respectively). No arsenic contamination in ground water was reported during this phase of the assessment.

Second Additional Phase II Environmental Site Assessment 1999. The focus of this second additional assessment performed by RMT, Inc. was on three areas of the site including the Former Solvent USTs (ground water), Identified Area D; the Old Ink House (soil), Identified Area B; and the Former Area of Surface Burning (soil), Identified Area F. Two monitoring wells were installed in the Former Solvent UST area based on vertical profiling using temporary wells and onsite analyses using mobile gas chromatograph. Four soil borings were sampled on August 16-18, 1999, in the Former Area of Surface Burning. Ground water samples from seven monitoring wells near the Former Solvent USTs area were collected and analyzed.

Sub-surface soils were well-graded and poorly-graded sands with coarser granular deposits observed intermittently between 25 to 45 feet below the ground surface. Ground water was encountered at depths of 12 to 17 feet with ground water flow generally to the southwest.

Soil samples contained arsenic concentrations ranging from 11.9 mg/kg to 69.8 mg/kg. Maximum concentrations of VOCs reported in soil samples were methylene chloride at 0.0063 mg/kg, toluene at 1,500 mg/kg, and trichloroethene at 0.0083 mg/kg. In saturated soils, concentrations of semi-volatile organic compounds (SVOCs) were 2.1 mg/kg of di-n-butyl phthalate, 0.400 mg/kg phenanthrene, 0.530 mg/kg fluoranthene, 0.440 mg/kg pyrene, 0.430 mg/kg benzo(a)anthracene, 0.052 mg/kg chrysene, 0.580 mg/kg benzo(b)fluoranthene, and 0.410 mg/kg benzo(a)pyrene.

In the ground water samples collected on August 25-26, 1999, vertical profiling using field screening found the highest concentrations to be 0.057 mg/l of benzene, 0.043 mg/l toluene and 0.026 mg/l xylenes in the 19 to 24-foot zone. Monitoring Well W-2 continued to have the highest concentrations of methylene chloride at 0.720 mg/l, toluene at 13.000 mg/l, ethylbenzene at 0.810 mg/l, and xylenes at 3.900 mg/l. Field measurements were also taken when the ground water samples were collected, and the pH ranged from 6.90 to 7.36 S.U., the corrected conductivity from 689.7 to 1,094.3 umhos/cm, dissolved oxygen 0.05 to 0.2 g/l and temperature 16.3 to 20.4°C.

The shallow ground water zone, including the capillary fringe, reportedly contained toluene-contaminated soil to depths of up to 25 feet. Ground water contamination during vertical profiling activities by others reported similar concentrations of toluene in the shallow ground water zone based on the presence of toluene in samples from depths from 19 to 49 feet.

The Phase II environmental site assessment defined the extent of impacted soil northwest of the Old Ink House and the extent of shallow arsenic contaminated soil in the Former Area of Surface Burning and concluded that ground water migration of VOCs below the Former Solvent UST area was limited. The limited ground migration of VOCs in the Former Solvent UST area was based on not finding evidence of significant vertical or horizontal contaminant migration near the former 1,500-gallon solvent tank removed in 1985.

Proposed Soil Remediation 2000.

In a January 25, 2000 revised proposal, RMT, Inc. proposed to perform limited remediation adjacent to the Old Ink House, Identified Area B, to a depth of approximately two feet based on toluene-contaminated soil. Approximately 35 tons of soil would have to be excavated from an area approximately 30 feet by 10 feet and placed into roll-off boxes for characterization, transport and disposal as a U-listed hazardous waste. The excavation would be backfilled and compacted.

Plant Decommissioning/Asbestos Abatement 2002.

RMT, Inc. prepared a letter report dated March 14, 2003 for the plant decommissioning / asbestos abatement activities completed on December 19, 2002, including regulated asbestos containing materials (RACM) abatement activities. Demolition activities were substantially complete on January 10, 2003. Abandonment of electrical and other underground utilities was arranged by Pechiney.

RACM abatement activities were reportedly conducted under 29 Code of Federal Regulation (CFR) 1926.1101 Subpart Z, an Ohio EPA, DAPC, Notification of Demolition and Renovation Permit and federal, state, and local ordinances. Forty-two loads (301.96 tons) of Class I friable asbestos and seven loads (73.66 tons) of Class II non-friable asbestos were transported and disposed at the Nobel Road Landfill, Inc. located in Shiloh, Ohio.

Demolition work included the removal and disposal of "special wastes" such as fluorescent, mercury vapor and high intensity discharge lights and PCB and non-PCB ballasts by Rineco.

Construction demolition debris (hard fill) that was suitable for backfilling was left on site. While the unsuitable construction demolition debris (soft fill), totaling 11,132 cubic yards or 367 loads, was transported to Roberts C&DD Facility, Inc. located in Newark, Ohio. A total of 2,403 tons of recyclable metal materials were transported off-site for recycling at Ross Bros. Recycling located in Mount Vernon.

Seven production wells numbered 1, 2, 3, 4, 4A, 5 and 6 were abandoned (plugged) between December 3 and 13, 2002 by G.M. Baker & Sons Company in accordance with Ohio Revised Code Section 1521.05(B). Water well sealing reports were submitted to the ODNR, Division of Water. Depths of these former production wells ranged from 75 to 95 feet deep (see Section 2.7 and Appendix A). Wells were in good to poor condition except for Well 4A, which was described as being collapsed prior to grouting from a depth of 31 feet to ground surface.

Site restoration activities, consisting of applying fertilizer and grass seed with a protective cover, were planned to commence in early spring of 2003.

Phase II Environmental Site Assessment 2005.

The Phase II environmental site assessment activities performed by Lawhon & Associates, Inc. (Lawhon) included an electromagnetic/ground penetrating radar (EM/GPR) survey of select areas of the site and installation of 25 soil borings and seven ground water monitoring wells in the vicinity of two former solvent USTs located behind the former on-site mail office, under the floor of the Old Ink House, and around former Building G. In addition, soil samples for determination of arsenic background concentrations were collected.

The results of this assessment are summarized below.

- No USTs were identified in the EM/GPR survey.
- Soil samples from the area of the Old Ink House, Identified Area B, contained detections of acetone up to 0.14 mg/kg and several metals. Ground water samples collected in the area of the Old Ink House contained detections including 0.001 mg/l of cis-1,2-dichloroethene, 0.005 mg/l naphthalene, 0.004 mg/l PCE, 0.0056 mg/l toluene, 0.004 mg/l 1,2,4-trimethylbenzene and 0.0044 mg/l xylenes. In addition, the metals, barium and selenium, were also detected in ground water.
- Trace concentrations (less than 0.050 mg/kg) of PCE, toluene, and xylenes were detected in the area of the Former Solvent USTs, Identified Area D. Ground water contaminated with toluene was detected on the northwest edge of the two Former Solvent USTs in an area of approximately 80 feet by 175 feet. The maximum concentration of toluene in ground water was 69 mg/l with detections of 23 mg/l xylenes, 4.3 mg/l ethylbenzene and 0.38 mg/l 1,2,4-trimethylbenzene. Arsenic was detected in ground water at 0.022 mg/l.
- The hot spot previously identified near the south wall of the Old Ink House building could not be located possibly due to rubble along the foundation of the building.

- Only slight ground water contamination was present in the vicinity of former Building G. The average concentration of arsenic in soil was 8.51 mg/kg.

The following recommendations were made by Lawhon:

- Installation and operation of a ground water pump-and-treat system consisting of three recovery wells and an air-stripper and granular activated carbon system with treated water being discharged to the Mount Vernon sanitary sewer for a period of one year followed by a year of quarterly monitoring.
- Removal of rubble and conducting a test excavation to determine the extent of the impacted soil to be excavated and hauled off-site for disposal at a licensed facility or land farmed onsite.
- If future land use includes the potential for a residential land use scenario, then address arsenic impacted soils through remediation or engineering controls.

VAP Phase I Property Assessment 2007.

A summary of available investigatory information is provided in Table 1 Identified Area and Chemicals of Concern. Table 1 contains a summary of 12 identified areas and chemicals of concern from Burgess & Niple, Inc., August 2007, VAP Phase I Property Assessment, and remarks. This report recommends that a VAP Phase II property assessment for the property be performed in the event a no further action (NFA) letter is pursued under the VAP.

Reportedly, Pechiney initiated interim remedial actions to address the solvent-contaminated ground water; however this attempt was unsuccessful. Pechiney has reportedly spent approximately \$1.5 million at the site to demolish buildings and to perform interim remedial actions.

2.7. TOPOGRAPHY, GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

The site is located in the physiographic area of Ohio known as the Glaciated Low Plateau (aka Central Till Plains). The deep to moderately deep, well to moderately drained soils found on the surrounding terrain are the Fox soils, of the Ockley-Bogart-Tioga association. The glacial sand and gravel terraces and alluvial deposits overlie bedrock, which lies more than 90 feet beneath the site. The bedrock consists of the Black Hand sandstone and Wooster shale of the Cuyahoga formation and the Berne member of the Logan formation. The Illinoian and Wisconsin age glacial deposits are hydraulically connected to the near-by Kokosing River with an average depth to water seasonally fluctuating between ten to 25 feet below the ground surface. On-site wet gravel and sand deposits were reported to have been encountered at depths of less than 15 feet below the ground surface (RMT, 1998).

The site is within the flood plain of the Kokosing River and contains a levee area and a relatively flat area at an elevation of approximately 1,000 feet above mean sea level. (See Figure 1 for the approximate location of the Ludlow Packaging site.) The area of Mount Vernon was abraded by the Illinoian and Wisconsin ice sheets with the City on the terminal moraine of the Wisconsin glacier (Stout et. al, 1943). The old Utica River Valley in this area extends to a bedrock floor consisting of shales and shaly sandstones of the Cuyahoga formation of Mississippian age at depths of approximately 767 feet. The glacial drift (valley fill) contains sand and gravel deposits.

Soil. Surficial deposits at the site consist of fill, silty clay and sand to depths of approximately ten to 12 feet below ground surface, with sand and gravel deposits. Ground water occurs in the sand and gravel deposits at depths of ten to 40 feet. Based on static depth to ground water measurements from production well logs, ground water levels in the mid-1960s were at a depth of 15 to 25 feet below the ground surface.

A clay and sand unit underlies the sand and gravel unit at depths of 36 to 40 feet. This clay and sand unit extends to depths of 62 to 66 feet and is underlain by a second sand and gravel unit to completion depths of the on-site wells of approximately 92 to 94 feet.

Surface water. The site lies in the flood plain of the Kokosing River and is within the Walhonding River Watershed. See Figure 3 for the relative location of the Ludlow Packaging site to the Kokosing River.

Ground water. The aquifer is encountered at approximately 60 feet below ground surface and is 30 to 40 feet thick based on the water well logs. The aquifer appears to be a confined aquifer at the Mount Vernon public water supply wellfield and the Ludlow Packaging site.

Climate. The weather station for Mount Vernon, Knox County is located at about 40.38° N 82.46° W at a height of about 977 feet above sea level (NCDC Cooperative Stations). The Annual Average Rainfall for the ten complete years between 1931 and 1944 is 36.7 inches. The months of June and August have the greatest average rainfall of 4.4 inches and the month of October has the least amount of average rainfall of 1.9 inches during the period.

Additional climate data including Average Maximum Temperature, 24-hr Average Temperature, Average Minimum Temperature, Heating Degree Days, Cooling Degree Days, and Average Rainfall over a 36-year period, are available for nearby stations at Fredericktown and Danville.

2.8. LAND USE AND DEMOGRAPHIC INFORMATION

Available 2000 census data for a four-mile radius of the site includes a total population of 19,802 people in 7,976 houses. There are 177 houses within ¼ mile of the site. See Figure 5 and Appendix C Census Data for available census information.

3.0. METHODOLOGY

3.1 REVIEW OF AVAILABLE ENVIRONMENTAL REPORTS

On June 5, 2008, Ohio EPA, DERR staff officially informed the Mayor of Mount Vernon, Ohio that a state site assessment was in process for this site and requested information from them including the August 2007 Phase I property assessment report. In a September 8, 2008 e-mail from the City's Clerk of Council, a summary of the August 2007 report by Burgess & Niple, Inc. was provided as well as a contact for requesting a complete copy of the report. Ohio EPA staff contacted Burgess & Niple, Inc. to request a copy of the August 2007 report. On November 17, 2008, Ohio EPA received a compact disk (CD) containing the requested August 2007 report.

On November 6, 2008, Ohio EPA, DERR staff requested copies of environmental reports from the current property owner, Pechiney. A compact disc containing copies of environmental reports for the site at 200 Madison Street in Mount Vernon prepared for Pechiney was received by Ohio EPA on December 22, 2008. Six documents were provided dating from October 1989 through March 14, 2003.

A complete copy of a June 27, 2005 Phase II environmental site assessment report by Lawhon & Associates, Inc. was also requested from Pechiney on December 29, 2008. The requested June 27, 2005 report was provided by Pechiney and received on January 12, 2009.

3.2. FIELD SCREENING AND SAMPLING LOCATIONS

See Appendix B Exhibits, for copies of available maps prepared by others, showing environmental sample locations during previous phases of work at the Ludlow Packaging site.

3.3. FIELD SCREENING AND/OR SAMPLING METHODOLOGIES

Below is a summary of analytical laboratories, methods and quality assurance/quality control issues for the site assessments performed by others for the Ludlow Packaging site.

Ohio EPA

Division of Surface Water 2007.

Laboratory analyses were performed by Ohio EPA, Division of Environmental Services using Ohio EPA Method 581.6 for percent solids and U.S. EPA Methods 8082A and 8270.

Division of Emergency and Remedial Response 1991.

Ohio EPA, Division of Environmental Services analyzed water samples collected from the Mount Vernon public water supply wells. Well #7 was sampled on January 17, 1991; November 19, 1990; and August 5, 1985 and the samples were analyzed for VOCs.

Division Ground Waters 1986.

Ohio EPA, Division of Environmental Services analyzed a water sample collected from one of the production wells, Ludlow Packaging Well #2, for VOCs on August 27, 1986.

Non-Ohio EPA

Phase II Environmental Site Assessment 2005.

The soil and ground water samples collected in 2005 were analyzed for VOCs by Method 8260B, the eight RCRA metals by the 6000 Series, arsenic by Method 6010B and mercury by Method 7470A, by Environmental Science Corp., Mount Juliet, Tennessee. The laboratory detection limit for the analysis of dissolved arsenic by Method 6010B on May 21, 2005, was 0.020 mg/l, which is higher than its screening level.

Additional Phase II Environmental Site Assessment 1999.

The soil and ground water samples collected on March 22 and 23, 1999, were analyzed for VOCs (including n-hexane) by Method 8260A and arsenic by Method 6010A, by GEO Analytical, Inc., Twinsburg, Ohio.

Soil samples were visually classified using the Unified Soils Classification System (USCS), ASTM D-2488. Field descriptions also included grain size distribution, grading, density and water content.

Phase II Environmental Site Assessment 1998.

The soil and ground water samples collected in 1998 were analyzed for VOCs by Method 8260A, SVOCs by Method 8270B, metals by Methods 6010A and 7471A, total cyanide by Method 9012, and total petroleum hydrocarbons (TPH) by Method 8015, by Quanterra Laboratories, North Canton, Ohio.

Petroleum samples collected in late 1998 were analyzed for VOCs by Method 8260A, TPH by Method 8015Mod and lead by Method 6010A, by Quanterra Laboratories, North Canton, Ohio.

4.0. RESULTS

4.1. FIELD SCREENING AND SAMPLING RESULTS

Ohio EPA.

Division of Surface Water 2007.

Ohio EPA, DSW staff conducted sediment quality sampling in the Kokosing River study area during July-September 2007. See Appendix D, Kokosing River Basin Sediment Data, for the draft table summarizing the results that will be part of the "*Ohio EPA Biological and Water Quality Study of the Kokosing River,*" which is currently being prepared.

The sample collected from RM 28.61 at Tilden Avenue is upstream of the Ludlow Packaging site and the sample collected from RM 24.30 adjacent to Glenn Road is downstream of the site and the Mount Vernon wastewater treatment plant. Lead at 36.6 mg/kg and mercury at 0.065 mg/kg were detected in the downstream sediment sample from RM 24.30, which is also the highest concentration measured in the Kokosing River Basin. In addition to an increase in the concentrations of metals in the downstream sample at RM 24.30, the concentrations of SVOCs in the sediment sample from RM 24.30 were detected at the highest concentrations in the Kokosing River Basin. These SVOCs included fluoranthene at 1.0 mg/kg and pyrene at 0.83 mg/kg, which were also identified as chemicals of concern at the site. No SVOCs were detected in the upstream sample at RM 28.61.

Division of Emergency and Remedial Response 1991.

The Mount Vernon public water supply wellfield was investigated by Ohio EPA DERR in 1991 (April 11, 1991). Well #7 contained 0.0013 mg/l PCE in 1985 (Ohio EPA, Division of Public Water Supply, August 15, 1985). In November 1990, this well contained 0.00307 mg/l toluene and 0.00157 mg/l chloroform. In January 1991, during follow-up sampling of this well, no VOCs were reported above detection limits. Well #7 was located east of the Kokosing River, north of Riverside Park and south of Greenwood Avenue and the site. This public water supply well was completed to a depth of 98 feet in a highly permeable sand and gravel aquifer. One of the potential sources was reported to be American National Can located approximately 800 feet to the northeast. Ohio EPA, DHWM documented the use of toluene at American National Can.

In 1991, the wellfield was composed of Well #7 pumping at 1.0 million gallons per day (mgd), a Ranney well, Well #8, (87 feet deep) pumping 4 mgd, Well #6 (103 feet deep) pumping 1.6 mgd, and Well #3 pumping 0.8 mgd.

Division of Ground Water 1986.

Ohio EPA, Division of Ground Water collected a water sample from one of the production wells, Ludlow Packaging Well #2, on August 27, 1986. Ohio EPA, Division of Environmental Services analyzed the water sample and identified two VOCs with concentrations exceeding their respective MCLs. Concentrations below are reported in micrograms per liter (mg/l):

<u>Chemical Name</u>	<u>Concentration</u>	<u>Screening Level*</u>
2-bromo-1-chloropropane	0.050	NA
Methylene chloride	0.001806	0.0048
1,2-dibromoethane (EDB)	0.000244	0.0000065
1,1,2,2-tetrachloroethane	0.000561	0.000067
Toluene	0.000137	0.0023

NA = Not Available.

* = See Section 4.1 for a detailed description of screening levels.

Non-Ohio EPA.

See Table 2 Summary of Select Maximum Site Concentrations in Soil and Table 3 Summary of Select Maximum Site Concentrations in Ground Water, which are based on data collected during Phase II environmental site assessment activities at the site.

Soil. In 1998, the preliminary Phase II assessment performed by RMT, Inc., reported exceedences of the Ohio EPA Voluntary Action Program (VAP) leach-based generic standards for toluene, arsenic, barium and cadmium in shallow soils at the site.

During the 1999 Phase II assessment, concentrations of ethylbenzene, xylenes, toluene, 1,2,4-trimethylbenzene and tetrachloroethane (.0197 mg/kg, 0.1252 mg/kg, 0.0661 mg/kg, 0.00855 mg/kg and 0.00804 mg/kg, respectively) were detected in soil samples. Arsenic concentrations in soil were reported to range between 11.7 to 16.3 mg/kg.

Four additional soil borings were sampled on August 16-18, 1999, in the Former Area of Surface Burning, Identified Area F. Soil samples contained arsenic concentrations ranging from 11.9 mg/kg to 69.8 mg/kg. Maximum concentrations of VOCs reported in soil samples were methylene chloride at 0.0063 mg/kg, toluene at 1,500 mg/kg, and trichloroethene at 0.0083 mg/kg. In saturated soils, concentrations of semi-volatile organic compounds (SVOCs) were 2.1 mg/kg of di-n-butyl phthalate, 0.400 mg/kg phenanthrene, 0.530 mg/kg fluoranthene, 0.440 mg/kg pyrene, 0.430 mg/kg benzo(a)anthracene, 0.052 mg/kg chrysene, 0.580 mg/kg benzo(b)fluoranthene, and 0.410 mg/kg benzo(a)pyrene.

In 2005, the Phase II assessment performed by Lawhon & Associates, Inc. included installation of 25 soil borings. In addition, soil samples for determination of arsenic background concentrations were collected. Soil samples from the area of the Old Ink House, Identified Area B, contained detections of acetone up to 0.14 mg/kg and several metals. Trace concentrations (less than 0.050 mg/kg) of PCE, toluene, and xylenes were detected in the area of the Former Solvent USTs, Identified Area D. The average concentration of arsenic in soil was 8.51 mg/kg.

Contamination identified in the soil includes acetone, arsenic, ethylbenzene, lead, methylene chloride, toluene, trichloroethene, 1,2,4-trimethylbenzene, xylenes, bis(2-ethylhexyl phthalate, di-n-butyl phthalate, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, chrysene, phenanthrene and pyrene.

Ground water. In 1998, the preliminary Phase II assessment performed by RMT, Inc. reported the exceedance of the VAP generic unrestricted potable use standard for toluene in ground water at the site.

During the initial 1999 Phase II assessment, concentrations of VOCs reported in ground water samples included ethylbenzene, xylenes and toluene (0.894 mg/l, 4.134 mg/l and 10.700 mg/l, respectively). No arsenic contamination in ground water was reported during this phase of the assessment.

In August 1999, ground water samples from seven monitoring wells near the Former Solvent USTs area were collected and analyzed. Vertical profiling using field screening found the highest concentrations to be 0.057 mg/l of benzene, 0.043 mg/l toluene and 0.026 mg/l xylenes in the 19- to 24-foot zone. Monitoring Well W-2 continued to have the highest concentrations of methylene chloride at 0.720 mg/l, toluene at 13.000 mg/l, ethylbenzene at 0.810 mg/l, and xylenes at 3.900 mg/l.

In 2005, the Phase II assessment performed by Lawhon & Associates, Inc. included installation of seven ground water monitoring wells. Ground water samples collected in the area of the Old Ink House contained detections including 0.0013 mg/l of cis-1,2-dichloroethene, 0.005 mg/l naphthalene, 0.004 mg/l PCE, 0.0056 mg/l toluene, 0.004 mg/l 1,2,4-trimethylbenzene and 0.0044 mg/l xylenes. In addition, the metals, barium and selenium, were also detected in ground water. Ground water contaminated with toluene was detected on the northwest edge of the two Former Solvent USTs in an area of approximately 80 feet by 175 feet. The maximum concentration of toluene in ground water was 69 mg/l with detections of 23 mg/l xylenes, 4.3 mg/l ethylbenzene and 0.38 mg/l 1,2,4-trimethylbenzene. Arsenic was detected in ground water at 0.022 mg/l.

Contamination identified in the ground water beneath the site includes arsenic, benzene, toluene, ethylbenzene, cis,1,2-dichloroethene, xylenes, methylene chloride, 1,2,4-trimethylbenzene, and PCE.

4.2. COMPARISON OF SAMPLING RESULTS TO SCREENING LEVELS CRITERIA

See Tables 2 and 3 for summaries of chemicals of concern in soil and ground water at the site based on available site investigation reports showing concentrations exceeding human health based screening levels.

Soil. Contamination concentrations in soil were compared to U.S. EPA Region 9 preliminary remediation goals (PRGs), residential land use (U.S. EPA, September 12, 2008). Arsenic, lead, toluene, benzo(a)pyrene, phenanthrene, benzo(a)anthracene, and benzo(b)fluoranthene exceeded the Region 9 PRGs.

Surface water/Sediment. For human health sediment screening, contamination concentrations in sediment were compared to Region 9 PRGs, residential land use. Fluoranthene, pyrene and lead were below the Region 9 PRGs. For potential ecological impacts, contamination concentrations in sediment were compared to U.S. EPA Region 5, RCRA Ecological Screening Levels for sediment (August 22, 2003). Fluoranthene, pyrene and lead exceeded the ecological screening levels of 0.423 mg/kg, 0.195 mg/kg, and 35.8 mg/kg, respectively.

Ground water. Contamination concentrations in ground water were compared to U.S. EPA MCLs for drinking water. Arsenic, benzene, toluene, ethylbenzene, xylenes, methylene chloride, 1,2,4-trimethylbenzene, and PCE exceeded their respective MCLs. The maximum concentration of toluene in ground water at the site exceeds more than 10 percent of its solubility constant, which is an indicator of the presence of free phase product.

5.0 DISCUSSION

5.1. MIGRATION AND EXPOSURE PATHWAYS

Soil Pathways. Currently approximately eight acres of the site are covered by concrete slabs (building foundations) thus limiting potential exposures to any contaminated soil beneath these areas. The burn pit and buried demolition debris pose a potential exposure pathway to humans as well as terrestrial and aquatic ecological receptors.

With the exception of arsenic, direct contact with surface contaminated soil, appears to be somewhat limited in its horizontal extent based on the review of available data although there are some identified data gaps. Shallow soils are contaminated with arsenic above the suggested site specific average background concentration.

Potential exposed populations would include trespassers, construction/excavation workers and future workers.

Ground Water Pathways. Reportedly, attempts by Pechiney to remediate the solvent-contaminated ground water at the site have been unsuccessful. Pechiney has reportedly spent approximately \$1.5 million at the site to demolish buildings and to perform site assessment and interim remedial activities. Other ground water cleanup options have been estimated to cost about \$1 million.

There are many production wells within one mile of the site according to well logs maintained by ODNR, Division of Water. There are several public drinking water systems in the vicinity of the site including seven community (city of Mount Vernon, Westgate Mobile Home Com., Herris Mobile Home Park (MHP), ODMRDD- T. Vernon Dev, Ctr., Colonial Terrace MHP, Grandview MHP-"A" and "B"), 12 non-community/transient and six non-community-transient ground water systems within approximately one to four miles of the site. See Appendix A, Public Ground Water Systems Data. These wells are sources for industrial and private potable water, as well as for public water supplies.

In general, the former deep industrial wells at the Ludlow Packaging site (which have been sealed) and the water supply wells used by the city of Mount Vernon were screened in the same sand and gravel aquifer. Two regional cross sections of the buried valley aquifer and the cross section location map for the Mount Vernon area along with a generalized cross section showing the Mount Vernon public water supply wellfield are provided in Appendix A (Camp Dresser & McKee, January 1997).

The site is located within Mount Vernon's source water assessment protection (SWAP) area extending more than four miles to the northwest. See Figure 4 Public Ground Water Systems - map for the location of these water supply systems and Appendix A Public Ground Water System Data for additional information. The goal of Ohio EPA's SWAP program is to protect Ohio's water supply sources for public drinking water from contamination (Burgess & Niple, Inc., August 2007).

The site is also located within the Inner Management Zone (one-year time of travel). See the Drinking Water Source Protection Areas map in Appendix A for the approximate location of the two public water system wells, Well 4 and Well 8, and the Inner Management Zone.

The Mount Vernon public water system currently operates two collector wells (Raney wells), Well 4 and Well 8, for its public drinking water supply. Well 4 is located about 1000 feet west of the Kokosing River and about 1500 feet north of the water treatment plant on State Route 229. Well 8 is located about 1400 feet east of Well 4, about 200 feet east of the Kokosing River and about 1500 feet southwest of the Ludlow Packaging site. Additional information on these wells is contained on Figure 3 and in Appendix A.

Monthly data for 2008 indicate that the average production for the Mount Vernon water treatment plant was between 2.4 and 2.9 million gallons per day. Each of the two Ranney wells has three turbine pumps that pump at set rates of 2000, 1500, and 1000 gallons per minute. The wells are pumped in combination to meet water demand but each one has the pumping capacity to meet the current demand if the other well is out of service. Mount Vernon currently serves a population of 17,674 and sells water to the village of Gambier with a population of 2,015.

Mount Vernon's first public water supply was installed in 1882 with two large diameter wells (20 feet and seven feet) both to a depth of 21 feet (Stout et. al, 1943). Over the years, additional wells of smaller diameter and deeper depth have replaced earlier public water supply wells. For example, in 1931, the public water supply was obtained from 16 4-inch to 8-inch diameter wells averaging about 80 feet in depth.

The Mount Vernon public water supply wellfield was investigated by Ohio EPA, DERR in 1991 (April 11, 1991). Well #7 was located approximately 800 feet to the southwest of the Ludlow Packaging site and was completed to a depth of 98 feet in a highly permeable sand and gravel aquifer. In 1991, the wellfield was composed of Well #7 pumping at 1.0 million mgd, a Ranney well, Well #8, (87 feet deep) pumping 4 mgd, Well #6 (103 feet deep) pumping 1.6 mgd, and Well #3 pumping 0.8 mgd.

Based on the available information, contamination released from the site is likely to migrate horizontally through the upper saturated zone then flow toward the Kokosing River and/or vertically into the deeper drinking water aquifer through improperly constructed wells or deteriorating wells at the site before they were abandoned. If the confining clay layer is absent in the vicinity of Mount Vernon public water supply wellfield, ground water contamination could migrate vertically and potentially impact their public water supply. Therefore, there remains a potential for contaminated ground water to migrate. The extent of ground water contamination has not been adequately defined. In addition, site ground water contamination appears to be limited in its horizontal extent based on the review of available data although there are identified data gaps.

Surface Water Pathways. The Kokosing River is a designated State Scenic River along the west border of the site and is adjacent to the on-site disposal area (ODNR, Natural Heritage Program, Letter dated May 30, 2007). The river is used for recreational purposes such as canoeing and fishing.

Contamination concentrations in sediment exceed the U.S. EPA Region 5, RCRA Ecological Screening Levels for sediment (August 22, 2003) for fluoranthene, pyrene and lead.

Shallow ground water flow to the southwest can carry contamination to the Kokosing River. Free product (toluene) in the ground water could enter the river. Any onsite contamination could adversely affect the surface water quality and channel sediment of the Kokosing River during flood events due to its proximity to the site (500 feet). Erosion of the constructed levee (fill, solid waste, etc.) along the Kokosing River is a potential migration pathway to sediments and could expose environmental receptors.

Air Pathways. The indoor air pathway is currently incomplete as the facility buildings have been demolished. Maximum concentrations of VOCs in shallow ground water at the site exceeding the target indoor screening levels include benzene, toluene, ethylbenzene, methylene chloride and PCE (U.S. EPA, November 2002). There remains a potential for adverse impact through the air pathway during excavation/construction activities through the future air pathways if contaminated media remains at the site.

Ecological targets. The Kokosing River is a designated State Scenic River. The river in the vicinity of the site is categorized as warm water habitat. Leachate and contaminated ground water entering the river from the disposal area could locally affect the biota especially during times of low river flow. The Kokosing River is currently under a Waterbody Specific Advisory, issued by Ohio EPA, DSW, from Knox County Road 13 (Green Valley Road in Mount Vernon) to its mouth (Walhonding River). This includes the section of the river that borders the site. The advisory includes the limitation of consumption of one rock bass per month 8 inches and over and one smallmouth bass per month 15 inches and over. The specific contaminant of concern is mercury.

Identified in the Natural Heritage database are 14 State Endangered, three State Threatened and two Federally Endangered species located within approximately three to 14.5 miles from the site center. See Figure 6 Natural Heritage Data Map for the identified locations and Appendix E Natural Heritage Data for additional information. There are no state nature preserves at the site (ODNR, Natural Heritage Program, Letter dated May 30, 2007). In addition, ODNR is unaware of any geologic features, animal assemblages or state parks, forests or wildlife areas in vicinity of the site.

The site lies within the range of the Indiana bat (*Myotis sodalist*), a federally-listed endangered species according to the U.S. Department of the Interior, Fish and Wildlife Service (U.S. DOI, FWS, May 29, 2007). There are no federal wilderness refuges, or designated Critical Habitat within the vicinity of the site. In order to avoid direct impacts to any occasional or transitory Indiana bats the U.S. Department of the Interior, Fish and Wildlife Service, has recommended that if any trees exhibiting characteristics of Indiana bat roosts (live or standing dead trees with exfoliating bark, cavities, split tree trunk and/or branches) must be cut, that they only be cut between September 15 and April 15, when bats would not be present.

The potential threat to the Kokosing River is primarily to benthic organisms adjacent to the site or in pools downstream of the former outfall for manufacturing facility surface and chill waters as well as already impacted sediments.

6.0. CONCLUSIONS

According to information provided to Ohio EPA, site soils are contaminated with arsenic, lead, toluene, xylenes, benzo(a)pyrene, phenanthrene, benzo(a)anthracene, and benzo(b)fluoranthene above the U.S. EPA Region 9 PRGs for residential land use. Ground water beneath the site is contaminated with arsenic, benzene, toluene, ethylbenzene, xylenes, methylene chloride, 1, 2, 4-trimethylbenzene, and PCE above the U.S. EPA MCLs for drinking water. The maximum concentration of toluene in ground water at the site indicates the presence of free phase product. Downstream sediments are impacted by fluoranthene, pyrene and lead above the U.S. EPA Region 5 RCRA ecological screening levels for sediments.

Based on the site assessment guidance, the site meets the threshold criteria for state and federal action (See Appendix F Site Assessment Worksheet):

- Ohio EPA has authority under state law and U.S. EPA has authority under federal law (CERCLA).
- Ohio EPA has documented a release(s) of hazardous substances to soil and ground water at the site and a potential release to sediment in the Kokosing River.
- Comparison of contaminant concentrations to screening level concentrations indicates that there exists a potential threat/harm to human health and the environment.
- Potentially responsible parties (PRPs) include Pechiney and its parent company, Rio Tinto Alcan.

Although the site meets the threshold criteria, balancing criteria affects the decision to pursue state actions. The balancing criteria considered with explanations are listed below:

- Local and state government priorities exist for continued redevelopment of the site as commercial properties. The city of Mount Vernon annexed the property to facilitate redevelopment of this brownfield property for a green energy project and applied for state COAF assistance to perform additional Phase II property assessment activities.
- Currently, there is a potential threat to human health if the ground water pathway from the site to the drinking water aquifer and public water supply wells is completed. There are also potential risks to future on-property construction workers and residents exposed to contaminated soil and ground water through direct contact, ingestion and inhalation pathways at the site.

- The potential threat to the Kokosing River is primarily to benthic organisms adjacent to the site or in pools downstream of the former outfall for manufacturing facility surface and chill waters. The threat to human health via direct contact with sediment or by ingestion of aquatic life from releases at the site will be assessed in a comprehensive study of the Kokosing River in this area that is currently being prepared by Ohio EPA, DSW.

Data gaps include the delineation of the vertical and horizontal extent of shallow ground water contamination and evaluation of the hydrogeologic characteristics of the layer separating the shallow zone and deep drinking water aquifer. The presence of building foundations may inhibit the determination of the horizontal extent of ground water contamination in some areas of the site.

Verification of post interim remedial actions for contaminated soil excavation and off-site disposal from an area approximately 30 feet by 10 feet to a depth of two feet adjacent to the Old Ink House, Identified Area B, is necessary to demonstrate completion of these actions as proposed in 2000.

Based on the review of historic site information, additional areas of potential concern may include the former resin silos in the southwestern area of the property and the proposed resin silos south of the former boiler room, as identified on Figure 2 Site Map in Appendix B (Lawhon & Associates, Inc. May 31, 2005) and the concrete equipment support pad at the east end of former Building J Sheet 1 Chemical Oxidation – Pre-remediation Site Data also in Appendix B (RMT, October 3, 2000). There may also be additional potential chemicals of concern for some of the identified areas.

7.0. REFERENCE PAGE/ATTACHMENTS

7.1 REFERENCE PAGE

Burgess & Niple, Inc., August 2007, VAP Phase I Property Assessment.

Camp Dresser & McKee, January 1997, Draft Wellhead Protection Plan, Figure Nos. 2-3 Cross-Section Location Map, 2-4 Section A-A' and 2-7 Section D-D'.

Dave Ellison, Division of Environmental Health and Safety, Pechiney Plastics Packaging, Inc., November 17, 2008, Telephone Memorandum.

Lawhon & Associates, Inc., June 27, 2005, Phase II Site Investigation.

Ohio EPA, DERR, April 11, 1991, Public Water Supply Project, the Mount Vernon Water Supply.

Ohio EPA, Division of Public Water Supply, Various 1985 - 1991, Environmental Sample Submission Reports, Mount Vernon WTP and American National Can.

Pechiney Plastic Packaging, January 28, 2000, Revised Proposal for Soil Remediation Adjacent to Old Ink House.

RMT, Inc., March 14, 2003, Plant Decommissioning / Asbestos Abatement and Demolition, letter report.

RMT, Inc., October 3, 2000, Chemical Oxidation – PreRemediation Site Data, marked working copy.

RMT, Inc., January 25, 2000, Revised Proposal for Soil Remediation Adjacent to Old Ink House.

RMT, Inc., October 1999, Second Additional Phase II Environmental Site Assessment: Pechiney Plastic Products, Inc. Former American National Can Facility, final draft.

RMT, Inc., May 1999, Additional Phase II Environmental Site Assessment: American National Can Facility, final draft.

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U.S. EPA, November 10, 1998, OSWER, Retransmittal of the Latest Superfund Removal Action Levels, Numeric Removal Action Levels for Contaminated Drinking Water Sites – Tables Dated April 1997.

7.2 ATTACHMENTS

Figures

See Section 2.1 for a listing of figures.

Tables

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Table 2 Summary of Select Maximum Site Concentrations in Soil

Table 3 Summary of Select Maximum Site Concentrations in Ground Water

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Appendix A Public Ground Water Systems Data

Drinking Water Source Protection Areas – Map

Cross-Section Location Map, January 1988, Camp Dresser & McKee

Section A-A', January 1988, Camp Dresser & McKee

Section D-D', January 1988, Camp Dresser & McKee

Water Well Logs for Site and Mount Vernon Wellfield

Ambient Ground Water Data

Appendix B Exhibits

Site Location Map, July 1, 1988, USGS, Burgess and Niple, Inc.

1995 Wetland Inventory Map, Burgess and Niple, Inc.

Parcel Records Printout, May 22, 2007, Knox County GIS – Public Access System

Site Parcel Map, August 2007, Burgess and Niple, Inc.

Site Parcel Areal, Burgess and Niple, Inc.

Survey for Continental Can Company, Inc., 1979, Destefani-Vance and Associates, Inc.

Former PCB TSCA Areas Map with Legend Items 0-15

Capacitors and Transformer List

Storage Tanks and Area B-2, American National Can

1926 Sandborn Map, Burgess and Niple, Inc.

1949 Sandborn Map, Burgess and Niple, Inc.

Factory Mutual Map, 1940-60, Burgess and Niple, Inc.

Figure 1, Location Map, Production Wells

Figure 2.1 Location of Identified Areas, September 1998, RMT Inc.

Figure 1 Boring / Monitoring Well Location Map, August 1999, RMT Inc.

Working Copy Chemical Oxidation – Remediation Site Data, October 3, 2000, RMT Inc.

Figure 2 Site Map, May 31, 2005, Lawhon and Associates, Inc.

Figure 3 Groundwater Elevation Map, June 21, 2005, Lawhon and Associates, Inc.

Figure 1 Site Diagram with Geophysical Survey Areas, May 20, 2005, Grumman Exploration, Inc.

Site Map, August 2007, Burgess and Niple, Inc. (Locations of Soil Borings and Monitoring Wells)

Identified Areas, August 2007, Burgess and Niple, Inc. (IA 1-12)

Appendix C Census Data

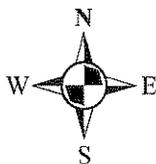
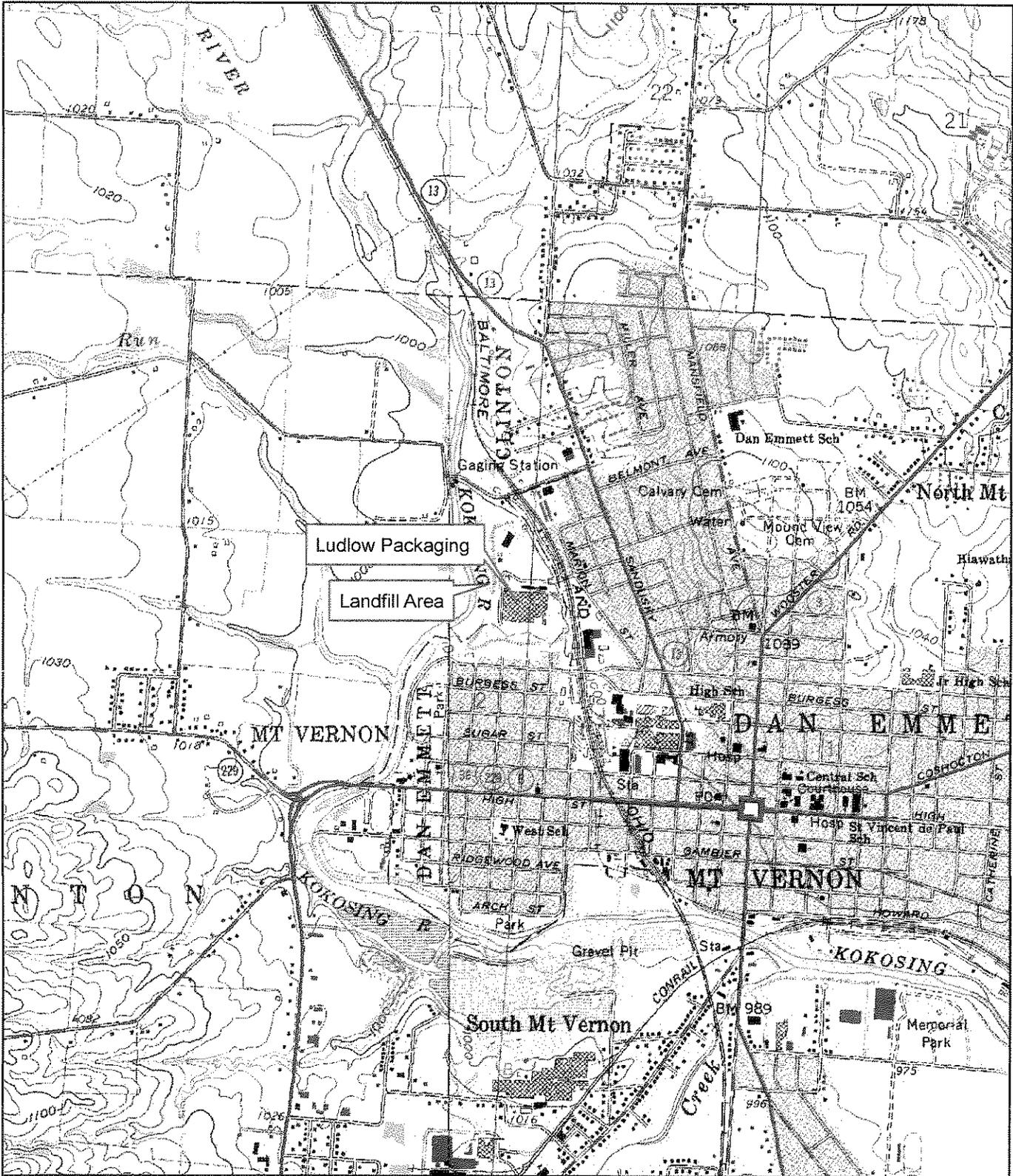
Appendix D Kokosing River Basin Sediment Data

Appendix E Natural Heritage Data

U.S. Department of the Interior, May 29, 2007 letter

Appendix F Site Assessment Worksheet

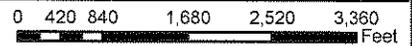
Figures



LUDLOW PACKAGING
 MOUNT VERNON, KNOX COUNTY, OHIO
 USGS QUADANGLE

FIGURE 1: SITE LOCATION MAP

Ohio Environmental Protection Agency

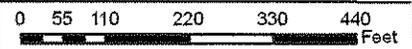


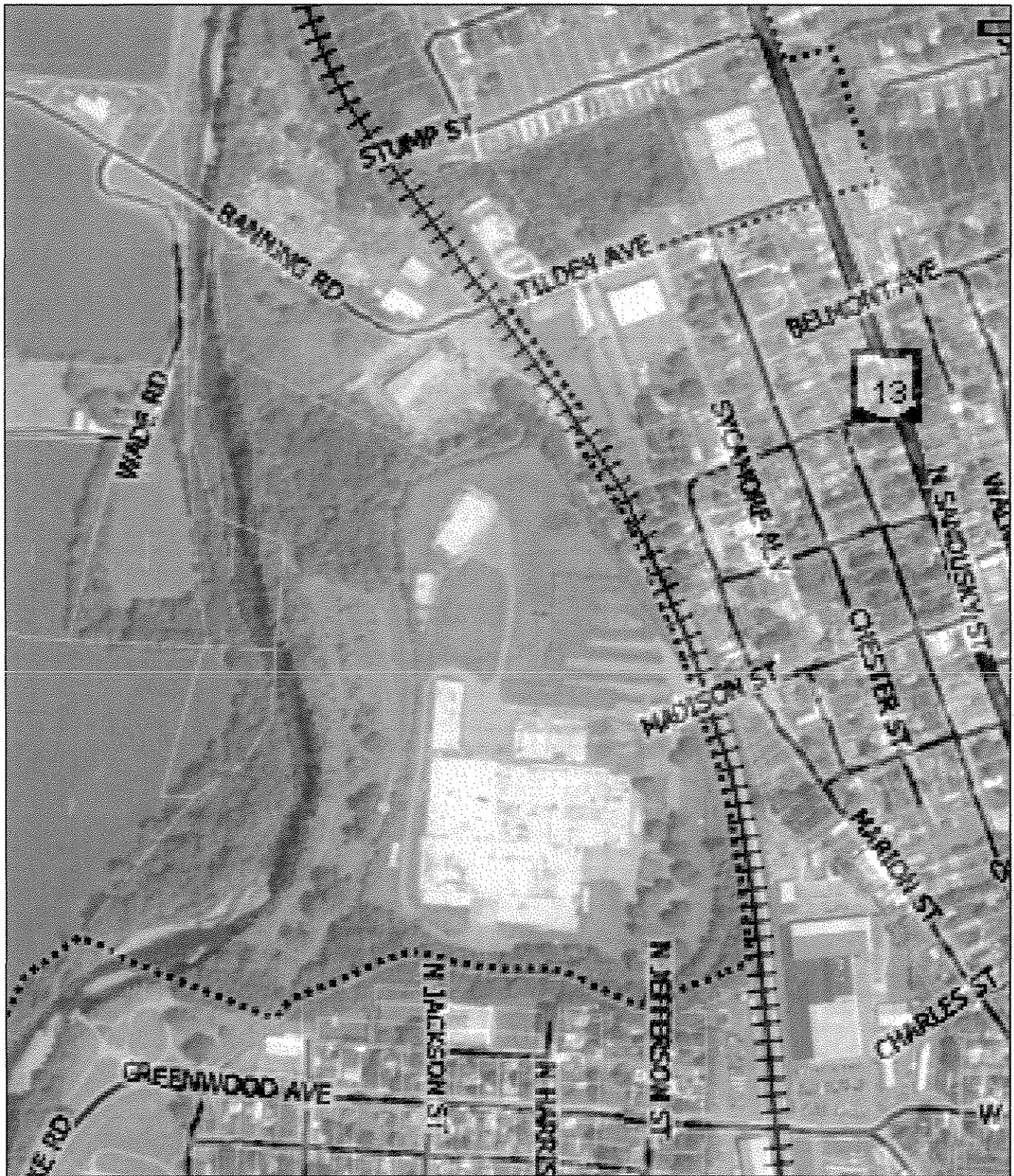


LUDLOW PACKAGING
MOUNT VERNON, KNOX COUNTY, OHIO
1970 AERIAL PHOTOGRAPH

FIGURE 2: SITE FEATURES MAP

Ohio Environmental Protection Agency

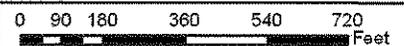




LUDLOW PACKAGING
 MOUNT VERNON, KNOX COUNTY, OHIO
 2005 AERIAL PHOTOGRAPH

FIGURE 3: PARCEL MAP

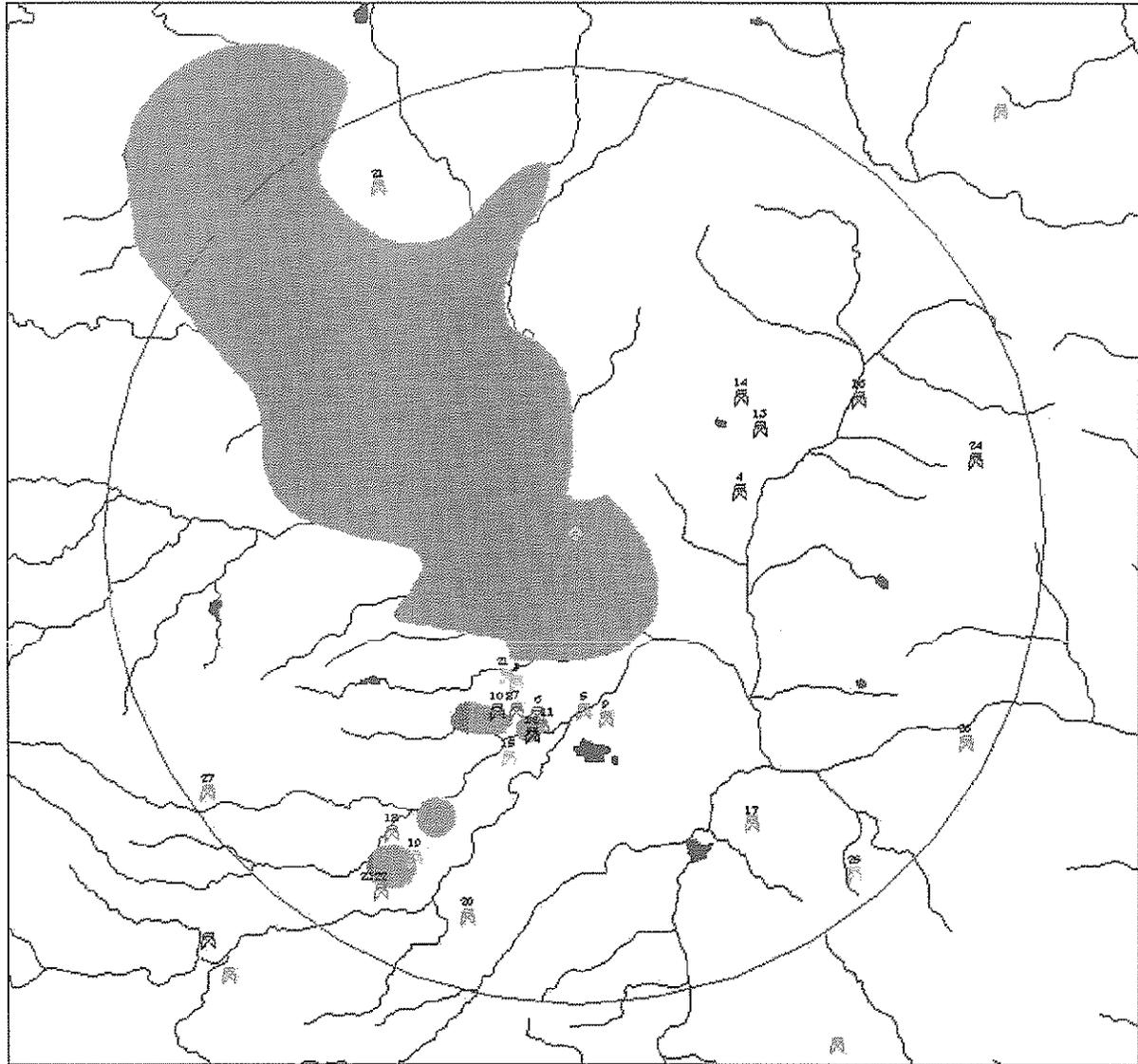
Ohio Environmental Protection Agency



OhioEPA

Division of Emergency & Remedial Response

GEOGRAPHIC INFORMATION SYSTEM 4-MILE RADIUS MAP PUBLIC GROUND WATER SYSTEMS Ludlow Packaging



- ★ Site
- Public Ground Water Systems
 - ⊗ Community
 - ⊗ Non-Community/Transient
 - ⊗ Non-Community/Non-Transient

- ▬ Rivers & Streams
- ▨ Wellhead Protection Area
- ▩ Lakes & Ponds
- ⊖ Limit of Radius From Site
- ▭ County Boundaries

1 0 1 Miles



LUDLOW PACKAGING
MOUNT VERNON, KNOX COUNTY, OHIO

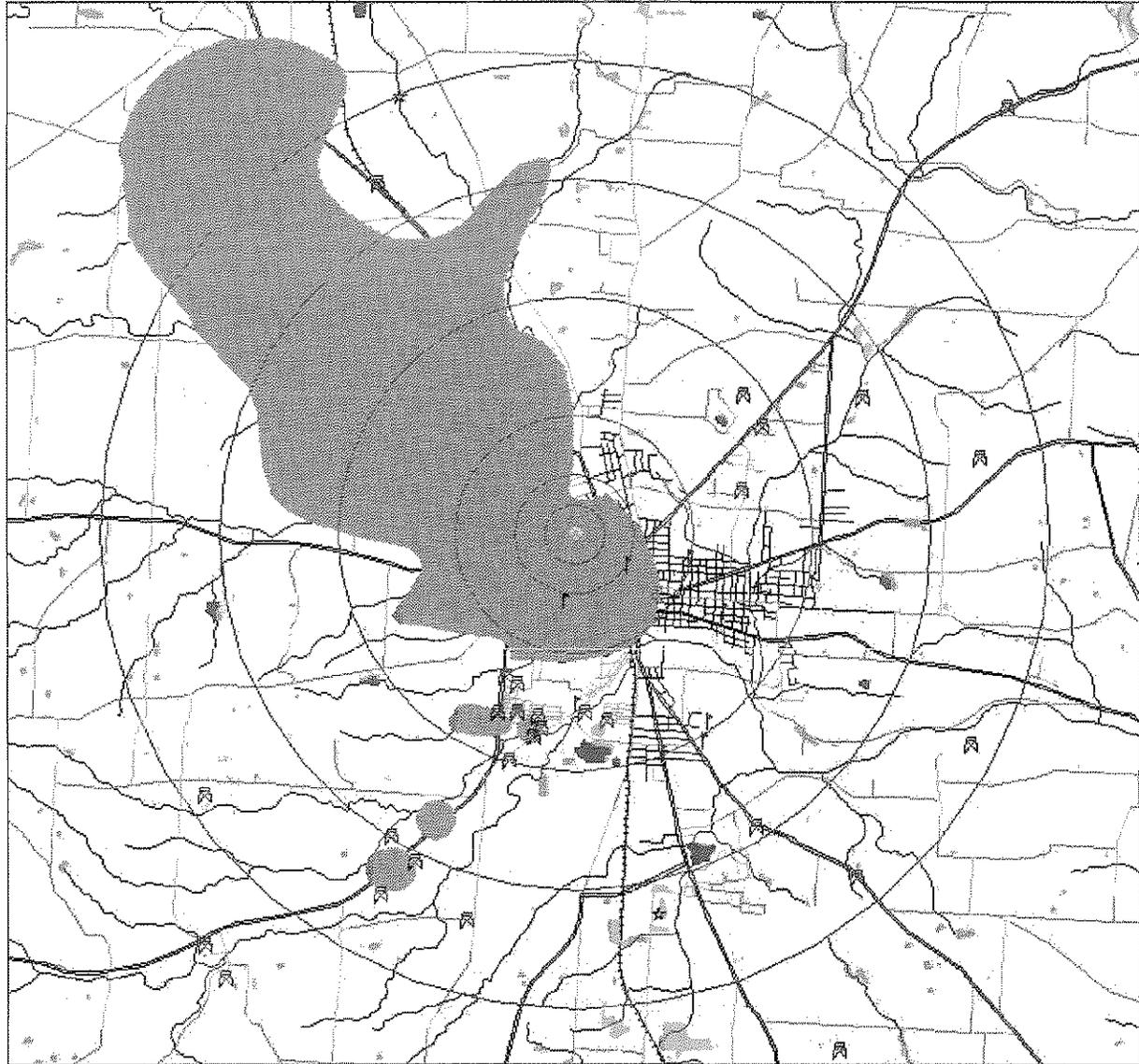
FIGURE 4: PUBLIC GROUND WATER SYSTEMS

Ohio Environmental Protection Agency

OhioEPA

Division of Emergency & Remedial Response
 GEOGRAPHIC INFORMATION SYSTEM 4-MILE RADIUS MAP

Knox County Ludlow Packaging



- ⊕ Site
- r School
- ⊕ Hospital
- ☒ Public Surface Water Systems
- ☒ Public Ground Water Systems
- ★ US Endangered/Threatened Species
- ★ Ohio Endangered/Threatened Species

- ▨ Wetland Area
- ▨ Lakes & Ponds
- ▨ Wellhead Protection Area
- Limit of Radius From Site
- ▭ County Boundaries

- ~ Rivers & Streams
- ≡ Railroad
- ≡ State and Federal Highways
- ≡ Local Roads
- ≡ Municipal Roads



LUDLOW PACKAGING
 MOUNT VERNON, KNOX COUNTY, OHIO

FIGURE 5: FOUR MILE RADIUS MAP

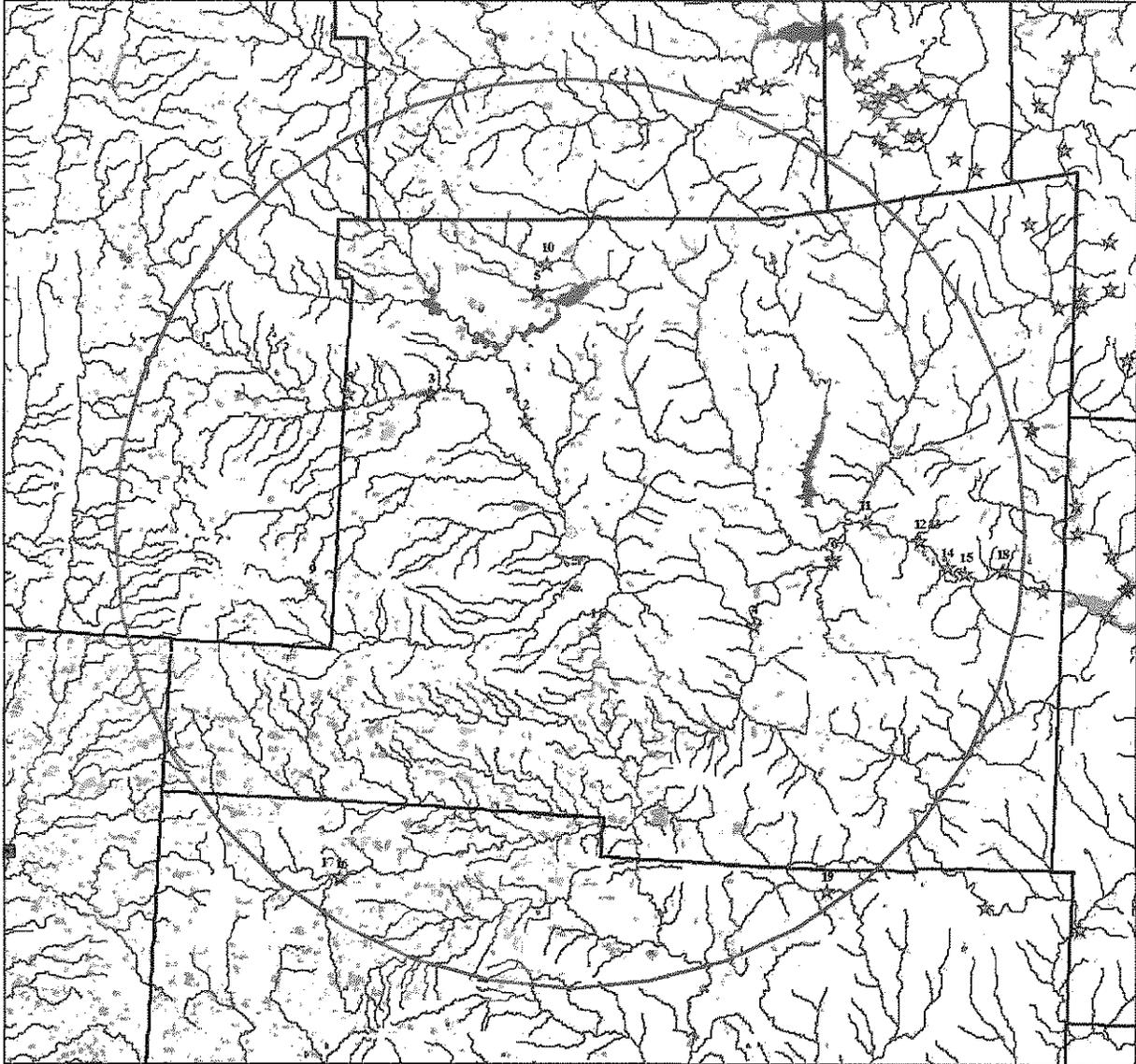
OhioEPA

Division of Emergency & Remedial Response

GEOGRAPHIC INFORMATION SYSTEM 15-MILE RADIUS MAP

NATURAL HERITAGE DATA

Ludlow Packaging



- ⊙ Site
- ★ US Endangered/Threatened Species
- ★ Ohio Endangered/Threatened Species
- Public Surface Water Systems
 - Community
 - Non-Community/Transient
 - Non-Community/Non-Transient

- ∩ Rivers & Streams
- ▨ Wetland Area
- ▩ Lakes & Ponds
- Limit of Radius From Site
- County Boundaries



LUDLOW PACKAGING
MOUNT VERNON, KNOX COUNTY, OHIO

FIGURE 6: NATURAL HERITAGE DATA MAP

Tables

Table 1 Identified Area and Chemicals of Concern

Identified Area	Chemicals of Concern
1 - Printing & Production Operations	TPH/VOCs/SVOCs/PCBs
2 - Plating Equipment & Maintenance Facility	TPH/VOCs/SVOCs/Metals
3 - Solvent Storage USTs	TPH/VOCs/SVOCs
4 - Fuel Oil UST	TPH/VOCs/SVOCs/Metals
5 - Transformer Cabinets	PCBs
6 - Ink and Solvent Storage (Ink House)	TPH/VOCs/SVOCs
7 - Solvent Storage ASTs	TPH/VOCs/SVOCs
8 - Washroom/Solvent Still	TPH/VOCs/SVOCs/Metals
9 - Hazardous Waste Storage ASTs	TPH/VOCs/SVOCs/Metals
10 - Fill & Former Burn Location - West (Landfill/Embankment)	TPH/VOCs/SVOCs/Metals
11 - Adjacent Northeast - Meckling Oil, Allied Waste, Knox Chemical (Historical)	TPH/VOCs/SVOCs/Metals
12 - Conrail/CSX Rail Sidings	TPH/VOCs/Metals
Ground Water (property-wide)	VOCs/PNAs/Metals/PCBs

Table 2 Summary of Select Maximum Site Concentrations in Soil

Constituent	Max. Concentration	Human Health PRGs	Remarks
Arsenic	69.8 mg/kg	5.7 mg/kg	8.51 mg/kg calculated average (background); Shallow soil impacts (0-2 feet) site wide
Chromium	12 mg/kg	210 mg/kg	
Lead	1,100 mg/kg	40 mg/kg	Area of former BUSTR UST
Acetone	0.14 mg/kg	6,100 mg/kg	
Toluene	1,500 mg/kg	500 mg/kg	Former Solvent UST Area
Ethylbenzene	0.0197 mg/kg	5.7 mg/kg	
Xylenes (mixture)	0.1252 mg/kg	60 mg/kg	
Methylene chloride (Dichloromethane)	0.028 mg/kg	9.1 mg/kg	
Trichloroethene	0.010 mg/kg	2.8 mg/kg	
1,2,4-trimethylbenzene	0.00855 mg/kg	6.7 mg/kg	
Tetrachloroethane	0.00804 mg/kg	0.41 to 3.2 mg/kg	
Tetrachloroethene (PCE)	0.029 mg/kg	0.48 mg/kg	
Benzo(a)Pyrene	9.3 mg/kg	0.015 mg/kg	Former Burning Area
Bis(2-ethylhexylphthalate) (Di(2-ethylhexyl)phthalate)	25 mg/kg	35 mg/kg	
Butyl benzl phthalate	9.3 mg/kg	1,200 mg/kg	
di-n-butyl phthalate (dibutyl phthalate)	2.1 mg/kg	610 mg/kg	
Phenanthrene (see pyrene, chrysene, or benzo(a)anthracene)	0.4 mg/kg	NA	Former Burning Area
fluoranthene	0.53 mg/kg	230 mg/kg	
pyrene	0.45 mg/kg	170 mg/kg	
Benz(a)anthracene	0.43 mg/kg	0.15 mg/kg	Former Burning Area
Chrysene	0.052 mg/kg	15 mg/kg	
Benzo(b)fluoranthene	0.58 mg/kg	0.15 mg/kg	Former Burning Area

Table 2 Summary of Select Maximum Site Concentrations in Soil - Continued

Key: Remedial Response Screening Levels = Residential soil screening level (SSL) with screening levels of generally 1/10th value for non-carcinogenic constituents.

Sources:

Chemicals of concern from Burgess & Niple, Inc., August 2007; Lawhon & Associates, Inc., June 27, 2005; RMT, Inc., October 1999; and RMT, Inc., October 3, 2000 *Chemical Oxidation – PreRemediation Site Data*.

Screening levels for human health are from U.S. EPA *Master Screening Level Table* dated September 12, 2008, *Residential Region 9 PRG table*. The non-carcinogenic PRGs are adjusted by 0.1. Carcinogenic PRGs are used as is.

Table 3 Summary of Select Maximum Site Concentrations in Ground Water

Constituent	Max. Concentration	Human Health PRGs	Remarks
Arsenic	0.025 mg/l	0.000045 mg/l	Former Burning Area
Benzene	0.057 mg/l	0.00041 mg/l	80'x175' area in northwest portion of property Former Solvent UST Area Old Ink House Area Former Solvent UST Area and Boiler Room Area
Toluene	158 mg/l	0.23 mg/l	
Ethylbenzene	4.3 mg/l	0.0015 mg/l	
Xylenes (total)	23 mg/l	0.62 mg/l	
Methylene Chloride (Dichloromethane)	0.72 mg/l	0.0043 mg/l	Former Solvent UST Area
Cis-1,2-dichloroethene	0.00131 mg/l	0.037 mg/l	Former Burning Area
1,2,4-trimethylbenzene	0.38 mg/l	0.0015 mg/l	Old Ink House Area
Tetrachloroethene (PCE)	0.004 mg/l	0.00011 mg/l	Former Solvent UST Area

Table 3 Summary of Select Maximum Site Concentrations in Ground Water - Continued

Key: Remedial Response Screening Levels = MCL or Tapwater with screening levels of generally 1/10th value for non-carcinogenic constituents.

Sources:

Chemicals of concern from Burgess & Niple, Inc., August 2007; Lawhon & Associates, Inc., June 27, 2005; RMT, Inc., October 1999; and RMT, Inc., October 3, 2000 *Chemical Oxidation – PreRemediation Site Data*.

Screening levels for human health are from U.S. EPA *Master Screening Level Table* dated September 12, 2008, *Residential Region 9 PRG table*. The non-carcinogenic PRGs are adjusted by 0.1. Carcinogenic PRGs are used as is.

Appendices